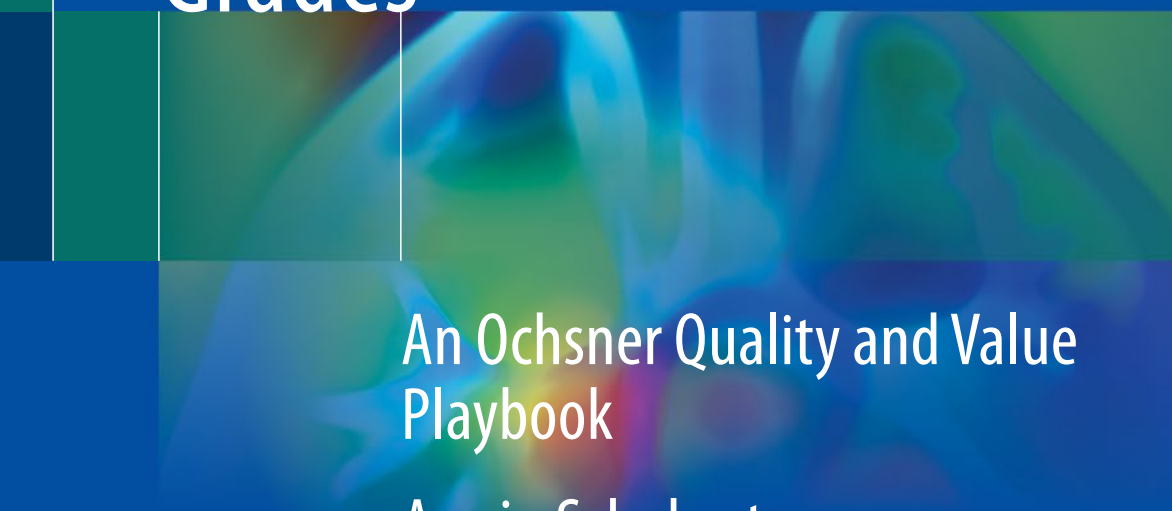
Optimizing Widely Reported Hospital Quality and Safety Grades



An Ochsner Quality and Value Playbook

Armin Schubert
Sandra A. Kemmerly
Editors

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To my wife Karen Curtis-Schubert for her encouragement and patience.

Foreword

Hospitals and health systems increasingly confront the ever growing need to create healthcare value by ensuring population health, reducing complications of care, improving survival and patient experience while also improving access to cutting-edge care and technologies. This is different from merely increasing the number of healthcare encounters such as visits and procedures. It is a global strategy shift commonly referred to healthcare's transition from volume to value.

Drs. Kemmerly and Schubert tackle an interesting aspect of this quest. Their premise is that deep knowledge of widely used metrics, accurate representation of a patient's health status, and the science of performance improvement are necessary to accomplish meaningful and durable quality improvement for hospitals. They and their authors describe how analysis of such metrics can serve as a catalyst for improvement. They draw heavily on their and their teams' decade-long experience of continual improvement at a comprehensive academic medical center that is part of an integrated health system.

It is evident that their teams have wrought substantive improvements in quality and value to the health system, such as achieving higher hospital safety grades, avoiding payer penalties, and performing well in quality-gated contractual arrangements with payors. The book presents a balanced approach to improvement that focuses as much on accuracy of documentation and representation of illness severity as it does on clinical performance improvement using the Institute for Healthcare Improvement's methodology. Only half of the book's chapters describe their approach to publicly and widely used hospital quality and safety metrics; the others concern themselves largely with the experience of teams analyzing and using the data for improvement. One unique aspect of this work is the detailed description of a collaborative concurrent multidisciplinary review process that assures reporting accuracy for diagnostic profiles, represented by coding terms.

The editors have taken a novel approach assembling a manual that presents practical and well-organized advice for optimizing performance as judged by widely, and often publicly, reported quality and safety metrics. Materials relating to optimization of such metrics are not commonly available. While this knowledge is variably resident within organizations' quality departments, it may often be closely guarded and is not routinely shared. The editors and authors break new ground by freely sharing their experiences in optimizing both reporting accuracy and care outcomes improvement. Our teams believe that sharing such information should result

in an overall benefit to the population of patients at large. At the same time, we look to supporting and inspiring healthcare improvement teams with the description of powerful tools, innovative collaborations, and resultant successful outcomes.

This work is remarkable in the manner it demonstrates the extent of collaboration and inclusivity within an organization. Contributors include a wide spectrum of disciplines, including medical specialists, clinical documentation professionals, coders, infection preventionists, performance improvement coordinators, as well as finance, hospital administrators, and medical staff leaders. In all, over 80 authors contributed to this effort. Despite this diversity of perspectives, the editors successfully weaved the topics into a well-presented practical manual organized logically into five sections dealing with general concepts, externally reported complication metrics, mortality, specialty populations, and team engagement.

The editors have achieved balance in another domain. Despite the fact that many of their authors work in a comprehensive academic medical center, they have included the perspective of community hospitals, with authors from various locations within Ochsner Health. At the same time, they emphasize the challenges for improvement in large academic medical centers by highlighting quality considerations for special populations such as surgical, transplant, cancer, neuroscience, pediatric, employer groups, and bundled care. They also engagingly bring the perspective of graduate and postgraduate medical education leaders who explain the potential contributions to quality improvement that residents, fellows, and medical students can make.

While not a comprehensive reference text on healthcare quality improvement, Kemmerly and Schubert's work presents sufficient detail that approximates the end-to-end workflows of performance improvement departments in hospitals and health systems. The detailed chapters addressing each quality metric, including each AHRQ Patient Safety Indicator, hospital-acquired infections, and other complications, and a separate section on mortality would appear of great interest and utility to members and leaders of clinical communities, performance improvement departments, and documentation/coding groups. Particularly engaging features of the book are the generous number of case examples as well as "clinical pearls," key concept inserts, tables, and illustrations.

Medical leaders readily agree that clinical quality and performance improvement is a "team sport." A critical success factor is the ability of organizations to inspire and engage their medical staff in these collaborative efforts. The book emphasizes how a focus on data accuracy can serve to engage providers; the editors devote an entire section that relates to how we engage and partner with medical staff, house staff, and nursing colleagues.

I'd like to thank our many teams and professionals who made it possible to assemble exceptional compendium of knowledge during a time of great challenge for all of healthcare. We are proud to be able to share the Ochsner Quality and Value Playbook in the hope that it will inform and inspire other physician groups and healthcare organizations on the journey to improving the quality of care and safety for all patients.

New Orleans, LA, USA

Robert I. Hart, MD, FACP, FAAP
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Acknowledgments

The editors would like to thank Ochsner team members Donnika Hess and Anita Lacy for assisting with the manuscript, Barbara Siede for helping to prepare the illustrations, and Kathleen McFadden for editorial review. We greatly appreciate the collective support of our organization and all of our authors, with special thanks to our executive leadership, the Academics Division, the Center for Quality, as well as the hospital Performance Improvement, Clinical Documentation Improvement, Infection Control, Coding, and Finance Departments. We owe a great debt of gratitude to our patients whose trust and dedication made it possible to describe the improvement activities in this book.

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Part I

General Concepts

Why Quality Pays

1

A. Schubert and S. Wells

The other health system executives were most attentive when their chief quality officer colleague started to speak at their planning session for the new year's leadership kickoff. "When it comes to payment, in the end it'll be all for quality," she said. "Finance will be a division of quality – what if that were true?" Reflecting further, she asked some provocative questions: "What would this mean for our care team members, our support teams, and for how we allocate resources?" Well, what if indeed this were the case? Operations, finance, marketing, innovations, and business development divisions would refocus on how to wrest out the highest quality performance with regard to mortality, complications, readmissions, patient experience, return to work, quality of life, and functional capacity. Hospital executives would need to be able to value accurately how much quality is worth and how payments are affected by quality performance.

While this conversation did not occur quite in this way at our organization, it aligns well with Ochsner values of putting patients first and striving for excellence through continual improvement. Achieving the greatest accuracy in reporting quality outcomes through clinical documentation improvement and concurrent review programs can then be understood as essential to the integrity of our reputation and ability to have the resources to continue our care mission.

Is payment for quality and value a fleeting trend? Industry experts agree that payers will continue to seek a higher tangible value from providers and their organizations as it is anticipated that more payers will pay for value over volume. CMS

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executives have promised that more than 60% of Medicare payments will be based on quality metrics. Health systems today are consolidating and creating new models of care. With these changes come the need for understanding the value of quality and the tools that influence quality performance.

As health-care organizations are weaned from the pay-for-volume addiction, they focus more on improving value to the patient. They standardize care, build positive patient experiences and loyalty, avoid complications, and improve outcomes that truly matter to their customers, their patients, and their families.

We don't have to look far to envision how such a view of health care would present. In fact, we merely need to be more aware of what already exists. A midsize health system in the South recently received annual value-based payments that exceeded 50% of its net operating income.

How does this happen? Provider organizations have a multitude of instruments to ensure accurate payment for quality. They include commercial contracts that reward via monetary incentives or let providers earn back a withhold from fee-for-service payments. The Medicare Shared Savings Program (MSSP) allows for a sharing in cost reduction based on quality gates [1]. The Medicare Value-Based Purchasing (VBP) Program allows organizations performing in the top quartile to earn back even more than the withheld amounts, based on performance in mortality, complications, readmission, and patient experience metrics.

One of the quality gates relating to the MSSP is readmission rate. Upside risk-sharing payments at risk under this program are conditioned on success in readmission prevention. In addition, readmissions represent a potentially avoidable cost to facilities. For example, our teams estimate that a readmission may represent an opportunity cost as high as $10,000. The Centers for Medicare & Medicaid Services (CMS) Hospital-Acquired Condition Reduction Program (HACRP) and the CMS Hospital Readmissions Reduction Program (HRRP) can impact up to 4% of a hospital's Medicare revenue [2–4].

Accurate and complete documentation of care quality is vital to patient safety and to ensure that patients receive the best care. But what exact metrics do these quality payment programs use to measure these outcomes? And how can health-care organizations ensure they are reporting the data used to measure the outcomes accurately? Outcomes are generally measured with publicly reported and available health quality data that are derived almost exclusively from the medical record and billing data. An organization's publicly reported quality metrics can have a substantial impact on its reputation in the eyes of patients, families and referring providers. As seen in the example of the health system mentioned above, quality metrics can also robustly affect the bottom line.

1.1 What Hospital Metrics Are Prioritized for Improvement?

The majority of hospital quality metrics are derived from billing data containing the medical diagnosis codes and diagnosis-related groups. Provider organizations report these to payers for each patient. Other metrics are directly reported to federal agencies such as the Agency for Healthcare Research and Quality (AHRQ) and

include process metrics such as core measures, patient-reported metrics such as satisfaction with hospital or provider experience, and infection control data that result in publicly reported standardized infection rates for hospital-acquired conditions (HACs) such as *Clostridium difficile*, methicillin-resistant *Staphylococcus aureus*, catheter-associated urinary tract infection, and central line-associated bloodstream infection.

Billing data from a hospital's claims submitted to CMS and its intermediaries are used to report hospital patient safety indicators (PSIs) and HACs. AHRQ PSIs are used in the CMS VBP and HACRP payment adjustment programs. AHRQ PSIs are also components of proprietary safety and quality scores, such as those generated by Vizient, IBM Watson Health (formerly Truven), CareChex, and Leapfrog. The AHRQ web page has a detailed description of the AHRQ PSIs [5].

Claims also provide data inputs for federally reported 30-day mortality and 30-day readmission data. Readmission rates that are particularly closely scrutinized are for conditions subject to the federal HRRP, that is, acute myocardial infarction, chronic obstructive pulmonary disease, heart failure, pneumonia, coronary artery bypass graft surgery, and elective primary total hip arthroplasty and/or total knee arthroplasty. Federal and insurer data are risk-adjusted based on well-established risk-adjustment models that are frequently based on an annual aggregate health assessment via hierarchical condition codes (HCCs). HCCs are most often reported from ambulatory patient billing data.

Private rating organizations generally use publicly available federal data to generate their own quality metrics. Examples of this are ratios of observed to expected complications or deaths, which is a way to risk-adjust these metrics. The Vizient Risk-Adjusted Mortality Index, for example, is the ratio of observed to expected deaths during hospitalization. Expected rates of adverse events (such as mortality) are generated by proprietary risk adjustment models.

1.2 Detailed Knowledge of Methodology Can Pay Off for Hospitals

Large hospitals and health systems successfully cultivate their reputations as the best in the nation by tightly managing the accuracy of the data inputs for publicly reported quality measures. One need only to look at the organizations listed in the *U.S. News* Best Hospitals Honor Roll to understand that their continued recognition is a result of very high-quality clinical work. These organizations also place exquisite attention on ensuring the integrity of the data that leave the organization.

Our own organization embarked upon a journey that resulted in a remarkable performance in risk-adjusted complications. Specifically, our hospitals enjoyed virtually unparalleled performance in the IBM Watson Health Expected Complications Rate Index as shown in Fig. 1.1. By 2019, our organization had achieved a performance level characterized by the following statement from our chief medical officer: "Ochsner Medical Center and Ochsner Health are nationally a top performer in risk-adjusted complications. This translated in our patients experiencing 36% fewer complications than expected based on their medical complexity."

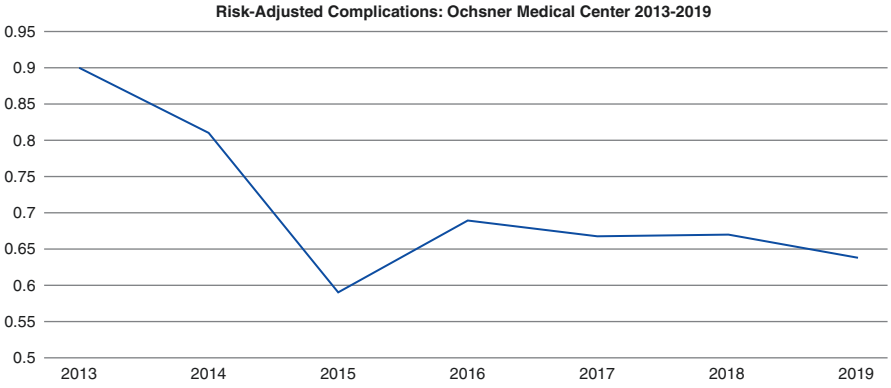

Fig. 1.1 Winning with concurrent review: long-term trend of risk-adjusted complications

How is this performance improvement accomplished? Besides being laser-focused on continuous care improvement, organizations that are successful in this arena employ a particular set of operating characteristics that allow them to achieve the most accurate representation of their patients' medical complexity and risk. In turn, accurate representation provides a more solid underpinning for identifying opportunities for clinical practice improvement. Operating characteristics that allow these objectives to be accomplished include concurrent administrative review, concurrent clinical review, administrative realignment of quality, clinical documentation, coding and finance activity, provider engagement and leadership, appropriate bill-hold processes, advanced use of predictive analytics and information technology, cognitive tools, point-of-care decision support, clinical validation, and management of education gaps.

Comprehensive knowledge of the definitions and inclusion and exclusion criteria for the most important publicly reported hospital quality measures is critical to devising a strategy for efficient and accurate documentation, review, and coding procedures. Quality leaders should be equally conversant with the past quality data, forecasts, and performance gaps for their hospital.

Appropriate processes for clinical coding profile review, provider engagement, and assistive information technology will be driven by such knowledge. Therefore, quality leaders should be conversant with the appropriate definitions and have access to the organization's metrics performance in as close to real time as possible. Accurate reporting of important care quality and patient safety metrics ultimately provides the soundest basis from which true quality and safety improvements can emerge.

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Organizing Structure for Quality Reporting and Improvement

2

R. Harmatz, A. Schubert, and R. Guthrie

Donabedian teaches that effective quality improvement depends on having an appropriate structure, focus on processes, and attention to outcomes [1]. While structure is foundational, it does not guarantee better outcomes [2]. We briefly review the structural elements that allow health systems to engage in successful performance improvement for patient safety and care quality. The process of building such a structure is illustrated by our own journey.

Key Concept
Components of a successful quality infrastructure for health-care organizations include leadership, performance improvement capability, goal setting to align with strategy, informatics analytic capability, communication, and training.

At Ochsner Health, the structure for quality improvement allowed us to accelerate previously well-meaning and often effective project work to improve care quality. It allowed us to identify high reliability as an overarching goal and operating principle. With a growing structure, we were able to tackle such concepts as trust in reporting, psychological safety, and just culture in the context of building a more robust safety culture. As structures for quality and patient safety are maturing, we

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are able to leverage our passion for accuracy in documentation and reporting to improve publicly and widely reported quality outcomes.

As accuracy improves, we are able to survey populations and cohorts of patients over time and geographical dimensions with increasingly sophisticated analytics and modeling. The latter is feasible through our capable medical informatics group. In the end, having access to more accurate data and analysis brought greater credibility and a more secure platform for directing our quality improvement teams so that care processes could be improved. We have found that such improvement is best informed and driven by accurate believable data, whether it occurs through innovation, process change, or variation reduction.

2.1 Leadership Structure

Quality improvement requires a solid clinical and operational leadership foundation to succeed. Our quality structure was enhanced greatly with the creation of the role of chief quality officer (CQO) for the health system whose dyad quality partners include the system's chief nursing officer (CNO) along with the vice president for quality who manages the resources needed to support a large health system. Together, these leaders formulated a convincing strategy for investing in performance improvement and goal setting to assure the best in patient care outcomes and patient safety. Through health system resources, they are able to influence direction and generate commitment. The latter is accomplished by supporting local teams, providing them with common tools, and setting mechanisms for continuous learning and accountability. These centrally managed resources are our accreditation, medical informatics, patient safety, public reporting, performance improvement, and infection prevention teams.

The success of this system quality structure is due in large part to the collaborative approach adopted. Leaders at the health system level bring expertise, resources, advice, and support to the local teams to help them achieve success. This is illustrated by the increasing level of regulatory preparedness afforded by health system accreditation resources supporting local facility teams. Joint Commission surveys had been a challenge for our hospital several accreditation cycles ago, but with support for continuous preparedness provided by administrative and physician resources (including an active Joint Commission physician surveyor), recent surveys have been successful without major citations and minimal follow-up. This has resulted in being able to continue team focus on more advanced improvement priorities.

Another critical component to success has been annual goal setting. Goals align everyone. System quality leadership has been successful in aligning everyone around a few goals (vs. many in the past) driven by areas we have been challenged in. This has greatly helped us focus effort. System leadership has also been flexible in adjusting goals, for example, in response to the COVID-19 pandemic. Quality goals account for 20% of the incentive payments for every leader at Ochsner and much more for quality leaders. Goal and incentive alignment driven by system quality leadership has been key to drive improvement activity and prioritize resources.

Key Concept
Goal setting is a key component of an effective quality structure for healthcare organizations. It helps focus effort and direct resources.

Each year, quality goals are set by the CQO at the system level and cascade to the local facilities. These goals and performance to goal are reported on a weekly and monthly basis. Performance improvement teams both at the health system and local levels are established to support goal achievement each year. A recent pivot in goal setting constituted the emphasis on "zero harm" goals expressed as a zero harm score. The emphasis on completely avoiding wrong-side/wrong-site surgery and retained foreign objects was introduced as a "line in the sand" initiative by the chief medical officer. CQO goal setting then followed to include such never events into the zero harm score goal that also includes hospital-acquired infections (HAI), hospital-acquired conditions (HAC), and patient safety components. A multiyear system-wide effort to adopt and deepen our commitment to the surgical safety checklist followed. With greater awareness of checklist process benefits and concurrent adoption, the comprehensive academic medical center at Ochsner was able to eliminate any occurrences of wrong-side/wrong-site procedures and retained foreign objects for a contiguous 2-year period. Another example of goals having driven focus is the investment in ultraviolet disinfection technology. Because we had strong goals to reduce or eliminate HASs, it was possible to command resources for this important technology that eventually helped reduce infections such as *C. difficile* substantially.

In each of the health system's service areas (mostly defined by hospitals and their surrounding clinics, family health centers, and ambulatory surgery centers), a similar quality leadership dyad structure exists. Within each area, a physician vice president of medical affairs (VPMA) oversees care quality and patient safety in their hospitals and clinics. The VPMA is partnered with their local nursing and quality leaders. These leaders were either chosen for their interest and prior training in quality improvement or they were committed to achieve such training quickly as they assumed their roles.

Ochsner Health CNOs and VPMAs are full members of their hospitals' executive teams. Therefore, they have the ability to influence decisions affecting quality and help set their groups' quality agendas. VPMAs work at the interface of hospital administration, physician service line leadership, and nursing leadership. Hospital medical directors and physician advisors' matrix report to them in these roles.

2.2 Process Improvement Structure

High reliability demands capability for robust process improvement. Service area and hospital quality improvement teams grew into the role of performance improvement coaches. This happened at different speeds depending on the facility. At the

health system's main academic medical referral center, performance improvement coordinators are embedded in each hospital floor or major department. They are process improvement trained, mostly through learning process and project management skills via Lean belt certifications, as well as being trained in the Institute for Healthcare Improvement Model for Improvement. Likewise, our embedded infection preventionists partner with nurses and providers to change processes and educate or simulate performance improvement while of course knowing and sharing each unit's infection control data. This performance improvement capability has become possible through a powerful alliance between our Performance Improvement units, the Ochsner Health Project Management Office, and the Ochsner Learning Institute; it is enabled by tight collaborations with our Epic information technology and operations teams.

2.3 Information Structure

Ochsner has a long history of innovating in information management. Our medical informatics group provides easily accessible platforms for data aggregation and display. An example are the large computer screens found on each floor of our main academic medical center that display up-to-date unit performance in patient safety. This promotes a superior level of transparency, while promoting the ability to use publicly reported data to focus limited process improvement resources for optimal quality improvement. More recently, a group focused on public reporting was created. Specialists validate the accuracy of diagnostic and demographic data before it is submitted to federal and other rating agencies. The group regularly surveys trends in publicly and widely reportable data. We use such trend data to inform and support medical and surgical physician documentation champions. Combined with care improvements, this activity has resulted in a multiyear reduction of hospital-acquired conditions and patient safety indicators. Over time, the organization moved its Leapfrog Hospital Safety Grade from C's and B's to A ratings for almost all our hospitals.

2.4 Patient Safety Reporting

Incident reporting systems are key to early identification of important patient safety risks. Our safety group has worked to improve the reporting platform for ease of use and analysis. Work to improve feedback about safety reports is ongoing. Many clinical communities review their safety reports weekly or monthly. A daily escalating safety huddle starts at the unit level and is escalated through local leadership to the health system's executive team to create awareness and speed action around key patient safety needs. We have taken a systems approach to root-cause analyses and trained all local quality teams on the root-cause analysis and actions methodology [3]. Lessons learned are shared across the system to enhance safety.

2.5 Communication Structure

Building this structural element has been the most difficult. The objective is to communicate our commitment to patient safety, continuous improvement, and safety culture. We communicate that this is done by streamlining processes and investing in the tools our patient-facing personnel need. We aim to inform how reporting results in positive change for the safety of our patients. We share safety insights across the health system and regularly celebrate good catches and safety championship.

System quality leaders meet every month to discuss annual goal progress and share best practices as well as learnings and other important issues impacting quality and patient safety. This venue is a safe space for local quality teams to share, learn, and discuss. Equally important platforms for such communication are daily escalating safety huddles starting with teams of patient-facing personnel whereby important safety concerns reach the top leadership level the very same day. There are also weekly safety messages from CNO/VPMA dyads, monthly communications from the CQO, and meetings of quality partners. We gauge the effectiveness of such communication in part by the results of the annual benchmarked patient safety culture surveys.

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Data Review for False Negatives

3

R. Harmatz and A. Schubert

In the context of quality metrics derived from administrative data, false-negative events refer to real complications that occurred but were not identified through administrative data. False-negative events and rates are difficult to quantify because this potentially requires medical record review or another surveillance process for a large number of cases.

False-negative patient safety indicator (PSI) quality data are known to exist, although most studies focus on positive predictive value (PPV). In a chart review study of nearly 500 randomly selected patients, Quan et al. found PPVs to vary substantially among different PSIs, ranging between 12% and 90%, with wide confidence intervals [1]. For example, the PPVs for PSI-12 and PSI-15 were 89.5% and 86.4%, respectively. On the other hand, the PPVs for PSI-13 and PSI-5 were only 12.5% and 62.5%, respectively. Winters et al. similarly found a high PPV for PSI-15 but not for other PSIs [2]. Therefore, several Agency for Healthcare Research and Quality (AHRQ) PSIs with high PPVs may be reasonable tools to find true positive events. While PSIs may be used to screen cases and identify the need for chart review, their sensitivity (i.e., their ability to avoid false negatives) is largely unknown. Using PSIs exclusively for screening or equating their performance summarily with quality of care should be approached with caution. There are plenty of situations and case examples, including at the authors' organization, where underdocumentation and undercoding of relevant diagnoses could have generated falsely low PSI rates.

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Key Concept
Despite the ready availability of many publicly and widely reported quality indicators, hospitals must be aware of improvement opportunities not addressed by them. Safety reporting systems, daily safety huddles, and medical informatics solutions can identify such opportunities.

3.1 Methods to Identify False Negatives

Medical record review and incident reporting systems have been the traditional methods to identify complications or other patient safety events.

Facilitated Medical Record Review Because 100% record review is generally not feasible, proxy indicators are helpful to review for patients at higher risk for quality numerator events (QNE). Borzecki et al. used an interesting approach to identify the occurrence of postoperative wound dehiscence in patients who were not identified with PSI-14 [3]. Instead of studying the entire population, they focused on a smaller group of patients who were at very high risk of developing this complication and found a 32% false-negative rate. This example illustrates that such patients might be identified prospectively, allowing the additional deployment of resources and interventions for prevention. Another way to use administrative data to help identify the potential for false negatives is to review cases where exclusion diagnoses prevented the event to enter publicly or widely reported date repositories. For example, software that identifies PSIs or other complications could be used for this purpose. This is especially true if such systems could show why the event would be excluded from becoming a reported QNE. Cases where exclusion diagnoses existed could then be identified and subjected to further in-depth review.

Information Technology Attempts have been made to find surrogate markers electronically. Shmelev et al. identified a set of composite markers from secondary procedure and diagnostic codes in PSI-15-positive cases [4]. These markers identified 13% more accidental punctures or lacerations than did reports from coded PSI-15 cases. Using automated electronic record review software to evaluate text associated with radiology reports may be helpful for better surveillance of events such as deep vein thrombosis or pulmonary embolism. Compared to AHRQ PSI-12 rates, such software has higher specificity [5].

Safety Reporting Systems Review of data from safety incident or occurrence reporting systems can be helpful. Trends can be evaluated for near misses or actual events that were not severe enough to be documented or coded. Our organization, like many other health systems [6], uses a voluntary safety occurrence reporting system (RL Systems®; locally known as our Safety on Site or SOS system). We ask our team members to complete occurrence reports within 72 h after discovery of a qualifying event. Reportable occurrences are defined as any defect, error, medical accident, near miss/good catch, or significant procedure variance, or other risk to

safety that did or could result in patient, visitor, or employee injury, a hazardous condition or that represents a risk in the environment of care.

To intensify the impact of reported events and collect additional perhaps not yet formally reported information, organizations have implemented daily safety huddles [7]. Daily safety huddles have been found to affect team members' perceptions of safety culture positively [8]. The positive impact on safety culture derives from the organization's daily preoccupation with potential failures, one of the key characteristics of highly reliable organizations [9, 10]. Conducting such safety huddles demonstrates to everyone in the organization that safety reporting is taken seriously and results in more timely responses and resolution of ongoing safety risks.

We have found that our daily escalating huddle events (Fig. 3.1) rapidly connect key leaders with work occurring throughout the hospital. They focus leaders on helping the patient-facing teams do their best work. They help drive organization-wide culture change needed to improve safety, quality, and engagement. Teamwork, one of Ochsner Health's key organizational values, is facilitated. We believe that engaging health system executives in solving systems challenges improves the culture of mutual accountability.

To promote huddle effectiveness and psychological safety, we have developed guidelines meant to elicit free flow of information about perceived or actual safety issues (Fig. 3.2). To further promote the reporting of actual and potential safety events, we continually recognize team members for good catches with publicly

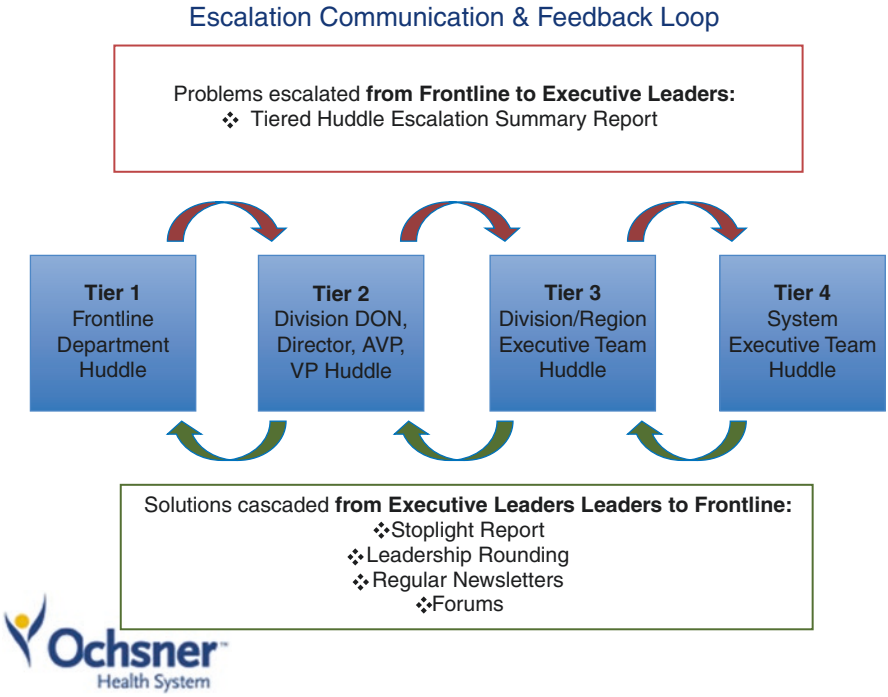

Fig. 3.1 Escalation process for daily safety huddles at Ochsner Health. DON director of nursing, AVP assistant vice president, VP vice president. (© Ochsner Health)

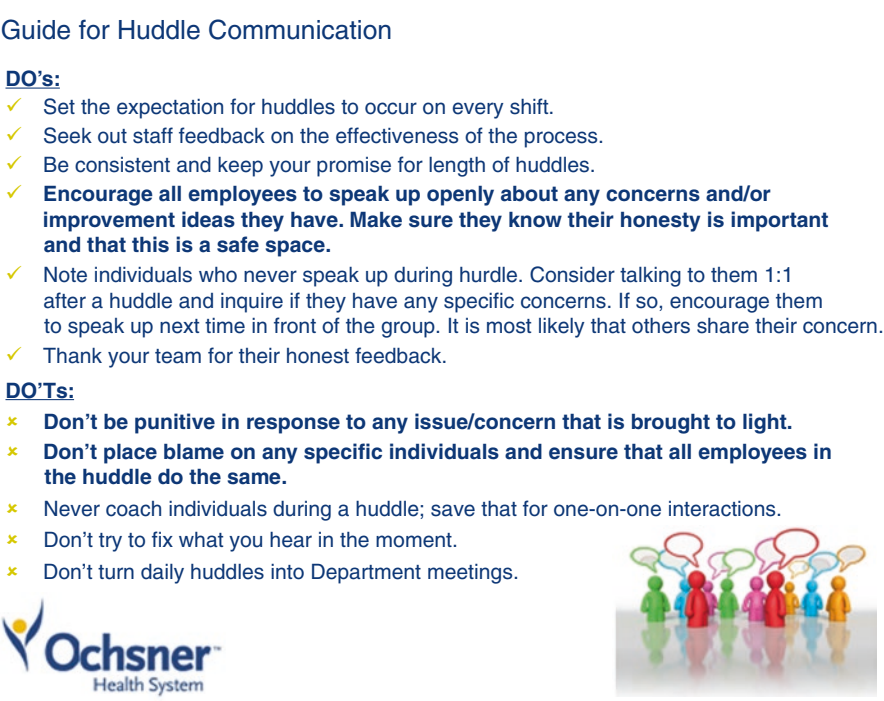

Fig. 3.2 Guideline visual for conducting daily safety huddles. (© Ochsner Health)

displayed acknowledgments and awards. These are reports of team members who helped identify or prevent harm from reaching the patient through their safety awareness. Good catches increase awareness of potential safety gaps and can lead to process improvements. Our hospital has a mechanism for regular review of trends of severe adverse events and good catches within our occurrence reporting system. Stoplight reports are a tool for sharing the state of the organizations' response to safety issues identified by personnel.

3.2 Impact of Systems That Can Report False Negative Events

We have experienced and communicated broadly many examples where occurrence reports highlighted opportunities and brought about real improvement. Occurrence reports of actual and potential safety risks from intravenous access devices have resulted in substantial improvements to improve access for line placement, such as the creation of a minor procedures unit and a dedicated hospital peripherally inserted central line team. Reports concerning gaps in care processes during transport to and while waiting for clinic appointments for postacute care facility patients have led to improved transportation and handoff procedures. Specimen-handling safety improvements resulted from analysis of trends of events reported in our SOS system. Implant safety improvements, standardized orders, and reverification at the

procedural timeout were prioritized and accomplished on a rapid timeline because of trends from our occurrence reporting system indicating a need to address the associated potential for harm. Data gathered from occurrence reports informed our organization's approach to infusion pump safety that culminated in revisions of drug infusion libraries and establishment of interoperability with the electronic medical record. Organ transplant safety improvements came from occurrence reports that enriched discussion at the hospital's quality and safety council, with resultant stronger protective measures during the medical ordering process. Information from the occurrence reports continues to inform improvements in medication safety such as revisions of electronic medical record protocols and decision support tools for high-risk medications.

Public reporting of the hospital's quality and safety metrics might eventually have identified opportunities for improvement for some of these themes, such as intravenous line or medication safety. Yet, we have found that most of the events or risks detailed in occurrence reports would not have been explicitly included in the medical record, which is the source of information coders must use to generate administrative billing data. Most of the improvements mentioned would not have occurred had we relied solely on publicly or widely reported quality data from administrative sources.

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The Power of the Driver Diagram: A Conceptual Approach

4

A. Schubert, T. M. Truxillo, and R. Guthrie

Driver diagrams are widely used as performance improvement tools. When performance improvement teams want to optimize the accuracy and performance of any quality metric, they often use a driver diagram to identify the main drivers to be considered for intervention. Consider a driver diagram approach for each metric, be it Agency for Healthcare Research and Quality (AHRQ) patient safety indicators (PSIs), mortality, readmission, or cost/efficiency metrics. Use of a driver diagram allows appropriate focus on areas of improvement identified by your data and difficulty level. Driver diagrams provide a visual representation that change management teams use to identify the factors that need to be addressed in bringing about durable change and improvement. These factors include structures, processes, tactics, and norms.

Figure 4.1 is a driver diagram that illustrates the relationship between first- and second-level drivers and actions for reduction of risk-adjusted mortality. Improvement science considers driver diagrams useful tools for generating a theory for improvement. It is generally possible to identify 3–5 main drivers, each of which may have secondary drivers. The last tier in a driver diagram identifies the actions that are taken to improve main drivers or secondary drivers.

The driver diagram's usefulness has its roots in W. Edwards Deming's teachings describing a System of Profound Knowledge that is necessary for successful

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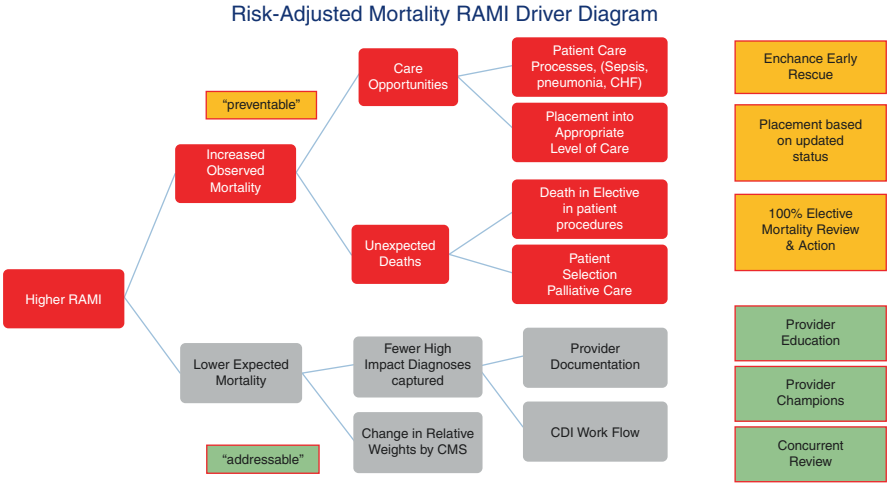

Fig. 4.1 Driver diagram for risk-adjusted hospital mortality (RAMI). Note: The green boxes denote drivers related to and addressable with accuracy in documentation and coding. (© Ochsner Health)

improvement. The four elements of this system are the appreciation of the system in which the improvement is to be made, the understanding of variation, psychology of behaviors (now also understood as change management), and theory of knowledge [1]. It is this *theory of knowledge* that driver diagrams aim to bring to life so that the theory can be tested in a series of successive improvement cycles, referred to as the Plan–Do–Study–Act (PDSA) cycles. It is not advisable to base individual PDSA cycles on the hope that all drivers can be simultaneously addressed.

Driver diagrams are based on the notion that a small and manageable number of factors can be identified to drive almost any performance improvement. This concept was embraced as a component of global influencing strategy described by Patterson and colleagues in the book *Influencer: The Power to Change Anything* [2]. They identify that changing only a few behaviors can result in solving some of the toughest and most complex problems.

4.1 Driver Diagrams and Performance Improvement

While PDSA cycles have become very well known in the parlance of performance improvement, many believe that without an understanding of all four elements of Deming's System of Profound Knowledge, performance improvement limited to PDSA cycles can be challenging and discouraging in its impact. The modern Model for Improvement [3], extensively described and taught by the Institute for Healthcare Improvement (IHI), brings additional concepts to the table. It incorporates the PDSA cycle and three questions to focus improvement. These three questions direct improvement teams' attention to all the components of Deming's System of Profound Knowledge. By calling out the specific aim of the

improvement effort with the question of "What are you trying to accomplish?" the Model for Improvement addresses motivation and takes relevant psychology into account. By focusing on measurement with the question "How will you know a change is an improvement?" it introduces the study and analysis of variation. By asking the question "What changes can you make that will result in an improvement?" it insists that teams grapple with the theory of improvement, identify and commit to the actions, behaviors, and processes that need to be addressed in effecting positive change.

Therefore, the driver diagram represents the improvement team's shared theory of knowledge. It is a tool to identify which hypotheses the team will test in their improvement efforts. The driver diagram should incorporate and integrate the team's understanding of the system they wish to improve, knowledge of available baseline data, behavioral and motivational considerations, as well as process and technical knowledge. The team's shared theory of knowledge is best developed by including members representing the entire team and affected stakeholders. Concerted efforts should be made to include a comprehensive view of patient-facing personnel. Inputs into the development of the shared theory of knowledge around the system they wish to improve include knowledge from experts, relevant beliefs of team members regarding team workflows and motivational factors, as well as published evidence. It is critical that sufficient time and effort are devoted to develop the team's theory of knowledge by consensus. This represents their shared understanding of, agreement on and commitment to the nature of the problem to be solved and the factors that need to be addressed to improve the outcome of interest.

Because the driver diagram is also a visual tool, it can be very useful in communicating the "why" of the needed changes, thereby influencing the behavior of team members. The diagram is represented as a series of boxes and arrows outlining the key (primary) and secondary drivers (often identified as actions) that are thought to influence the outcome directly (primary drivers) or indirectly (by acting on primary drivers).

4.2 Examples of Driver Diagrams as They Relate to Publicly Reported Quality Metrics

Many publicly reported quality and patient safety metrics depend as much on accurate documentation and coding as they do on adoption of best clinical practices. Therefore, driver diagrams intended as tools to improve such metrics need to incorporate these important drivers of outcomes, such as hospital-acquired infections (HAIs), severe pressure ulcers, falls with harm, or any of the AHRQ PSIs or hospital-acquired conditions.

Our improvement teams have successfully included structural elements in the concurrent review and documentation process as well as practice changes to reduce such harms as iatrogenic pneumothorax, postsurgical sepsis, central line-associated bloodstream infections (CLABSIs), catheter-associated urinary tract infections, hospital-acquired severe pressure ulcers, postprocedural retained foreign objects, postoperative dehiscence, and accidental punctures and lacerations. The reader is

referred to the individual chapters for these harms, as well as the chapter on performance improvement based on case review and analysis of outcome metrics.

Drivers for Patient Safety Indicators For metrics such as the AHRQ PSIs, collaborative review and documentation teams are aware of the primary and secondary drivers, allowing them to concentrate on the most appropriate action. As in the RAMI driver diagram, high-level primary drivers are clinical practice and provider documentation (see Table 4.1). The concurrent review and feedback process constitutes another high-level driver. Drivers for specific quality metrics generally dictate the approach to concurrent review. Concurrent review aims to identify whether the medical record and/or the preliminary coding profile accurately reflect the patient's clinical condition. To be most effective, this is done early in the patient's hospital course and, at the very latest, prior to submitting the patient's coding profile for payment.

A PSI example is our driver diagram for severe hospital-acquired pressure ulcers (Fig. 4.2). The primary drivers of PSI-3 are (1) early recognition of the skin lesion

Table 4.1 Drivers of accurate impactful documentation

Drivers	ED/prehospital	Admission	Hospital course	Discharge
Documentation that supports generation of a medical record query for POA status	Clinical indicators supporting the diagnosis to be POA	Mention of the diagnosis in the admission note		
The diagnosis is added to the coding profile as POA		The diagnosis was mentioned as certain, likely, probable, or suspected to be POA	Confirmatory documentation is found in the medical notes	The discharge summary again indicates that the diagnosis was POA
An exclusion diagnosis is added to the coding profile if satisfying MEAT criteria		An exclusion diagnosis is documented	Such a diagnosis is confirmed, and evidence for MEAT documented	The discharge summary again mentions the exclusion diagnosis
A diagnosis triggering a complication code is omitted from the coding profile			The diagnosis is documented as having been ruled out	A medical record query is answered, ruling out the diagnosis
Circumstances that allow compliant medical record query generation		There is unclear or conflicting provider documentation	There is unclear or conflicting provider documentation	There is unclear or conflicting provider documentation

POA present on admission, *MEAT* monitored, evaluated, assessed, treated

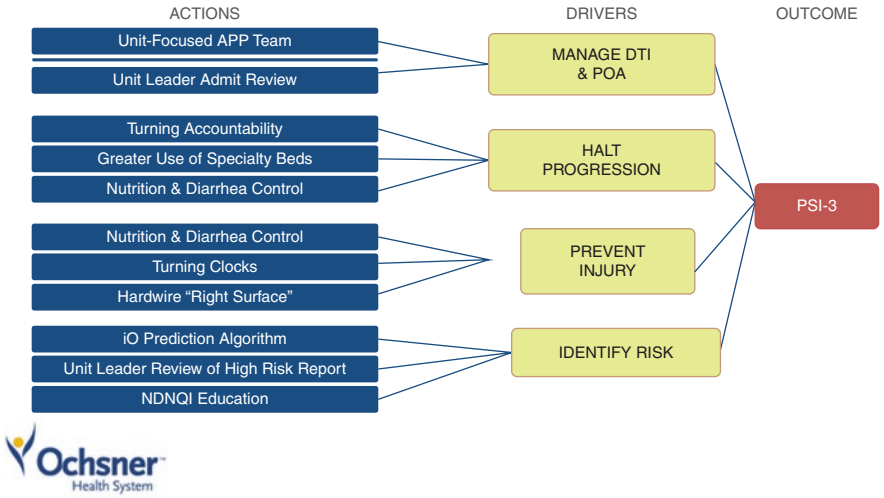

Fig. 4.2 Driver diagram for severe hospital-acquired pressure ulcers (PSI-3). POA Present on admission, DTI Deep tissue injury, PSI-3 AHRQ Patient Safety Indicator 3, NDNQI National Database of Nursing Quality Indicators. (© Ochsner Health)

and documentation of its correct diagnosis, (2) measures to prevent progression of the lesion, (3) preventive measures such as frequent turning, and (4) proactively identifying and acting upon indicators of high risk. It is easily seen that driver #1 aims at optimal accuracy in describing and diagnosing the skin lesion, while drivers #2–4 relate to clinical practice.

Improvement activity for AHRQ PSIs is aided by the use of driver diagrams, as illustrated in the figure. The driver diagram can be adapted to virtually any PSI. For example, PSI-6 is the AHRQ PSI for the occurrence of iatrogenic pneumothorax. Primary drivers include clinical practice, documentation, and concurrent review. Secondary drivers of clinical practice might include robust central line insertion training, technology-guided placement of small-bore feeding tubes (whose placement is associated with iatrogenic pneumothorax), and greater utilization of peripherally inserted central catheter lines.

Drivers for provider documentation accuracy for PSI-6 include documentation of the condition on admission, assessment of clinical significance, and documentation of clinical context. Clinical context in turn might be driven by how well the procedural description depicts whether the pneumothorax development was inherent in the procedure (such as during some abdominal procedures that involve the diaphragm) and whether there were any clinically significant exclusionary diagnoses (such as pleural effusion; see Chap. 14).

Drivers for Hospital-Acquired Infections Our clinically based teams have used driver diagrams successfully for improving performance, especially at the hospital

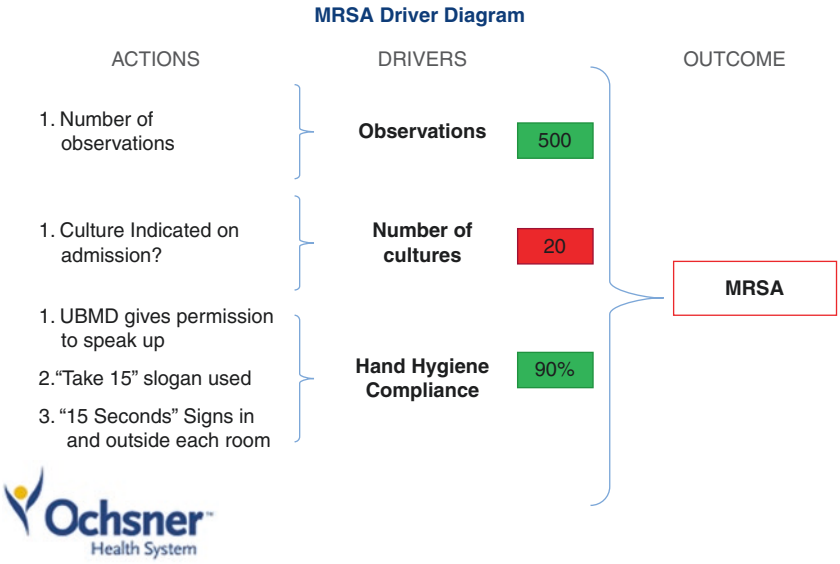

Fig. 4.3 Driver diagram for hospital-acquired methicillin-resistant *Staphylococcus aureus* (MRSA) bloodstream infections. UBMD Unit-Based Medical Director, POA = Present on admission; DTI = Deep tissue injury; PSI-3 = AHRQ Patient Safety Indicator 3; NDNQI = National Database of Nursing Quality Indicators. (© Ochsner Health)

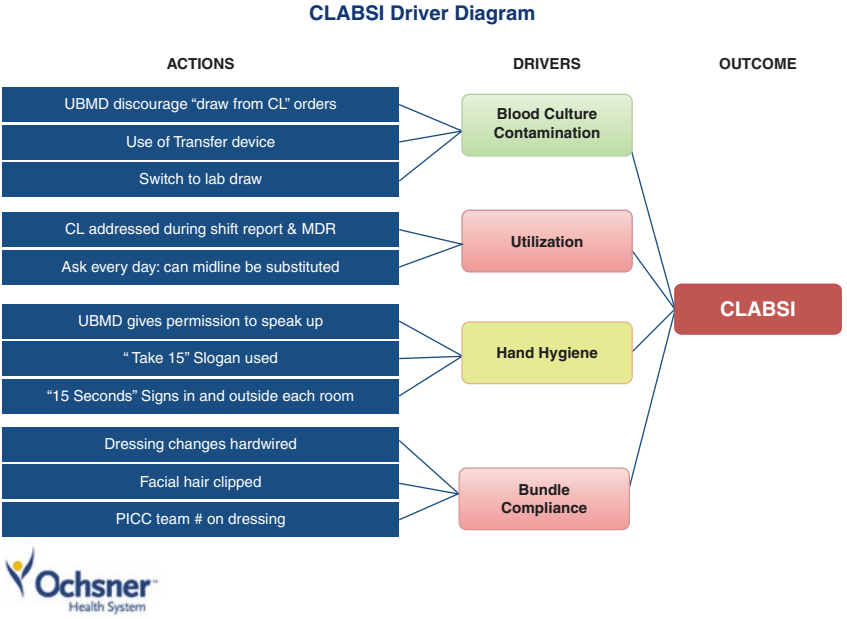

Fig. 4.4 Driver diagram for hospital-acquired central line-associated bloodstream infections (CLABSI). CL Central line, UBMD Unit-based Medical Director, PICC Peripherally inserted central catheter. (© Ochsner Health)

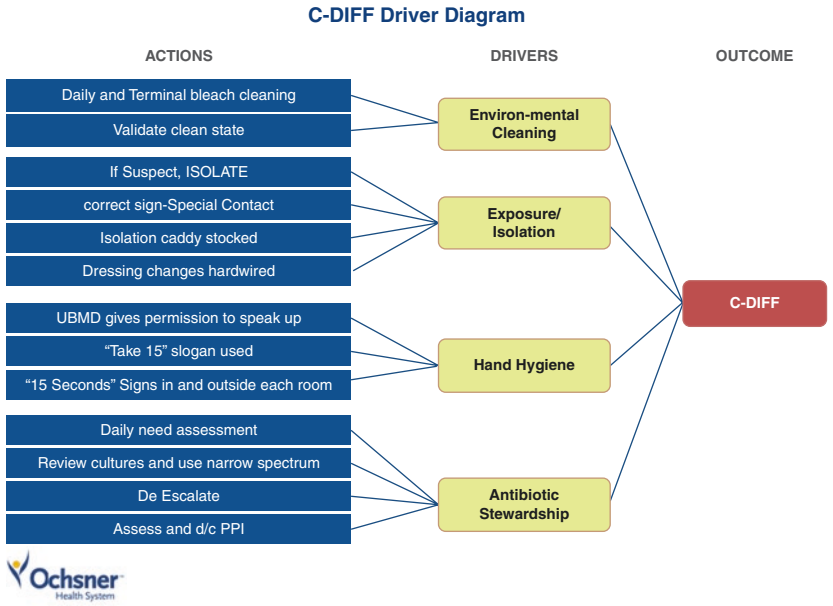

Fig. 4.5 Driver diagram for hospital-acquired *Clostridium difficile* (*C-Diff*) infections. UBMD Unit-Based Medical Director, PPI Proton pump inhibitor, D/C Discontinue. (© Ochsner Health)

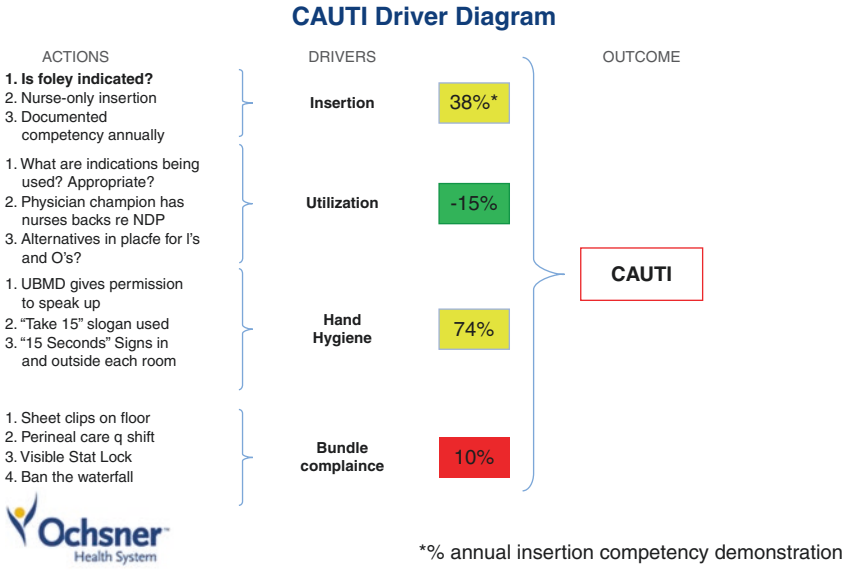

Fig. 4.6 Driver diagram for hospital-acquired catheter-associated urinary tract infections (CAUTI). Note: the numbers next to the drivers represent process performance related to the drivers. I's & O's inputs and outputs, UBMD Unit-Based Medical Director, NDP Nurse-driven protocol. (© Ochsner Health)

unit level. High-level drivers for HAIs are testing stewardship, clinical practice, hygiene measures, and documentation, and, at the organizational level, concurrent review. Figures 4.3, 4.4, 4.5, and 4.6 are real-life driver diagrams used by our teams. HAIs are confirmed after review by infection preventionists based on National Healthcare Safety Network (NSHN) definitions and criteria (see Chap. 10). While some CDC definitions of HAIs are strictly based on culture results, documentation can be important in some cases. For example, if bacteremia can be attributed to a source of infection other than the central line, NSHN guidelines allow excluding the case as a CLABSI event. Clear documentation of timely workup and identification of the source of bacteremia aid in accurately describing the source of infection and thereby avoiding a default attribution of the bacteremia to the central line, which would result in the reporting of the CLABSI event to NSHN. Such documentation facilitates the ability of the infection prevention team to accurately reflect the source of the bacteremia and thus avoid reporting a CLABSI.

Risk-Adjusted Mortality Risk-adjusted mortality, introduced earlier in this chapter, is another use case for the use of the driver diagram. As mentioned previously, Fig. 4.1 represents a driver diagram that illustrates the relationship between first- and second-level drivers and actions for reduction of risk-adjusted mortality. Please see Chaps. 25 and 43 for a more complete discussion of this topic.

Drivers for Accurate and Impactful Documentation Drivers can also be identified to generate a theory for improving the accuracy of medical record documentation. Table 4.1 identifies various drivers of accurate documentation. They are stratified by the phase of the patient's hospital course.

4.3 Involving the Medical Staff

Being aware of the drivers of accurate and impactful documentation can inform and direct education activity for the medical staff and medical staff documentation champions. The challenge always is to create memorable learning opportunities and cognitive aids that allow the members of the medical staff to achieve documentation accuracy with a minimum of additional effort. At the authors' organization, physician documentation accuracy champions have been recruited for all major clinical practice groups. They use a variety of cognitive aids to help their colleagues, including pocket cards, preference lists for identifying diagnoses in the electronic medical record, and advanced practice providers specifically educated to document and answer medical record queries accurately. Teaching the science of improvement, including the theory of improvement and the use of driver diagrams, can be a useful tactic to engage the medical staff. Medical staff are more easily motivated to participate in improvement efforts when evidence-based approaches are used. We teach that the driver diagram is an essential element in identifying the optimal approach to testing the team's hypotheses for improvement. Members of our medical staff are interested in the IHI Model for Improvement in part because it is grounded in the

science of performance improvement, including Deming's teachings. When we brought a 3-day course on the subject of improvement science to our facility, at least a dozen senior physicians and their care teams participated in the entire course and most completed a performance improvement project within 6 months.

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Seeing Documentation Through the Lens of Risk Models

5

S. Beeram, J. D. Jeffreys, E. K. Chacko, and R. Guthrie

Risk models in health care are designed to assign the probability of an outcome to an individual or a group of individuals, within a specific time frame, using available diagnoses and demographic data [1]. These risk adjustment variables or model inputs generally include demographic data, diagnoses, procedures, and descriptors of social conditions. Understanding the way risk adjustment is used in a model can help organizations identify opportunities for improvement in documentation as well as performance improvement. Knowing the most impactful risk model components can focus efforts and benefit efficiency in performance improvement.

5.1 What Information Is Used in Risk Adjustment Models?

In order to construct an outcome metric that assesses only the quality of the treatment provided, one needs to adjust for, or negate, the impact of other factors that might independently affect care quality outcome. Examples of such factors are (1) the patient's principal diagnosis and (2) the presence of comorbid conditions, (3) procedural interventions, (4) age, (5) gender, (6) ethnicity, and, possibly, (7) social determinants of health (SDOH).

With few exceptions, most rating agencies use data that are most widely and publicly available. These data are contained in the traditional Medicare-only files

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[Medicare Provider Analysis and Review (MedPAR) and Standard Analytic Files (SAF)]. Exceptions are organizations such as the National Surgical Quality Improvement Program (NSQIP), United Network for Organ Sharing (UNOS), or the Society of Thoracic Surgeons (STS) that use data abstracted via medical record review. Companies with risk adjustment tools and enough subscribers can use their own proprietary models, such as *U.S. News*, Truven (IBM Watson), CareChex (based on Comparison), Vizient, Leapfrog, Healthgrades, and others. Their inputs for their risk models are still the same, that is, the Medicare data files.

5.2 Why Are Risk Adjustment Models Used?

Without adjusting for the risks before treatment is initiated, it is impossible to compare, in an apples-to-apples way, most quality outcomes measures across different populations. Such comparisons are necessary to understand accurately the impact of treatment interventions on patient outcome.

Risk adjustment creates clarity. In clinical practice, this becomes important when one tries to discern priorities for performance improvement given limited resources. For example, a hospital tries to determine whether the hospital's overall mortality is in line with the generally expected mortality for patients of similar demographics, medical severity, and complexity. Using risk adjustment methods, it can compare its risk-adjusted mortality to peer organizations. Let's say their quality team finds that their hospital's risk-adjusted mortality is within about 5 percentile points of the median for mortality among the hospital's peer comparator group. The hospital's leaders then have more accurate and believable information to inform their decision to improve or be satisfied with their current performance. If they decide that they are not satisfied with their status quo, they can then further evaluate the variation in risk-adjusted mortality that exists for various groups of patients, again benchmarked against peer comparators. To be able to compare mortality within their own organization and benchmark themselves against peers, they will need mortality metrics that are risk-adjusted for a number of factors so that apples-to-apples comparisons can be made and opportunities identified.

The National Patient Safety Foundation's Lucian Leape Institute strongly endorses transparency as a platform to achieve improved outcomes, avoid errors, satisfy more patients, and lower cost [2]. Risk adjustment offers transparency. Quality improvement and group practice leaders have greater flexibility to manage through the enhanced transparency offered with the use of risk-adjusted performance metrics. Knowledge of the odds ratios and coefficients of the factors influencing risk-adjusted metrics also offers greater clarity. It can be used to understand how to influence the risk-adjusting factors, such as those driving expected mortality. Transparency with regard to benchmarked performance within one's group, regionally or nationally, would be expected to promote improvement. One reason is that transparency of performance offers much greater capacity for improvement when experience and information sharing are encouraged and facilitated.

5.3 The Case for Use

In a view across the health-care business spectrum, insurance and managed care companies might be interested in assigning the risk of healthy members experiencing clinical deterioration and their health-care utilization during a given year. Such organizations might also be interested in patients who are getting healthier, that is, patients whose health-care resource utilization may be decreasing after high utilization in the prior year. Insurance companies might then design an incentive plan for members to engage in behaviors associated with better health [3]. Actuarial risk models are a good example of this.

When attempting to implement almost any improvement that requires a change in hospital or medical practice, care team members will want to be assured that the data underlying the need for these interventions are accurate and believable. Physicians, in particular, will want to be assured that outcome metrics, which they are asked to act on in their practice, are risk-adjusted for the severity of their patients' medical disease. A hospital system with a strong presence in a geographical area might be interested in the issue of unplanned readmissions occurring within a 30-day period or the incidence of mortality within a 30-day period for a specific population admitted across a service line. Successful improvement efforts depend on engaging a broad coalition of stakeholders, including physicians, facility administration, and payors. Engagement is strengthened when participants can be assured that the risk-adjusted measurements, such as mortality and readmission rates, can create a more level-playing field.

Key Concept
Risk adjustment is key to effective performance improvement through transparency, successful engagement of medical staff, and allocation of medical resources.

5.4 Evaluation of Risk Models

In response to increased emphasis on value outcomes from health care and more guidance becoming available from the Centers for Medicare & Medicaid Services (CMS) in recent years, health-care institutions have employed a variety of clinical and financial decision support tools. These tools are powered by internally developed risk models, risk models developed by third-party vendors, risk models available in the public domain, or some combination of these.

Risk models are usually evaluated by their accuracy and precision [1]. Accuracy is determined by how well the risk model predicts the intended outcome across different subgroups of a population, that is, how do the number of true positives and true negatives compare to the total number of cases subjected to the model. Precision is the ability of the model to discriminate among true risks; it considers how the

number of true positives compares to the total of true and false positives (see Table 5.1). One will want to ascertain if the model is exposing too much of the population to a possible outcome (i.e., it predicts too many false positives despite a large portion of that population not truly being at risk). Different risk factors or covariates are usually evaluated to arrive at a score that gives one a good sense of the model's accuracy and precision.

While there is plenty of statistical literature on this subject, we will use a simple example to illustrate how to evaluate risk adjustment or risk prediction models. Such an evaluation would apply to population risk models or general outcome-based risk models to judge their effectiveness and provide guidelines for decision-making. Risk adjustment of patient outcomes is accomplished by comparing the observed rate of the outcome with the rate predicted by the model.

Table 5.1 Illustration of two risk adjustment models

	Actual readmit = no		**Actual readmit = yes**		**Total cases**	**Total % cases**
Model A: readmit predicted	**Cases**	**%**	**Cases**	**%**		
No	2849	78.94 %	84	48.55 %	2933	77.55 %
Yes	760	21.06 %	89	51.45%	849	22.45 %
Grand total	**3609**	**100.00 %**	**173**	**100.00%**	**3782**	**100.00 %**
Accuracy (TP + TN/TP + FP + FN + TN)	0.78					
Precision = TP/TP + FP	0.10					
Sensitivity = TP/TP + FN	0.51					
Model B: readmit predicted	**Cases**	**% c**	**Cases**	**%**		
No	4620	96.69 %	152	80.43 %	4772	96.07 %
Yes	158	3.31 %	37	19.57 %	195	3.93 %
Grand total	**4778**	**100.00 %**	**189**	**100.00 %**	**3782**	**100.00 %**
Accuracy (TP + TN/TP + FP + FN + TN)	0.94					
Precision = TP/TP + FP	0.19					
Sensitivity = TP/TP + FN	0.20					

TP = true positives; TN = true negatives; FP = false positives; TP = true positives

Red fields indicate failure of the model to predict a readmission; green fields indicate successful prediction, while yellow indicates falsely predicted readmissions (false positives)

TP true positives, *TN* true negatives, *FP* false positives, *TP* true positives
Red fields indicate failure of the model to predict a readmission, green fields indicate successful prediction, and yellow fields indicate falsely predicted readmissions (false positives)

Consider the following example of two different risk models (models A and B; see Table 5.1) predicting unplanned readmission risk within 30 days for patients discharged to home. The predicted risk is applied to an actual sample of discharges to home during a quarter.

Model A in this example is built on assigning a risk score based purely on the comorbidity burden of the patient. For a sample of discharges to home, say, in the fourth quarter of 2019, at a very basic level, it predicts slightly more than 50% of readmissions accurately. However, it doesn't have much precision; there are too many false positives [4]. Model B shows a higher accuracy and higher precision than model A. It achieves this by making use of many risk factors instead of just using comorbidities like in model A. However, its sensitivity is poor. It only predicts about 20% of true positives compared to about 50% with model A.

From an operational perspective, the goal is to identify the people who are at risk of unplanned readmission within 30 days, so that follow-up and care coordination resources can be focused on them. Speaking purely in terms of the number of readmissions that would have been captured, model A identifies more than 50% while model B only identifies about 20% of the actual unplanned readmissions. Model evaluation may need to include additional perspectives. In this scenario, one may need to consider the additional operational cost to contact the high number of false positives and how labor intensive this might be. Further, model A is based purely on comorbidity. Other risk factors may exist that still make this a high-risk population (e.g., with regard to emergency department utilization), even if patients did not get readmitted to the hospital. It may therefore still be worth following such patients closely after discharge.

Now let's consider a different scenario. During the peak of the first COVID-19 wave, we have two models to predict the usage of ICU beds [5]. In this case, let's say, for example, that model A is predicting the usage of ICU beds in the next 10 days with a high number of false positives. Model B has more precision and is able to predict a high number of true positives with a minimal number of false negatives and false positives. Hospital bed planners and intake specialists use these models to prioritize ICU beds for COVID-19 patients. If they were to use model A with the high number of false positives, they would run the risk of overestimating the need for COVID-19 ICU beds and might unnecessarily turn down patients in need of a non-COVID ICU bed by trusting this model.

In short, operationally, organizations need to evaluate models based on their intended goals, needs, and resources. A system of checks and balances may be needed to use the risk prediction models responsibly, especially in rapidly changing scenarios. In the COVID scenario above, a risk model with huge bias is no substitute for clinician expertise. In the readmission scenario, the models are being used to design and implement a postdischarge follow-up program but not for real-time clinician decision-making. Risk adjustment in health care is complex and difficult to perfect as mortality risk adjustment models differ substantially in their ability to predict death [6–8]. It is also important for hospitals to evaluate risk adjustment and benchmarking services on their ability to provide their quality teams with sufficient knowledge of the model that would allow identification of specific determinants of mortality risk [9].

5.5 Examples of Risk Adjustment Models

Without being exhaustive, we discuss specific risk adjustment models that relate to commonly encountered widely reported metrics.

The Elixhauser Model The Elixhauser model has been adopted by agencies of the US government such as CMS and the Agency for Healthcare Research and Quality (AHRQ). It is used for risk adjustment of the CMS 30-day mortality and readmission metrics. It also has been adopted by *U.S. News* for risk adjustment. It is statistically somewhat superior to other comorbidity risk adjustment models such as the Charlson Comorbidity Index [10]. The Elixhauser Comorbidity Index is a way of measuring the comorbidity burden on a patient, which in turn can be used to judge in-hospital mortality rates, 30-day readmission rates, and other in-hospital resources related to level of care assigned to the patient [11]. Based on a combination of diagnoses and diagnosis-related groups (DRGs), about 40 such comorbidity conditions were identified as of 2021 [12] (see Table 5.2). Comorbidities are updated each year through the AHRQ website. This risk adjustment can be assigned at an encounter level to risk-adjust for outcomes of interest such as mortality, readmission, length of stay, and cost.

Key Concept
Some risk adjustment models are based on comorbidities identified and procedures performed during the hospitalization, whereas others are based on comorbidity burden present before the hospital admission (vs. focusing on the reason for hospital admission), such as the Elixhauser risk model.

The original Elixhauser Comorbidity Index provided a binary outcome for each comorbidity condition that could be summed if a score was desired. One advantage of this is flexibility; more comorbidity buckets can be identified and deidentified with time if they prove significant or insignificant toward outcomes. It also provides flexibility to researchers to focus on the comorbidities they are interested in and to fine-tune the diagnoses and DRGs for this purpose. Over the years, the index has been used by researchers as a general measure of risk across different service lines and specific to service lines with reasonable success. Not having a weighted score causes statistical complications (e.g., in multivariate analyses with small sample sizes) despite the advantages of using a summed-up score on binary outcomes. This dilemma was addressed by van Walraven in 2009 [10]. AHRQ has a tool that provides readmission and mortality weights for comorbidity buckets (see Table 5.2 [13]). These weights were developed with ICD-9 data [14]. There is opportunity to investigate how well these weights predict outcomes for local hospital or administrative data when used with ICD-10 diagnoses.

Table 5.2 Comorbidities identified in the Elixhauser risk model [13]

AIDS = "Acquired immune deficiency syndrome"
ALCOHOL = "Alcohol abuse"
ANEMDEF = "Deficiency anemias"
ARTH = "Arthropathies"
BLDLOSS = "Chronic blood loss anemia"
CANCER_LEUK = "Leukemia"
CANCER_LYMPH = "Lymphoma"
CANCER_METS = "Metastatic cancer"
CANCER_NSITU = "Solid tumor without metastasis, in situ"
CANCER_SOLID = "Solid tumor without metastasis, malignant"
CBVD = "Cerebrovascular disease"
CBVD_NPOA = "Cerebrovascular disease, not on admission"
CBVD_POA = "Cerebrovascular disease, on admission"
CBVD_SQLA = "Cerebrovascular disease, sequela"
CHF = "Congestive heart failure"
COAG = "Coagulopathy"
DEMENTIA = "Dementia"
DEPRESS = "Depression"
DIAB_CX = "Diabetes with chronic complications"
DIAB_UNCX = "Diabetes without chronic complications"
DRUG_ABUSE = "Drug abuse"
HTN_CX = "Hypertension, complicated"
HTN_UNCX = "Hypertension, uncomplicated"
LIVER_MLD = "Liver disease, mild"
LIVER_SEV = "Liver disease, moderate to severe"
LUNG_CHRONIC = "Chronic pulmonary disease"
NEURO_MOVT = "Neurological disorders affecting movement"
NEURO_OTH = "Other neurological disorders"
NEURO_SEIZ = "Seizures and epilepsy"
OBESE = "Obesity"
PARALYSIS = "Paralysis"
PERIVASC = "Peripheral vascular disease"
PSYCHOSES = "Psychoses"
PULMCIRC = "Pulmonary circulation disease"
RENLFL_MOD = "Renal failure, moderate"
RENLFL_SEV = "Renal failure, severe"
THYROID_HYPO = "Hypothyroidism"
THYROID_OTH = "Other thyroid disorders"
ULCER_PEPTIC = "Peptic ulcer disease × bleeding"
VALVE = "Valvular disease"
WGHTLOSS = "Weight loss"

The Vizient® Risk Adjustment Model Vizient Inc. is a for-profit corporation that offers member health-care organizations comprehensive data reporting and benchmarking. Its risk adjustment model is transparent to its members who can replicate the code for its risk adjustment model. Vizient is selling its capability for risk adjustment; at the same time, it offers transparent data sharing in the club of its members. This is not the case for many other rating agencies whose methodology is closely

guarded and proprietary and therefore not transparent to stakeholder health-care organizations.

This transparency allows us to study the model coefficients for expected values and understand how we might more accurately document and code to capture the true acuity of our patients. By furnishing accessibility to these tools for internal data, we can streamline the process to find outliers and allow for more time to be spent developing solutions to an underlying problem that the data brought to light. For example, we have Tableau® dashboards utilizing Vizient data that allow users to sort patient lists based on outcome as well as expected mortality so as to find outlier cases (e.g., low expected mortality but the patient died) to conduct further detailed case reviews. Such reviews then could tell us whether the clinical acuity of the patient and the documentation were sufficient to represent that clinical picture. The transparency of these models allows us to pinpoint comorbidities (determined by ICD-10 codes) where additional documentation might lead to an increased expected mortality value.

In order to provide more robust and accessible analytics around quality outcomes, our teams utilize Vizient's data download feature [15]. This enables us to bring the data from Vizient's online tools for all hospitals using Vizient back to Ochsner in-house databases to analyze. It also provides access to a wider array of users via our Tableau® dashboards and other ad hoc analytics. We have in-house dashboards for readmission, patient safety indicators, mortality index, and other specific conditions such as sepsis that allow users to drill from high-level summary metrics down to patient-level claim data detail.

Other Risk Models Organizations such as Healthgrades, Leapfrog, CareChex, and others employ proprietary risk adjustment models. Each rating agency uses a distinct methodology to rate hospitals, but all use the common data source available to develop ratings, the data provided to the public by CMS via the MEDPAR database and the SAF. The various reporting agencies essentially compete to have the best (perceived) model to assess hospital quality. The agencies differentiate in the market by their product features, that is, the underlying algorithm/methodology that scores performance. The most common component in most of the ratings systems is a ratio of outcomes normalized to acuity; the use of such modeling therefore gives credit to high-acuity centers for the higher level of illness and complexity of disease of the patients that they treat relative to lower acuity community centers.

Each risk model uses a proprietary methodology that includes an array of elements that come from publicly available, deidentified billing data. Which elements are included in each respective model depends on the statistical analysis done by the organization's group building the model, as well as data availability. Many agencies use very similar elements (i.e., model input variables) because those elements are all that are available. Model differentiation is the selling point in the market (either patients deciding on which hospital to utilize or hospitals deciding

which rating agency to market to patients). Generally speaking, most models use some combination of demographics, diagnoses, and procedures to assess patients' relative risk of adverse outcome (in most methodologies, the primary outcome is mortality, while some also focus on complications). The presence of certain diagnoses, procedures, and demographics increases or decreases the expected value depending on the specific model. For example, Truven Top 100, CareChex, and Healthgrades all use combinations of procedures and diagnoses codes, as well as demographics (age, gender, race, etc.). *U.S. News & World Report* historically used similar elements until recently. This rating agency recently adopted a version of the Elixhauser risk adjustment model that focuses only on the patients' diagnoses. The intent was to adopt a model that would only consider comorbidities and disregard the reason for the hospital admission. While methodologies differ somewhat across these rating agencies, the goal of each is to provide the most robust and reliable acuity-normalized data for patients to make informed decisions about the hospital they choose, and for hospitals to identify areas of strength and priorities for improvement.

5.6 Challenges in Risk Adjustment

The accuracy of risk adjustment models is affected by difficulty in accurately assessing and weighing the diagnoses relating to the admission episode. In addition, varying practices of documentation and coding, including undercoding [16] and overcoding [17], affect model accuracy [9].

Hospital-to-hospital transfer of patients with very high disease severity (the type that is not associated with higher preventable mortality) will affect a hospital's acuity and therefore numerator death events, as well as the observed-to-expected ratio. Mortality modeling and benchmarking services should be selected also on their ability to compare centers with like populations of transferred patients [9].

Another area in which interest might rise rapidly is risk adjustment for ethnicity or race. When one risk-adjusts for race, the ability to see a health disparity effectively disappears for the metric that is risk-adjusted in such a way, such as risk-adjusted complications or mortality. In order to accurately depict and understand health disparity, risk adjustment for ethnicity may need to be re-engineered.

There is still a substantive potential for risk adjustment to take into account SDOH. One reason for not risk-adjusting certain metrics for SDOH, such as readmission rates, is that hospitals might otherwise become less aware of their opportunity to engage with their community resources to drive improvement in care outcomes related to SDOH. On the plus side, Z-codes already exist to describe most social risk factors. There are substantial challenges, however. Physicians and providers don't always consider it their role to document these. Coding has not

traditionally identified this as a priority as there has not been a tangible reimbursement impact. For health systems whose payments depend heavily on risk-adjusted quality outcomes, incentives to document SDOH may be different. Quality departments likewise have focused on other risk-adjusting factors that are more easily accessed and reviewed. Further, until recently, little impact on metrics such as expected mortality has been evident. This is changing now. For example, in 2020, Vizient began to introduce SDOH Z-codes that will impact expected mortality in its risk adjustment models.

Risk adjustment models tend to become less reliable with the outliers of illness within a patient population, that is, with really sick patients. Deaths that are unavoidable because of end-stage or overwhelming acute illness primarily account for a hospital's numerator or observed deaths [9]. Preventable hospital deaths are generally in the minority, perhaps accounting for as much as 12% measured by the effect of rapid response teams on hospital mortality [18]. Therefore, the variation in numerator deaths among hospitals is likely to be more sensitive to the acuity of their patients than to the quality of their care processes [9].

Risk-adjusted metrics are frequently described as a ratio of observed-to-expected event outcomes, such as observed mortality to expected mortality. The numerator is driven by patient events that actually occurred. The denominator, which provides the risk adjustment, only works at a population level; it is a population concept only. Therefore, one needs a population large enough for statistics to work, that is, generating sufficient statistical power to allow for comparisons to be meaningful.

5.7 Medical Record Documentation and Risk of Mortality

Coded comorbidities affect expected rates of mortality. Accurate coding depends in large part on what providers document in the medical record. Assuming hospitals benchmark themselves appropriately, accurate documentation should allow identification of true opportunities for quality improvement. Given the known prevalence of undercoding, it is not unreasonable to identify the determinants of different levels of mortality risk. Mathematical modeling yielded a finite list (see Table 5.3) of relatively common diagnoses that discriminated well between lower and higher risk categories in the All Patients Refined Diagnosis Related Groups (APR-DRG) and Vizient (formerly University Health Consortium or UHC) mortality risk adjustment methodologies [9].

Table 5.3 List of diagnoses that discriminate well between mortality risk levels in the 3M and APR-DRG methodologies [9]

Comorbidity	ICD code	3M	Vizient
Acute renal failure	584.9	Yes	Yes
CHF, unspecified	428	Yes	Yes
Acute respiratory failure	518.81	Yes	Yes
Urinary tract infection/bacteriuria	599	Yes	Yes
Encounter for palliative care	V66.7	Yes	Yes
Pneumonia, organism NOS	486	Yes	Yes
Food/vomit pneumonitis	57	Yes	Yes
Atrial fibrillation	427.31	Yes	Yes
Coronary atherosclerosis native	414.1	Yes	Yes
Pleural effusion NOS	511.9	Yes	Yes
Hyposmolality	276.1	Yes	Yes
Pulmonary collapse	518	Yes	Yes
Acidosis	276.2	Yes	Yes
Accidents occurring in residential institution	E849.7	Yes	Yes
HY KID NOS W CR KID I-IV	43.9	Yes	Yes
Secondary malignant neoplasm of bone	198.5	Yes	Yes
Anemia NOS	285.9	Yes	Yes
Severe sepsis	995.92	Yes	Yes
DMII WO COMP NT ST UNCNTR	25	Yes	
Septic shock	785.52	Yes	
Hyperlipidemia NEC/NOS	272.4	Yes	
History of tobacco use	V15.82	Yes	
Decubitus ulcer, low back	77.3	Yes	
Hypertension	41.9	Yes	
Septicemia NOS	38.9	Yes	
Hypopotassemia	276.8		Yes
Dehydration	276.51		Yes
Hypothyroidism NOS	244.9		Yes
Hyperpotassemia	276.7		Yes
Chronic kidney disease NOS	585.9		Yes
Thrombocytopenia NOS	287.5		Yes
Secondary liver Ca	197.7		Yes

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Managing Clinical Selection Risk

6

G. Loss, A. J. Cohen, R. M. Zweifler, S. Desai, J. S. Jenkins, and A. Schubert

Although many factors influence the clinical outcomes of medical and procedural interventions, appropriate patient selection is probably the most important. Assessment and recognition of appropriate candidates for an intervention constitute a large part of procedural training.

This is especially important in procedural care as the mere performance of a procedure frequently influences expected outcomes in risk models. For example, the performance of percutaneous coronary intervention reduces expected mortality in risk models used by data-sharing organizations such as Vizient. It stands to reason that a mortality following such a procedure carries an even greater impact on overall risk-adjusted mortality for the population of patients subjected to the procedural intervention.

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6.1 What Indicators Exist to Alert Medical Teams of the Need to Manage Selection Risk?

Not much is written in the literature about the management of selection risk. Transplant programs follow the success of transplant interventions by means of a CUSUM (cumulative sum) analysis, which is very sensitive to small changes over time. If a substantial movement in an adverse direction is observed, programs may pause to investigate where improvements can be made. In addition, they may reevaluate entry criteria and take less risk until the outcome trends improve. This process allows selection committees to err on the conservative side of patient selection to assure that benefit outweighs the risk in the cohort of patients under scrutiny.

Case review can serve a similar purpose. Programs can stay apprised of high selection risk by reviewing cases regularly, especially patients who have suffered an adverse outcome or long hospitalizations. Review should focus on the quality of preprocedural assessment and decision-making. In our own practice, mortality after elective surgery is reviewed 100%, as are mortalities that fall into the *U.S. News & World Report* diagnosis-related group (DRG). Patients with poor outcomes, whose preprocedural course identifies considerable risk, inform care teams of the need to strengthen the workup process, marshal additional care resources, and deepen cross-disciplinary decision support.

Our organization's mortality oversight group reviews mortality trends across service lines and directs action when adverse trends are identified. Case selection for high-risk procedures is an important driver of risk-adjusted mortality and a focus of our group. During its work for the past 4–5 years, this group has intentionally and systematically requested and reviewed a grouping of reports from our medical informatics department. Examples are mortality by service line, mortality of patients presenting with sepsis or acquiring sepsis in hospital, and mortality of patients transferred from other health-care facilities. This coordinated and rigorous review process has helped identify the need for improvement efforts and supported necessary resources to effect these changes. These improvements have included more rigorous processes in cross-disciplinary input for case selection, care planning, and longitudinal coordination of care. This has greatly benefited our programs for the management of advanced heart failure, pulmonary embolism, extracorporeal membrane oxygenation, stroke, and intracranial bleeding.

Key Concept
Timely availability of outcome data allows teams managing high-risk interventions to adjust their processes, including the process for patient selection, so that optimal outcomes can be achieved.

6.2 Real-Life Examples of Managing Clinical Selection Risk

The following examples illustrate how clinical interventional programs at our organization have used data analyses and case review to improve care through data transparency, standardization, and multidisciplinary decision-making.

Advanced Cardiovascular Interventions After a year of review for *U.S. News* mortalities in the specialty of cardiology and cardiac surgery, a pattern of selection risk became evident. Advanced heart failure patients (INTERMACS classification level 1) with cardiogenic shock have a substantially elevated mortality [1], likely related to the end-organ damage incident to cardiogenic shock. Careful patient selection processes are required to identify patients with cardiogenic shock who require percutaneous cardiac assist devices to reverse end-organ damage. We identified a number of cases for whom advanced heart failure interventional care was initiated and for whom a destination procedure such as heart transplant or mechanical heart was ultimately not appropriate. Instituting a clinical pathway for advanced heart failure allowed the introduction of cross-disciplinary decision-making at a much earlier stage in the patient's therapeutic planning process. As a result, fewer patients died while supported by bridging or assist therapies prior to transplant or mechanical heart implantation. The clinical decision to embark on the advanced heart failure option is now reliably made with cardiac surgical, cardiology, and transplant specialty input. The survival score for the specialty increased during the years following this intervention (Fig. 6.1).

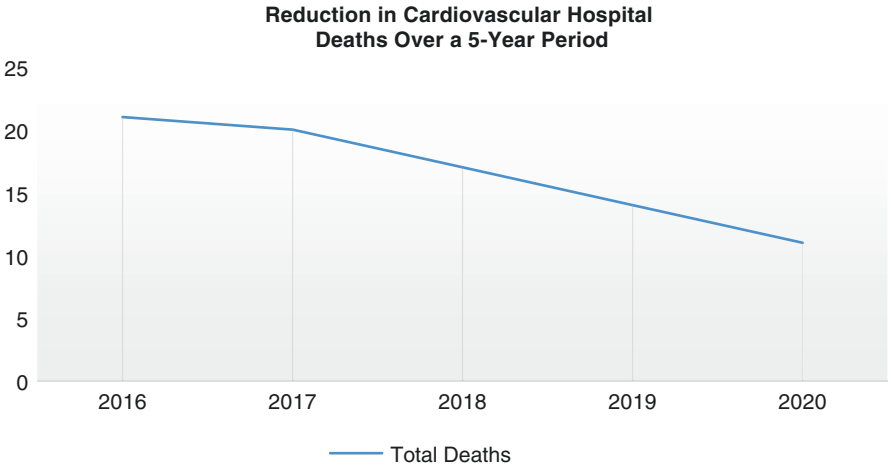

Fig. 6.1 Reduction in hospital deaths for DRGs defining the *U.S. News* medical specialty of cardiology and cardiac surgery. (© Ochsner Health)

Pulmonary embolism (PE) outcomes improve when physicians representing the specialties that contribute to clinical and interventional management agree on a schema and process for a multidisciplinary approach. Over the past decade, major referral centers have organized pulmonary embolism rapid response teams (PERTs). While the overall impact of PERTs on mortality and functional outcome after major PE is still being investigated, PERTs have been demonstrated to improve access to advanced therapies for PE, such as catheter-directed thrombolysis [2, 3]. Our organization's mortality oversight group identified an opportunity for improvement in this population. As a result, physician leaders from cardiology, cardiovascular surgery, emergency services, interventional radiology, pulmonary critical care, and hospital medicine agreed to establish a PERT. In addition, there was agreement on a clinical management algorithm and process by which the physicians on call for each specialty come together via a dedicated conference call prior to interventional management for PE (Fig. 6.2). After initiation of this call, which occurs on a 24/7 basis, the approach to interventional care for the patient with PE is agreed upon and implemented with input from all disciplines.

This multidisciplinary approach has allowed for the streamlined evaluation of patients and formulation of comprehensive treatment plans. It has facilitated the rapid mobilization of resources to provide the highest level of care to those patients with PE in need. At a national and international level, the PERT Consortium has been developed to unite the efforts of PERT teams across the United States and internationally. The purpose of the PERT Consortium is to serve the general public by undertaking activities to advance the status of PE care and promote research in the treatment of PE. The mechanisms to engage a multidisciplinary approach are proving to be an invaluable resource in the decision-making processes and treatment of high-risk PE patients. Our institution has joined this consortium to better serve the needs of our patients using a multidisciplinary approach.

Managing Clinical Risk in the Neurosciences A similar review process exists for the specialties of neurology and neurosurgery. During mortality review, we identify patients who underwent percutaneous neurovascular or open neurosurgical procedures, with a view toward optimal selection. The recognition of significant comorbidity, coupled with ongoing life-threatening disease (such as hemodynamic instability), has led to rethinking the need to perform a neurointervention as a first resuscitative measure. We have also implemented a clinical evaluation unit designed to evaluate patients with devastating neurological injuries prior to admission. This adds value to a center like ours with a high volume of regional transfers. As we accomplished concurrent mortality reviews for patients with neurological disease, inpatient hospital deaths began to decrease (Fig. 6.3). In addition, the organization's neuroscience service line has continued to rank among the top 50 hospitals in *U.S. News*. In Vizient, our neuroscience service line ranked at the 65th percentile in risk-adjusted mortality among comprehensive academic medical centers. Ochsner neuroscience risk-adjusted mortality was also lower than that of 7 of the 20 *U.S. News* Honor Roll hospitals in 2020.

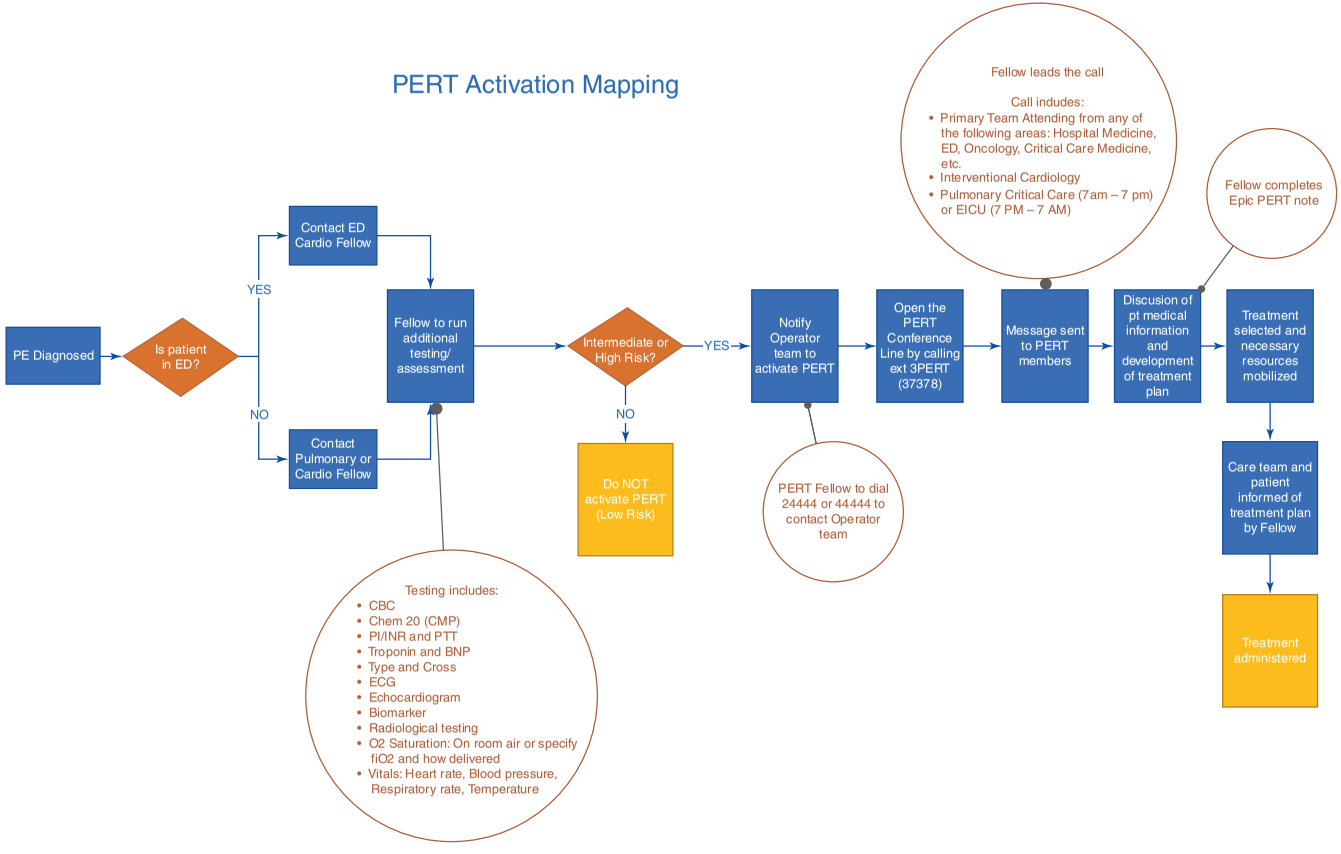

Fig. 6.2 Process map for the pulmonary embolism response team (PERT) process. (© Ochsner Health)

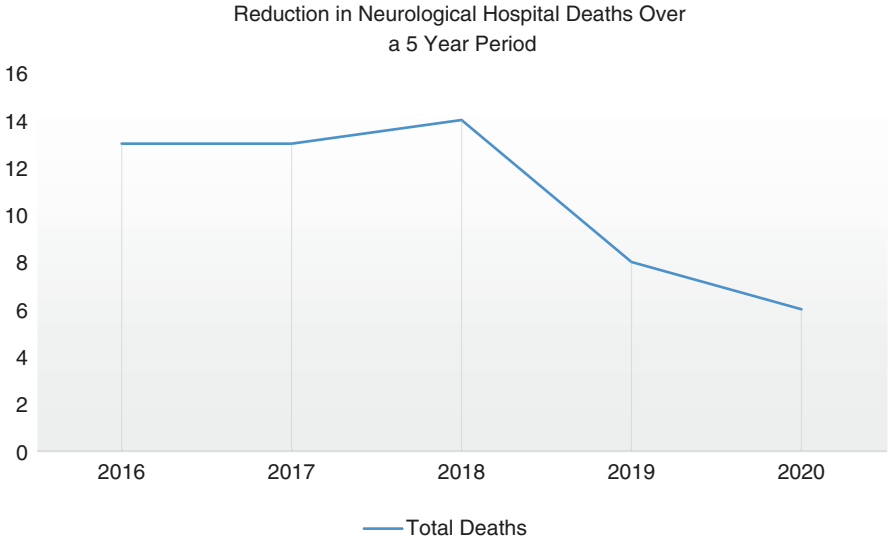

Fig. 6.3 Reduction in hospital deaths for DRGs defining the *U.S. News* medical specialty of neurology and neurosurgery. (© Ochsner Health)

Managing Clinical Risk in a Multiorgan Transplant Institute Several mechanisms allow transplant programs to manage their risk. First, our transplant teams' results are publicly available on the Internet. These results are not provided by the transplant programs themselves but come from a third party that assures 100% compliance with every process and outcome measure included. Second, the Centers for Medicare & Medicaid Services and the United Network for Organ Sharing (UNOS) mandate a quality program with internal audits for every transplant program.

Our teams have developed multiple dashboards to track our results in real time for risk management. The Scientific Registry of Transplant Recipients reports a 2.5-year rolling cohort of results; we can also look at each individual 6-month cohort. We share all the dashboards in real time with all our staff (Table 6.1). We hold monthly transplant council meetings and have each organ director present their own dashboard in depth. The entire transplant department has the opportunity to discuss the dashboards after each presentation. A recent example of improvement using this approach has been to assure complete documentation of pretransplant verification of ABO status.

We have also developed internal tools to stratify the risk of the recipients, which allows for appropriate donor and recipient selection. The CUSUM charts are one of many tools we use to manage risk. When adverse trends in outcome are noted, an in-depth investigation into possible causes is conducted.

Table. 6.1 Example of heart transplant regulatory process compliance dashboard

HEART TRANSPLANT REGULATORY COMPLIANCE DASHBOARD		Goal	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	YTD 2020	Actual 2019	Actual 2018	Actual 2017	Actual 2016	Actual 2015
Phase		Regulatory Standard																		
Pre	UNOS Candidate Form Submission for 12 months ending	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	2 Separate ABO Typings Prior to Listing	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Patient Notification Letters of Listing within 10 calendar days, including required information	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	67%	100%	100%	97%	97%	98%	100%	100%	98%
	Patient Notification Letters of Wait List Removal within 10 calendar days, including required information. (excl. reason of death or tx)	100%	100%	n/a	100%	n/a	100%	100%	100%	n/a	100%	n/a	100%	100%	100%	100%	100%	96%	95%	100%
	Wait List Status Change Letters to Patients (Active vs. Inactive)	100%	100%	100%	100%	100%	100%	100%	100%	67%	100%	88%	100%	100%	97%	97%	99%	88%	87%	97%
	Documentation for UNOS Status 1-3	100%	67%	60%	100%	83%	100%	100%	100%	100%	n/a	50%	100%	100%	86%	90%	89%	93%	83%	86%
	Pre Organ Arrival ABO Verification	100%	67%	100%	n/a	n/a	0%	0%	100%	100%	100%	100%	100%	n/a	85%	85%	100%	88%	75%	
	Consent for Evaluation	100%	82%	100%	83%	100%	50%	90%	100%	100%	100%	100%	100%	100%	95%	97%				
	Multi-disciplinary Team Documentation	100%	100%	100%	n/a	n/a	100%	100%	100%	100%	100%	100%	100%	n/a	100%	100%	100%	97%	89%	79%
Tx Event	UNOS Recipient Form Submission for 12 months ending	95%	100%	100%	100%	96%	100%	100%	95%	95%	89%	94.7%	100.0%	100.0%	98%	100%	96%	100%	99%	99%
	Transplanted Patients Removed from WaitList within 24 hours	100%	100%	100%	n/a	n/a	100%	100%	100%	100%	100%	100%	100%	n/a	100%	96%	96%	94%	100%	100%
	PHS Increased Risk Donor Consent Prior to Transplant	100%	n/a	100%	n/a	n/a	n/a	100%	100%	n/a	100%	100%	n/a	n/a	100%	88%	100%	83%	100%	100%
	Recipient ABO Verification at time of Transplant (date/time/signatures)	100%	100%	80%	n/a	n/a	0%	100%	100%	100%	100%	100%	100%	n/a	90%	88%	96%	97%	88%	92%
	Multi-disciplinary Team Documentation	100%	100%	100%	n/a	n/a	100%	100%	100%	100%	100%	100%	100%	n/a	100%	100%	100%	97%	100%	92%
Post	UNOS Recipient Follow-Up Form Submission for 12 months ending	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Post-Transplant Serologies Completed at 3 months post-txr for Recipients of PHS Increased Risk Donor Organs	100%	n/a	n/a	100%	100%	100%	n/a	n/a	n/a	n/a	100%	n/a	100%	100%	100%	100%	100%	100%	100%
	Multi-disciplinary Team Documentation	100%	100%	100%	n/a	n/a	*	n/a	100%	100%	100%	*	*	n/a	100%	96%	100%	90%	89%	83%

Selection risk is evaluated, such as the quality of the donor organ, the age, major comorbidity, and retransplant status [4, 5]. The concept of recipient selection as a way to balance the risk of using a potentially marginal liver allograft has previously been addressed [6, 7]. Allografts with the highest risk, such as those with advanced age, prolonged ischemia times, or high fat content by liver biopsy, are matched with lower-risk recipients in an attempt to optimize outcomes.

Risk may also lie with the potential recipient. The technical complexity of liver transplant surgery substantially influences outcomes. Transplant outcomes are affected by recipient factors such as previous abdominal surgeries, central obesity, history of intra-abdominal infection, the presence and chronicity of ascites, and/or the presence and extension of portal vein thrombosis. Each of these factors can significantly impact operative physiological conditions that may compromise the conditions for organ reperfusion. Taking stock of these risk factors is key when considering marginal donor allografts since they may be more susceptible to challenging reperfusion conditions.

For more than 5 years, transplant surgeons at Ochsner Medical Center have been using a risk classification system so that the approach to manage risk is more standardized [8]. Patients listed for liver transplant are categorized by potential surgical complexity, based on the recipient's surgical and medical history, physical examination, and cross-sectional imaging. Risk scores of A (low), B (moderate), or C (high) are assigned. The goal of this risk stratification system was to further understand the role of surgical complexity in transplant outcomes. In addition, we sought to facilitate donor–recipient matching and expedite the placement of marginal allografts. Team discussion of the potential recipient surgical risk classification is integral to the on-call workflow at the time of an organ offer.

Key Concept
Standardizing the recipient–donor match process in liver transplantation allows for better operative planning and resource utilization. As a result, patient and graft survival rates using marginal organs compare favorably with those achieved using organs according to conventional criteria.

Carefully taking into account the surgical complexity related to the recipient allows for better operative planning and resource utilization. When we stratify patients according to expected surgical complexity, we can predict operative risk more precisely (e.g., predicting operative time and transfusion requirements). This stratification allows our transplant team to match a higher-risk organ rapidly with a lower-risk recipient, thus expediting organ placement. It also allows us to achieve patient and graft survival rates using marginal organs that compare favorably with those achieved using organs according to standard criteria.

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A Comprehensive Program for Concurrent Review

7

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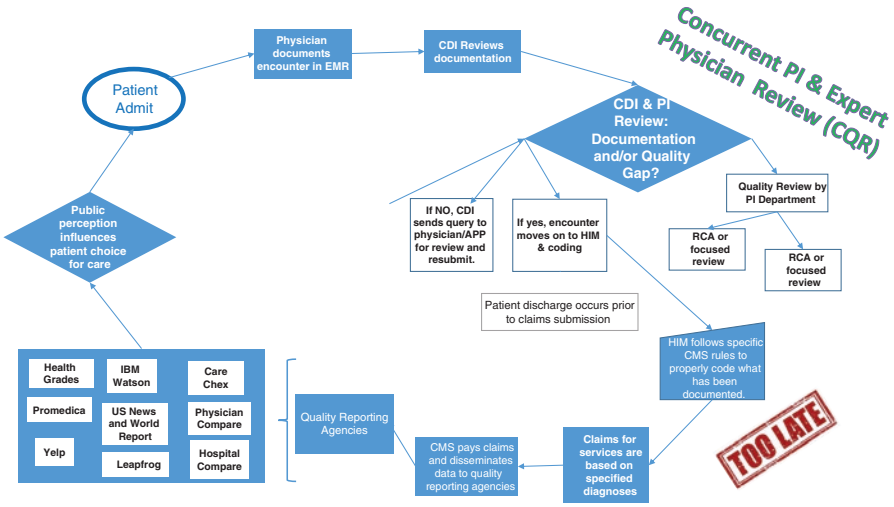

Fig. 7.1 Medical record and billing-based cycle of publicly reported quality information. CDI clinical documentation improvement team, PI performance improvement team, HIM health information management department, RCA root-cause analysis, CMS Centers for Medicare and Medicaid Services. (© Ochsner Health)

Concurrent quality review (CQR) aims to identify whether the medical record and the coding profile accurately reflect the patient's clinical condition. This type of review should be done as early as possible in the patient's hospital course and medical record-based billing submission cycle (Fig. 7.1). At the very latest, it should be completed prior to submitting the patient's coding profile for payment.

7.1 Concurrent Review and Measure Validity

It is well known that documentation and coding issues affect, for example, the validity of the Agency for Healthcare Research and Quality (AHRQ) patient safety indicators (PSIs) [1]. The positive predictive value of this measurement is the ratio of true positives to events that were identified as PSIs. If this ratio were 1, the reporting or measurement of PSIs would be considered completely accurate, meaning that the reported PSIs reflected the occurrence of actual harm events 100% of the time. If patients are identified as having safety or quality events when no such event occurred, such situations are referred to as false positives. The false-positive rate, false-negative rate, and positive predictive value of AHRQ PSIs have been reported repeatedly. Their validity was summarized in a 2016 systematic review and meta-analysis, with the conclusion that PSI validity is limited [2]. The purpose of CQR is to increase their accuracy by eliminating or at least minimizing as many false positives as possible. Missed cases or false negatives also contribute to accuracy but are much more difficult to identify (see Chap. 7). CQR should take the opportunity to identify missed cases when such cases appear evident on review.

Documentation and coding inaccuracies can be thought of as *noise* that obscures opportunities for improvement. Poor performance in a quality metric such as post-procedural bleeding can all too easily be blamed on coding mistakes. When this is the case, it is difficult to mobilize medical staff or performance improvement professionals to engage in true quality improvement efforts. Improving the accuracy of documentation and coding should reduce data variability, instill greater confidence in measurement integrity, and facilitate the identification of opportunities for care process improvement [1]. Therefore, greater measure accuracy, greater confidence in reported data, and better process improvement work can all be facilitated by a thoughtfully constructed CQR program.

Another way to look at this is through the accountant's lens. Just like the accountant aims to avoid unnecessary taxes, CQR aims to assure that documentation and coding our patients' medical diagnoses occur in the most accurate way. CQR aims to "avoid more taxes than required by law" (i.e., avoid reporting events that do not satisfy the official definition of a complication event, such as an AHRQ PSI). In CQR, we can think of such unwarranted complication codes as unnecessary taxes on an organization's quality performance. This is so because the organization's reputation, as measured by performance in publicly reported quality indicators, may be diminished by inaccuracies in documentation and coding. Especially in light of multiple reports of high false-positive rates and coding errors [3, 4], organizations are well advised to examine carefully every claim that contains the potential of a PSI or similar reporting event. Again, CQR can accomplish such careful examination to remove unwarranted blemishes on reputation.

7.2 How Does Concurrent Quality Review Protect Against False-Positive Complications?

CQR affords the opportunity to avoid unwarranted complications by assuring accurate documentation and coding before the patient's demographic and billing information is submitted to the payer. CQR can have a substantial impact. This is in part achieved by examining and correcting whether a medical diagnosis triggering a complication report is present on admission (POA) [5]. Furthermore, review also attempts to verify whether a medical diagnosis is present at all (or was ruled out during the diagnostic workup) and whether other medical conditions are present that could exclude complication codes from being counted as occurrences that negatively affect publicly reported quality metrics [1].

An example from the authors' practice is how CQR has helped to identify previously not reported medical diagnosis codes describing exclusionary conditions for a report of postoperative hemorrhage (AHRQ PSI-9). Our CQR activities identified that coagulopathic conditions were frequently present based on valid clinical indicators or language used by providers in their notes. When appropriately included in the patient's coding profile, exclusionary diagnoses prevent a number of diagnostic complication codes, such as for perioperative bleeding, from being counted as PSIs or complications included in risk-adjusted complications metrics. By adding these codes where appropriate, case mix index also increase, which may also affect payment positively.

Key Concept
Concurrent review can help identify diagnoses based on evidence in the medical record. Examples are coagulopathy or thrombocytopenia. These PSI exclusion diagnoses may also lead to a more accurate DRG assignment by adding a comorbid condition (CC) or major comorbid condition (MCC) to the coding profile.

Evidence for bias against including certain diagnoses exists. One example is the bias against reporting chronic disease conditions or comorbidities in patients who die in the hospital, as reported by Iezzoni et al. [6]. Other common inaccuracies relate to the accurate reporting of the elective nature of a surgical procedure as would be important in the review for AHRQ PSI-10, PSI-11, or PSI-13, which are only applicable to elective surgical procedures. Occasionally, there may be a misunderstanding of a medical record entry, such as the presumption that a deep vein thrombosis (DVT) occurred when the medical record entry refers to prophylaxis against DVT. Moreover, a diagnosis may be reported as having occurred during the hospitalization, but the medical record mentions it only in the context of history or rule-out documentation [7]. Misunderstandings may also occur over descriptions of a deliberate surgical intervention such as a plaque laceration, which, when reported as a complication code, may lead to an inflated PSI-15 rate [1].

7.3 Components of a Successful Concurrent Review Program

A comprehensive model and program for concurrent review (Fig. 7.2) include a collaborative approach, a rigorous review rhythm, a well-defined process, and timeline for bill holds, electronic efficiency tools, and metrics to gauge program impact.

Collaborative Approach CQR should allow real-time communication among the collaborating members of the team, including clinical documentation improvement (CDI) specialists, coders, performance improvement personnel, and medical reviewers. At the authors' hospital, a work queue in the Epic electronic medical record (EMR) allows these team members, including clinical documentation specialists, performance improvement coordinators, and designated medical staff members (such as physician advisors and medical quality leaders), to enter the results of their review of the medical record, which allows for transparent communication. The procedure for review of the Epic electronic medical record (coders' view) is as follows:

- In the Doc(ument) Review tab, open "Account Activities" and enter "160" to open an account note to be able to document the results of concurrent review.
- Disagree or agree with coding based on clinical indicators identified, such as POA status, whether the diagnosis was correct (e.g., pressure or nonpressure

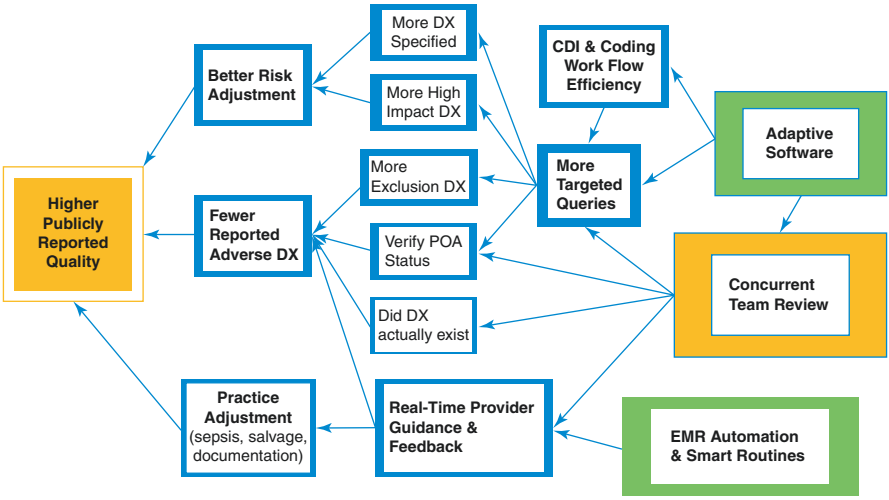

Fig. 7.2 Model and process of concurrent quality review (CQR). POA present on admission, Dx diagnosis, CDI clinical documentation improvement team, EMR electronic medical record. (© Ochsner Health)

ulcer), whether the diagnosis was clinically insignificant, etc. Give reasons, including specific clinical indicators, to support opinion.

- Identify diagnoses that were not picked up in the current (preliminary) coding profile, based on clinical indicators in the record; for the purposes of quality review, the most relevant diagnoses are those identified as exclusions (e.g., coagulopathy is an exclusion diagnosis for PSI-9) and diagnoses of high impact especially when POA.
- Buttress requests for including or changing diagnosis codes by identifying clinical indicators from the medical record in support of such diagnoses.

Performance improvement coordinators may be able to present evidence for or against a particular diagnosis or intended code, which may result in a report of a complication. Still, because of the complexity of clinical decision-making in all but the most straightforward cases, we recommend that a member of the medical staff be designated to provide a higher level of review (in addition to a second level coding review).

Clinical Review Pearl

Is the coded diagnosis correct? Was the coded diagnosis of septic shock really cardiogenic shock? Was it really shock? Was it specifically treated and confirmed or was it just part of a differential diagnosis and later ruled out? Was the deep tissue injury really a venous stasis ulcer? The answer to these questions could determine whether a PSI-13 (see Chap. 19) or PSI-4 (see Chap. 26) is reported.

Physicians chosen for this review role should have a broad and general knowledge of inpatient care, with special emphasis on procedural care, as a large portion of AHRQ PSIs and other complications relate to this aspect of medicine. In addition, the designated physician should have a network of trusted colleagues in various medical and procedural disciplines to call upon for an expert opinion.

Physicians are in a unique position to bring the medical perspective to the table of what otherwise is a fairly rote procedure of dredging the medical record for diagnoses and their attributes. Consider the physician's ability to understand the evolution of disease, the interplay of diagnostic conditions to produce otherwise puzzling symptoms in a patient, and the procedural care provided. Because they bring years of medical training and expertise in practice, members of the medical staff are able to point out relationships between diagnoses (linking them) and identify clinical indicators for diagnostic conditions. They can elucidate the evolution of diagnoses such as stroke or pneumonia, which may not always have declared themselves on admission, and formulate evidence in support of some diagnoses or in favor of their dismissal from a list of differential diagnoses. They may also be able to see if a condition mentioned in the medical record was clinically significant. Alternatively, they may be able to discern if interventions mentioned in the medical record as seemingly addressing the condition were part of an already established treatment and surveillance regimen for another diagnosis, thereby failing the MEAT (monitoring, evaluation, assessment, and treatment) test for the diagnosis in question. In general, a physician reviewer's most valuable contribution will be to ascertain situations, based on clinical indicators in the medical record, where medical judgement is required to arrive at the most accurate diagnosis, and to request a suitable clarifying query. For most medical diagnoses to be codable, evidence in the medical record must show that they meet the MEAT test.

Review Procedure, Rhythm, and Workflow In the first level of review, a performance improvement or quality department coordinator identifies and reviews numerator diagnoses for POA status and assesses the obvious presence of complications. This first level of review can be prompted by using commercially available identifier software programs such as 3M/MModal, Nuance, ChartWise, or others [8]. For cases where no controversy exists, the first-level reviewer enters his or her findings into the team-available software platform and closes the review.

Key Concept
Software programs are essential for efficient and accurate concurrent review; they facilitate the scanning of large numbers of medical records for more accurate documentation and coding opportunities.

Cases of high medical complexity or those with unclear documentation prompt a higher level of review. The performance improvement coordinator may assign a list of remaining cases to concurrent expert specialty physician reviewers (surgical,

infections, cardiology, stroke, etc.). For some complications (e.g., pressure ulcer), an expert allied health or nursing review may also be helpful. Table 7.1 is a tool for such review assignments. The concurrent expert physician reviewer either works from such an assignment tool or from work queues in the EMR. Smaller facilities may be able to accomplish a 100% review procedure by creating swim lanes of names of recently discharged patients to prioritize timely review.

Table 7.1 Form for requesting and recording physician specialty reviewer feedback

Concurrent physician specialty reviewer form				
Assigned to:	Surgical physician reviewer			
Due by:	5/26/19			
MRN				
HAR				
Mortality?	no			
Discharge date	5/24/19			
First surgical or procedure Date	4/10/19		**Recommendations**	
Request to Investigate	**Findings**		**Follow-up: Medical Staff**	**Follow-up: CDI/Coding**
The preliminary coding profile includes postop bleeding, sepsis, and wound dehiscence as complications. Please review for accuracy	*Bleeding occurred during the laparotomy but was inherent in difficult anatomy and cancer spread. Wound intentionally only closed with retention sutures (no dehiscence). Sepsis was present but related to pneumonia that developed on POD5 from aspiration event.*		*Discharge summary states "course complicated by postop sepsis"– educate on meaning of "complicated by" and "postoperative"*	
Hematoma	Assessment	Reasoning		

(continued)

Table 7.1 (continued)

• Was coagulopathy present?	*No*	*No diffuse oozing*		
• Inherent in procedure?	*Yes*	*altered anatomy, tissue planes distorted*	*Reinforce importance of documentation of difficult anatomy and linkage to bleeding if appropriate*	
• Clinically significant?	*Yes*	*required transfusion*		
Wound Dehiscence				
• Inherent in procedure	*Yes*	*wound not closed*	*Reinforce importance of documentation that wound was left open intentionally*	*Review op note for closing technique; look for "retention," "stay" sutures, "wound vac," etc.*
• Clinically significant?	*NA*	*Wound intentionally left open*		
Postop Sepsis (PSI-13)				
• Was sepsis present (vs. infection or bacteremia)? • Was sepsis directly related to surgical procedure?	*Yes* *No*	*per medical staff guideline (SOFA)* *likely from pulmonary aspiration*	*Reinforce importance of documentation* *Linkage of sepsis to the likely causative condition (e.g., pneumonia vs. intestinal spillage)*	

Normal text represents the content of the form when presented to the physician reviewer. The blue italicized text represents the physician reviewer's findings and recommendations

Clinical Review Pearl
Sometimes patients are moved from outpatient to inpatient status; when the QNE occurred during their outpatient procedure, it likely was POA for the inpatient stay.

Reviewing physicians may also look up a patient in the identifier software and review diagnoses for POA status, diagnostic accuracy and specificity, PSIs, hospital-acquired conditions, and other potential complications. The reviewing physician prioritizes review of diagnoses that have a high impact as complications, such as PSIs or other complications prioritized by the organization, such as Vizient complications or subgroupings thereof. Such diagnoses may include respiratory failure, sepsis, hematoma, wound dehiscence, DVT/pulmonary embolism, pneumothorax, line or catheter infection, and device-, infusion-, or transfusion-related complication codes. The physician reviewer completes the assessment and enters the findings into the appropriate form or software tool. The latter often more easily allows multidisciplinary access and sharing among performance improvement, clinical documentation excellence, and coding partners. If the reviewing physician agrees with the coding profile, it is imperative that this be communicated immediately to reduce bill hold times.

It has been our experience that approximately 10–30% of escalated physician reviews yield a disagreement with the proposed or preliminary coding profile. This is similar to error rates previously reported [4]. In case of disagreements over the accuracy of coded diagnoses, physician reviewers need to be explicit about the evidence and the reasons supporting their disagreement and why the issue at hand is important. The supporting clinical indicators should be cited, as well as the reasons for a need for further clarification, pointing out discrepancies in the medical record, lack of provider documentation of a finalized diagnosis when a differential diagnosis is previously mentioned, or clinical impossibilities.

CDI personnel and coders may not always be aware of the intricacies and definitions related to publicly reported quality metrics. When the physician reviewer indicates why it is important to assure maximum accuracy for a coding profile (even if the diagnosis-related group's value may not change), CDI and coding partners feel included and benefit educationally. Our experience is that such case-proximate education and explanation lead to favorable changes in coding practice over time.

7.4 Benefit of Concurrent Review in the Absence of Coding Changes

Even if CQR does not result in any changes to the coding profile, educational opportunities for providers may arise from concurrent physician quality review. We have successfully used this in our group. The reviewing physician communicates any learnings to the treating or discharging clinician as appropriate, indicating findings and a request to consider such information in their documentation of future cases. It

is imperative that such communications are made in a regulatorily compliant manner. No expectation should be created to alter the medical record as a result of the communication, and this should be clearly stated in any communication. The educational message is purely intended to promote future learning; we find that its efficacy is enhanced by taking the opportunity to discuss the learnings using the particular provider's patient in real time to illustrate principles of optimal documentation. Coding professionals have the final responsibility to represent a medical diagnosis compliantly based on the guidelines they are bound by and the potential of a federal audit. When there are irreconcilable disagreements between concurrent reviewers (CDI personnel, coder, quality coordinator, or physician), organizations have set up processes for a fair resolution. At our organization, an appeals process exists to help bring about an appropriate independent review. This process is managed by our corporate compliance department with input from the chief quality officer.

Helpful Exclusion Hint
Consider using physical memory aids (laminated cards) or EMR tools such as exclusion diagnoses added to a specialty preference list.

7.5 Efficiency of Review

One of the most important features of CQR is the ability to identify medical records for review of quality numerator events (QNEs). This means identifying, as early as possible, patient records that may contain codes or combinations of codes that will trigger a QNE. Examples of such QNEs are mortalities, complications, PSI events, and readmissions.

Concurrent reviewers may wish to use branching logic during the review process. Review efficiency will be improved substantially if certain facts are established early during a case review. This will allow the triaging of case reviews when time or personnel are short or other organizational priorities demand greater efficiency. For example, reviewers will find it helpful to identify early on how medical staff responded to a medical record clarification query. Depending on the physician query response, the review procedure may be able to be completed immediately because the definitive documentation was provided in the query. The next place to look for definitive confirmation of a diagnosis should be the patient's discharge summary. This component of the medical record is often viewed as providing the final and confirmed view of the patient's diagnoses as they became clear during the hospital course.

Efficiency Pearl
When a provider responds unequivocally to a medical record query – such as affirming that the enterotomy was a complication of the procedure – concurrent review for this QNE can be stopped.

Table 7.2 A checklist to enhance performance reliability in concurrent quality review

☐ Establish POA status. Recognize the timing of admit orders and the possibility of delayed admit orders due to prolonged preceding emergency department or observation stay.
☐ Establish that the diagnosis truly existed. Assure it was ruled in among multiple diagnostic possibilities. If mentioned only once or in isolation, did the attending physician or surgeon appear to agree with it in their notes? Was this mentioned in the discharge summary?
☐ Confirm clinical significance. Was it an incidental finding not relevant to the patient's care or hospital stay? Check if MEAT criteria are met. Did a plan for treatment or diagnostic evaluation change as a result of knowledge of the diagnosis? Were significant resources devoted to the condition?
☐ For complication diagnoses, is there a clear link to the procedure or treatment modality or did the condition arise concurrently vs. being causally linked to treatment?
☐ Were all applicable exclusion diagnoses represented on the coding profile? If not coded, determine what clinical indicators exist to justify inclusion or query for their existence.
☐ For complication conditions that are linked to timing of surgery or procedures, assure the correct date and time are used.
☐ For complication diagnoses that are linked to the patient's admission type (elective, urgent, emergent), assure that this field is correctly represented.
☐ For complication diagnoses that are linked to point of origin (such as home, another hospital, long-term acute care, and nursing home), assure that the field indicating this information is correctly represented.

Commercially available software and in-house-developed adaptive software can be used to identify QNEs as soon as they are documented, put into a preliminary coding profile, or included in the final coding profile. This should ideally be done while the patient is still hospitalized and definitely prior to external code submission (for billing). It is imperative to examine commercially available software packages for their ability to identify the QNEs of interest to one's organization, as well as their currency with ever-changing definitions from public rating agencies. Because the volume of QNEs can be high (at the authors' 600 bed tertiary/quaternary medical center, the QNEs screened by commercial and internal software range between 60 and 100 weekly), adaptive software should be configured to identify QNEs efficiently. Efficiency in this context means that coding profiles can be batch entered into the software, and well-organized tabular output is available to reviewers in real time. Output should specify the type of QNE and the conditions that triggered its identification. For learning purposes, it is also helpful to be able to query the software for occasional cases that appear to qualify as a QNE from independent clinical review but are not triggered in the software. Finally, a checklist approach to concurrent review has been helpful to guide systematic review (see Table 7.2).

7.6 Metrics of Success

The resources devoted to a well-functioning CQR procedure are not inconsequential. Just like any other part of a health-care system's business, concurrent review must function with accountability for success. Leaders will want to assure that

certain performance metrics are established to identify performance gaps and promote continued value generation.

CQR performance metrics should address effectiveness, efficiency, timeliness, and regulatory compliance. Effectiveness is perhaps the most difficult metric to establish. We suggest tracking the number or percentage of cases reviewed that result in improved accuracy of coding. Our own experience has taught us that early on during the establishment of collaborative CQR the fraction of cases that resulted in coding changes was higher, approximately 30–35%. As team function matured and cross-disciplinary learning took place, this fraction reduced to 10–30%. Beyond tabulating cases with coding changes as a result of CQR, teams can also assess the completeness of review, expressed as the percentage of QNE cases identified that were reviewed by a member of the quality team. Finally, teams can review the organizational performance in PSI rates or risk-adjusted complication rates.

Efficiency of review is gauged by the team's ability to review with the least downtime and overall cost to the organization. One way to express this is by using a capacity utilization measure. For example, if the team's capacity to review is 50 cases per week, the metric to be watched is the speed with which QNEs are made available to the review team. The metric can be expressed as the difference in the number of QNEs made available daily for review minus the team's daily review capacity. By monitoring this metric, we were able to identify deterioration in efficiency both toward the end of the month and at the beginning of the month. Toward the month's end, the number of QNEs that populated our work queues exceeded our review capacity, while at the beginning of the month, the opposite was true. A redistribution of workflow by our clinical documentation and coding specialists increased review efficiency by enhancing the level loading of CQR resources. Another aspect of review efficiency relates to the relative use of first- and higher-level review resources. The fraction of cases that are sent for higher-level or physician review may be a useful gauge of trends. Another aspect of team efficiency is the degree to which a higher-level or physician review results in coding changes. If the review process is done correctly, expenditure of physician time should generally result in acceptance of suggestions to improve coding accuracy. Periodic audits of all cases in which a physician reviewer determined an opportunity for greater accuracy in coding or documentation should be undertaken. Such processes will help the team understand the degree to which coders are taking insights for concurrent review into consideration in their final coding procedure. It should also help team leaders understand where additional provider, CDI, and coding education efforts should be directed.

Timeliness of review is monitored through feedback of the time allotted for review against actual performance. Another measure is the billed dollar value of the work queue for review. Transparency around timeliness and bill hold dollars allows for mutual appreciation of the impact of bill holding for review. Some organizations set a threshold for action once the bill hold amount exceeds a certain amount. At that point, additional review resources may need to be mobilized to mitigate the impact of quality review on the revenue cycle.

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Optimizing Clinical Documentation Excellence and Physician Queries

8

J. Foley, B. Panunti, J. Chighizola, J. Cruz, and W. Johnson

In order to understand how a patient's diagnosis code profile is assembled and how its accuracy is assured, one must have knowledge of the organization's Clinical Documentation Integrity (CDI) department, their Coding Department partners, the federal guidelines relating to coding, and the processes that lead to the submission of the final bill and its associated diagnosis codes. In this chapter, we provide an overview of the evolution of CDI from finance to quality and illustrate how processes and tools have been aligned accordingly in our health system. We also describe our efforts in optimizing one of the critical tools, the physician query.

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8.1 Inpatient Payment Methodology Shift

Historically, under the Centers for Medicare & Medicaid Services (CMS) inpatient prospective payment system (IPPS), hospitals pursued opportunities for enhanced revenue capture by launching a formal Clinical Documentation Improvement (CDI) program comprised of dedicated staff concurrently reviewing patients' charts to improve both the accuracy and completeness of the medical record. This finance-driven approach was the rationale for the program implementation at Ochsner Health, and a team of registered nurses was established reporting within the organization's Revenue Cycle in the department of Health Information Management.

8.1.1 Inpatient Prospective Payment System

Under the IPPS payment system, hospitals are reimbursed based on the volume of Medicare Severity diagnosis-related group (MS-DRGs) assigned. MS-DRGs are intended to describe resource consumption and severity of diagnoses. MS-DRG assignment is driven by the selection of principal diagnosis, procedures performed, identification of complications/comorbidities (CC), and major CCs (MCCs) such as age, gender, and discharge disposition. Each MS-DRG is also assigned a relative weight (RW). A higher relative weight is associated with longer length of stay, greater severity of illness, and higher reimbursement. Hospital reimbursement is then calculated by the specific MS-DRG relative weight multiplied by the hospital blended rate. A hospital is assigned its specific blended rate based on a formula that includes geographic location, services provided, etc. (Fig. 8.1).

8.1.2 Diagnosis Codes and Quality

The early mission of the CDI department was the optimization of the MS-DRG but evolved to include a new focus on capturing severity of illness (SOI) and risk of mortality (ROM) using the 3M™ All Patient Refined DRG (APR DRG) Classification System [1]. APR DRG helps provide a higher level of detail about a patient's condition and the care provided by addressing the differences in relationship to "how sick" and the "likelihood of death." This was a first step to correlate with the hospital's mortality index, an early measure of health-care quality.

The classification system is driven by a section of principal diagnosis, procedures performed, most secondary diagnoses, age, and gender. It groups similar DRGs between

Fig. 8.1 DRG payment inputs. (© Ochsner Health). (© Ochsner Health)

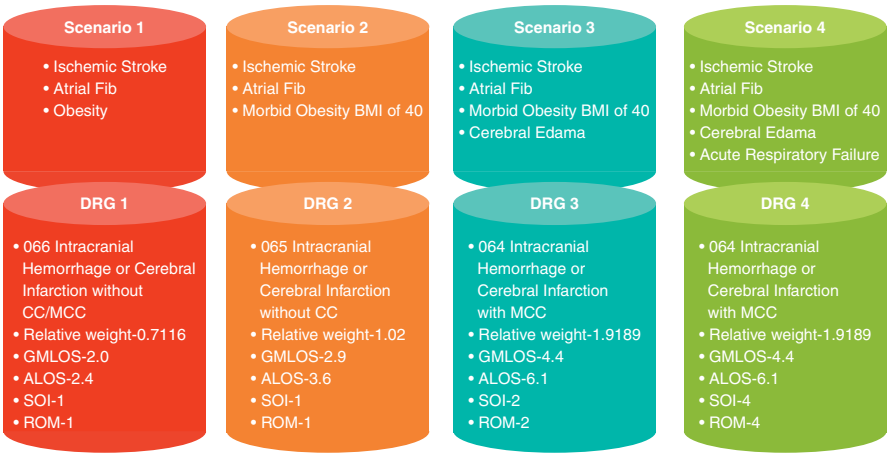


Fig. 8.2 Examples of DRGs with differing relative weights and impact on expected LOS and SOI/ROM

four different categories (1 – minor, 2 – moderate, 3 – major, and 4 – extreme). By having CDI specialists focus on the APR DRG, they are helping physicians and coders improve the depiction of patient acuity. This classification, along with cost and charges obtained from claims data and other discharge data associated with patient care, enables payers and others to profile patients and providers. By analyzing practice patterns and resource utilization, it allows for comparison of items such as the actual mortality vs. the expected mortality; patient length of stay and cost; and facility and physician performance compared to similar groups, to name a few. Figure 8.2 shows the change in DRG and SOI based on documentation and the corresponding relative weights.

The relationship between quality measures and reimbursement continued to evolve as CMS made changes to the inpatient methodology mandated within the Patient Protection and Affordable Care Act (ACA) signed into law in 2010. The approach to health-care performance is focused on three dimensions known as the "Triple Aim": improving the patient experience of care (including quality and satisfaction), improving the health of populations, and reducing the per capita cost of health care [2]. To operationalize this, the Department of Health and Human Services implemented three value-based programs: Hospital Value-Based Purchasing Program (HVBP), Hospital Readmission Reduction Program (HRRP), and Hospital-Acquired Condition Reduction Program (HACRP).

Implementation of Value-Based Care (Fig. 8.3) transforms CMS from a passive payer to an active purchaser of higher-quality, more efficient health care. It incentivizes the best care and improves transparency for Medicare Beneficiaries by making comparative data available on the Hospital Compare website. Measurable goals were set to link 85% of the Medicare fee for service payment to quality or value by 2016 and 90% by the end of 2018. The impact of the program includes a 2% reduction in reimbursement across all MS-DRGs, and then hospitals are awarded money based on their total performance. The bottom 25% of hospitals are penalized with 1% payment reduction and hospital-acquired conditions (HACs) not reimbursed as CCs and MCCs. Hospital performance for HVBP is based on an approved set of measures grouped within domains (Fig. 8.4). Each domain is assigned weights (percentages), used to

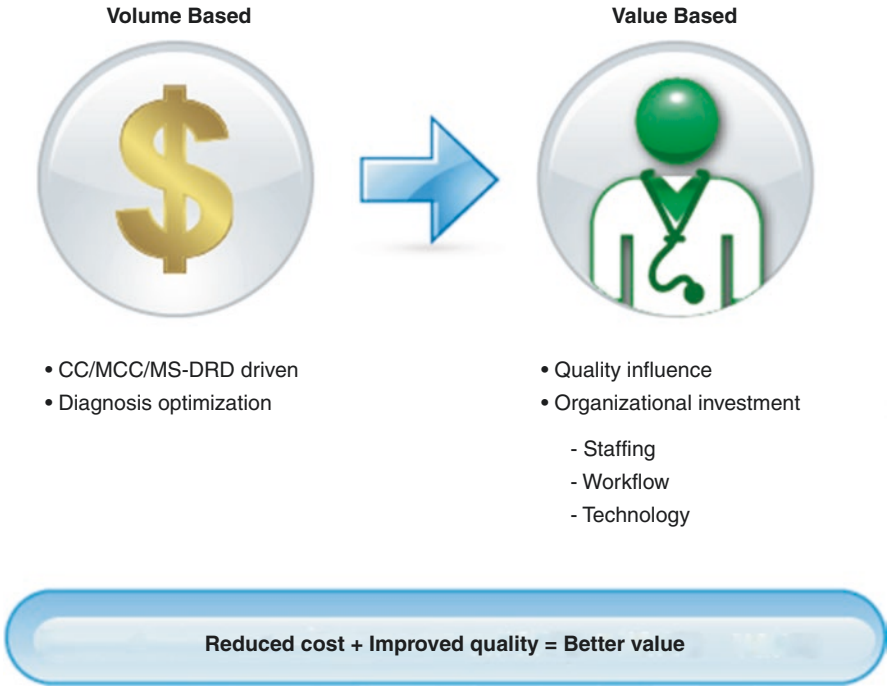


Fig. 8.3 Transformation to value-based approach through the inpatient payment methodology shift

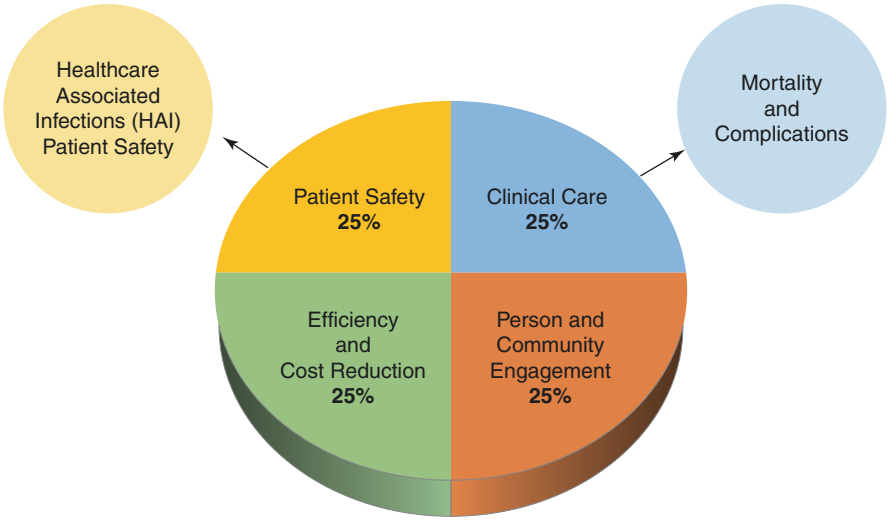


Fig. 8.4 Overview of CMS value-based purchasing (VBP) program [3, 4]. (© Ochsner Health)

score each domain. Fiscal year 2021 domains include Clinical Outcomes (25%), Person and Community Engagement (25%), Safety (25%), Efficiency and Cost Reduction (25%). Within the Safety Domain are specific patient safety indicators (PSIs) identified by the Agency for Healthcare Research and Quality (AHRQ) as potentially avoidable in-hospital safety events and the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) healthcare-associated infection (HAI) measures, which include central line-associated bloodstream infection (CLABSI), catheter-associated urinary tract infection (CAUTI), surgical-site infection for abdominal hysterectomy and colon procedures (SSI), methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia, and *Clostridium difficile* infection (CDI). The Clinical Process of Care Domain measures how often a hospital performs care for specific conditions.

8.2 Organizational Changes with Value-Based Hospital Reimbursement [5]

The shift to value-based reimbursement requires organizations to evaluate the efforts of the CDI specialist, coding and operations including staffing, workflow, available technology, and performance metrics to address the requirement for detailed coding and documentation. Within our organization, the full-time equivalent staffing was calculated to allow for a lower percentage of total discharge patient account coverage and a lower percentage of daily chart reviews to account for the increased review efforts focusing on quality measures. Implementation of CDI software allowed for the identification of PSI and HAC during the CDI review process.

Adaptation to the new CDI software allowed for the ability to identify and share real-time data with the quality team to conduct PSI and HAC review instead of the quality team waiting for administrative data to conduct a retrospective review. Led by the chief quality and patient safety officer, a committee composed of system quality improvement leaders, documentation specialists, and data manager, the team was trained on the new review process. This collaborative approach helps the organization ensure accurate data and minimize penalties under the HVBP. Similar efforts have been described by others [6, 7].

A significant structural change within our health information management (HIM) division was the adoption of a service line model that allows for enhanced review of documentation through the implementation of a concurrent coding process in addition to concurrent CDI review within service specialties. The focus of the model was to create coding and CDI experts within their own discipline and specialty. Workflow redesign helped to minimize duplicate work and post billing adjustments while creating a stronger partnership between the two disciplines. This collaborative effort of the two disciplines (Fig. 8.5) helps to support achieving the goal of complete and accurate coding by ensuring the right information is being captured in a complete and timely fashion.

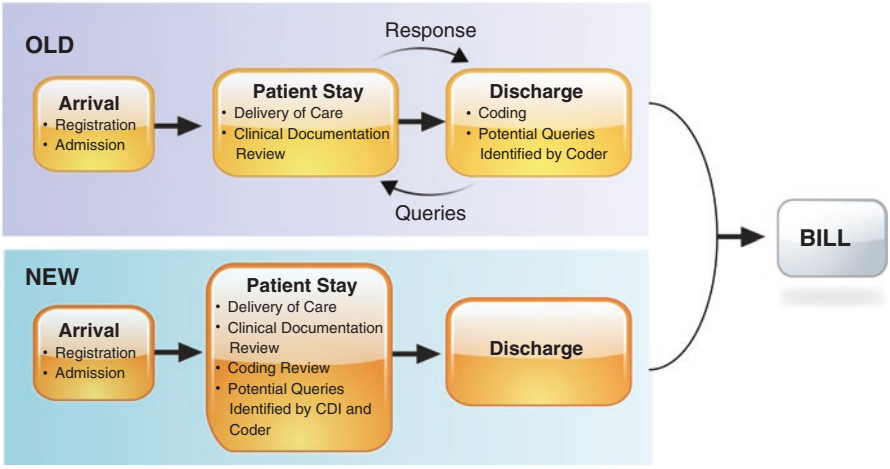


Fig. 8.5 Collaboration between clinical documentation improvement and coding groups. (© Ochsner Health)

8.3 Ochsner Health Clinical Documentation Guidelines

With a service line model in place, certain diagnoses were identified as opportunities for provider education due to the high number of queries, discrepancies between documentation and coding, and the frustrations among the providers as well as the HIM team reflecting that clinical language does not always equate to coding language. This was the basis to form a team focusing on documentation improvement initiatives, including system-wide clinical definitions for provider documentation known as the Ochsner Health Clinical Documentation Guidelines (see Fig. 8.5). The team included stakeholders, leadership, quality, and compliance. Our physician advisor took the lead to collaborate with CDI, coding, compliance, and specialty-specific providers on the development of evidence-based clinical criteria. Prioritization was determined by a steering committee based on available internal data.

Each guideline was developed as an educational tool to communicate health system clinical definitions and fundamental coding guidelines for certain diagnoses, though never intended to replace the provider's clinical judgment. In addition to the definition, guidelines include criteria for a specific diagnosis, approved abbreviations, documentation tips for coding accuracy, documentation examples, as well as references. Since clinical language does not always equate to coding language, these tip sheets include specific examples of documentation that cannot be captured as coders cannot make any assumptions. Commonly used terminology by our providers that did not translate into codable language was identified using chart audits and was termed "words to avoid" in the tip sheets. Examples include recommendations to avoid documenting "creatinine doubled, if you mean acute renal failure," avoid documenting "use of continuous home O_2 if you mean chronic respiratory failure," and avoid documenting "chest pain if you mean angina" (Fig. 8.6).

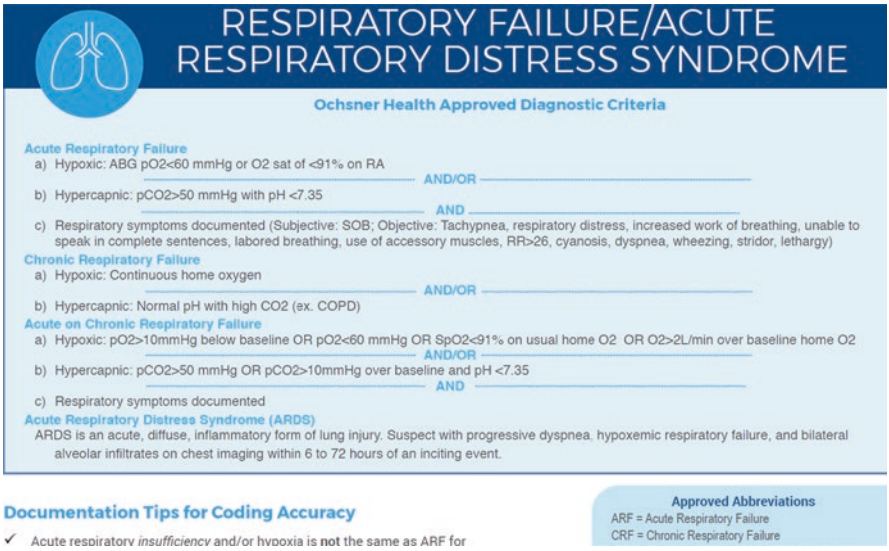


Fig. 8.6 Example of an Ochsner Health Clinical Documentation Guideline. (© Ochsner Health)

Although these clinical documentation guidelines were developed to standardize medical diagnosing and clinically support documentation for diagnoses across the organization, they have evolved to be the basis of smart phrases builds and query form optimization. The first phase of rollout of the Ochsner Health Clinical Documentation Guidelines included making the content available in the electronic medical record as linked resources. The reference can also be found on the health system provider portal, an intranet resource (see Fig. 8.7).

The second phase of the rollout was developing smart phrase builds in the electronic medical record that can be used by the provider to guide documentation needs (see Fig. 8.8). Whether this smart phrase is automatically populated when a diagnosis is chosen using problem-oriented charting or whether it is brought in by the provider using a dot phrase, the provider merely needs to navigate through the phrase and answer the questions. If the smart phrase is utilized, supporting documentation is still needed to reflect the patient's severity of illness risk of mortality and justify the provider's level of service will be populated. The third phase of rollout included aligning the tip sheets with the physician query forms.

8.4 The Physician Query

CDI utilizes a communication tool known as the physician query to ensure precise code assignment. Professional guidelines for use of the query are set forth in the American Health Information Management Association (AHIMA) practice briefs. Queries are not used to question the medical judgment of the provider, but rather to clarify documentation.

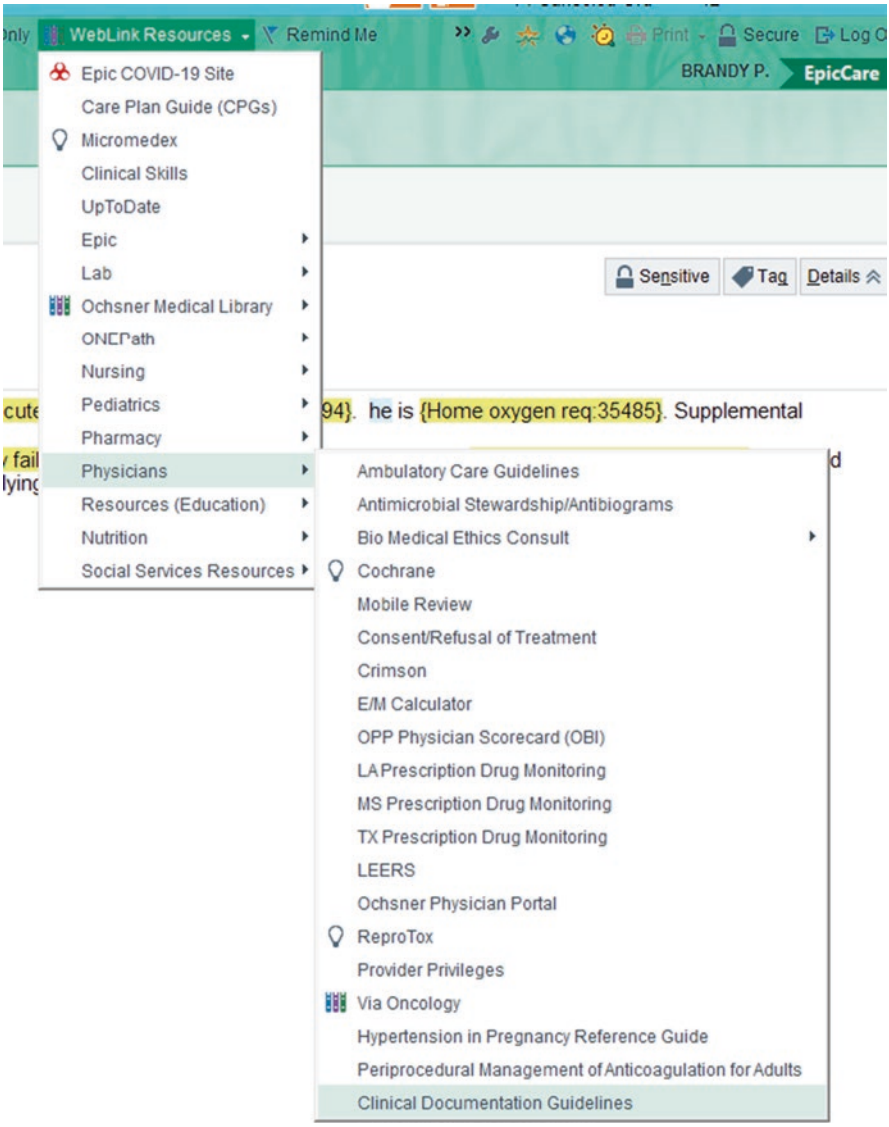


Fig. 8.7 Location of the Ochsner Health Clinical Documentation Guidelines on the organization's intranet. (© Ochsner Health)

Queries may be submitted (but are not limited to) by the following instances [8]:

- When documentation is conflicting, incomplete, lacking, or ambiguous
- When documentation describes or supports a medical condition or diagnostic evaluation and/or treatment without a corresponding diagnosis or procedure
- When documentation is not clear to support assignment of present on admission indicator

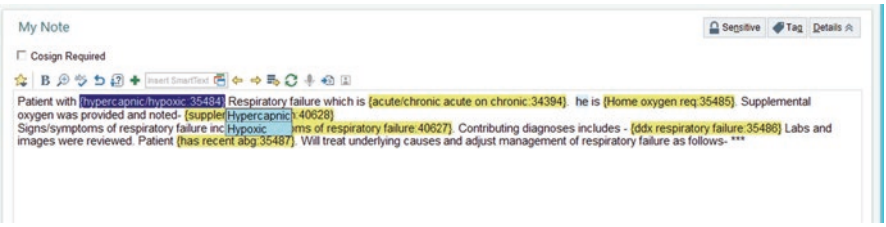


Fig. 8.8 Example of smart phrase designed to improve documentation accuracy in the electronic medical record. (© Ochsner Health)

- When documentation reports a diagnosis that is not supported by clinical indicators

The query format includes open-ended, multiple-choice, yes/no, or verbal questions. Regardless of the format, every query must be individually adapted to the patient during a particular encounter. Clinical indicators pertinent to the condition in question are included in the query and may include signs and symptoms with duration, diagnostic test results, lab findings, findings of consultants, and treatment performed. As discussed above, our query forms also include our health system definitions as a tool for providers.

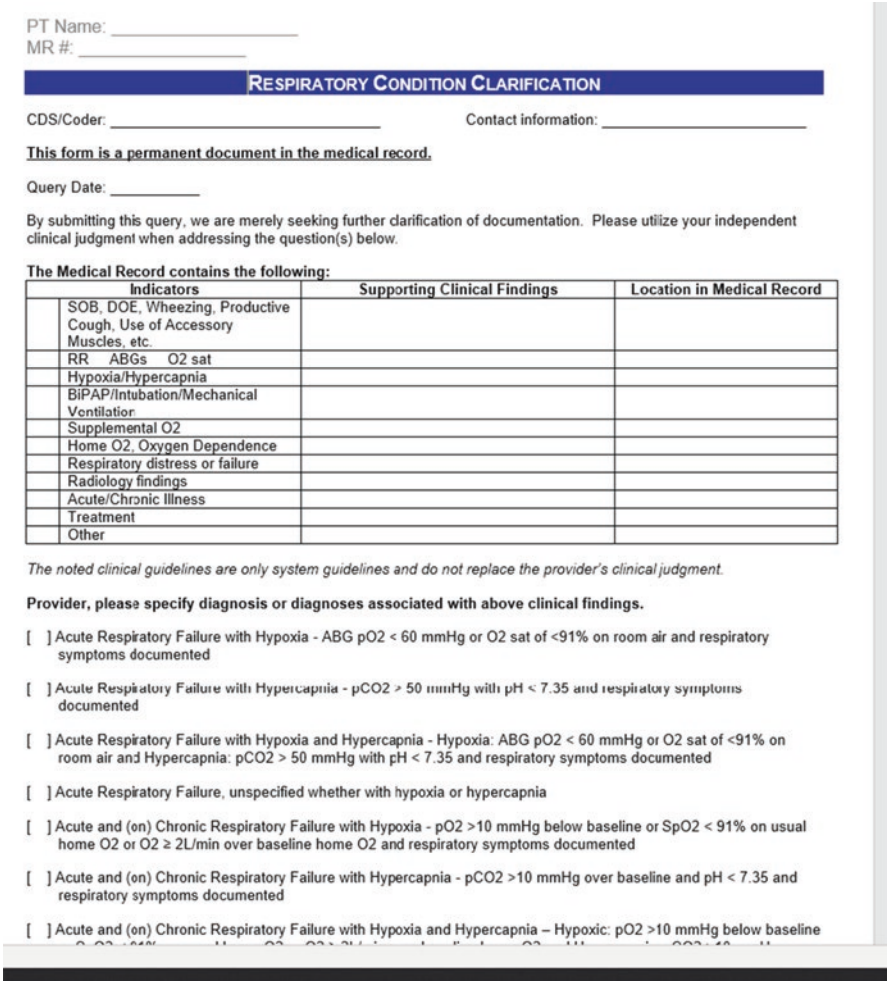
The multiple-choice query is the type query utilized within our organization. It offers direction to the type of information sought; therefore, clinically significant and reasonable options are listed based on the clinical indicators. Options such as "clinically undetermined," "other," "not clinically significant," or even "integral to," along with an open space for the provider to add additional verbiage, may also be included.

Queries are identified through the CDI record review either concurrently by initiating the review within 24–48 h of patient admission or retrospectively. Once the query opportunity is identified, the appropriate form is utilized to formulate the content and assign it to the provider of record electronically. Providers may enter their response either directly on the query or within their progress notes. All queries are retained as a permanent part of the legal medical record.

When diagnoses in the medical record are not supported by clinical indicators, the CDI submits a query known as a clinical validation query. The intent of the query is to gain further clinical evidence of the condition to support accurate code assignment. This type of query allows for the provider to indicate if the condition is present and the opportunity to provide clinical support. If the provider concludes the condition is not present, a statement can be made indicating that the condition has been ruled out (Figs. 8.9 and 8.10).

8.4.1 Practical and Real-Life Considerations

Queries are the bridge between the true clinical picture and accurate clinical documentation. They are one of the pillars of success for a hospital from a



PT Name: _____
MR #: _____

RESPIRATORY CONDITION CLARIFICATION

CDS/Coder: _____ Contact information: _____

This form is a permanent document in the medical record.

Query Date: _____

By submitting this query, we are merely seeking further clarification of documentation. Please utilize your independent clinical judgment when addressing the question(s) below.

The Medical Record contains the following:

	Indicators	Supporting Clinical Findings	Location in Medical Record
	SOB, DOE, Wheezing, Productive Cough, Use of Accessory Muscles, etc.		
	RR ABGs O2 sat		
	Hypoxia/Hypercapnia		
	BiPAP/Intubation/Mechanical Ventilation		
	Supplemental O2		
	Home O2, Oxygen Dependence		
	Respiratory distress or failure		
	Radiology findings		
	Acute/Chronic Illness		
	Treatment		
	Other		

The noted clinical guidelines are only system guidelines and do not replace the provider's clinical judgment.

Provider, please specify diagnosis or diagnoses associated with above clinical findings.

[ ] Acute Respiratory Failure with Hypoxia - ABG pO2 < 60 mmHg or O2 sat of <91% on room air and respiratory symptoms documented

[ ] Acute Respiratory Failure with Hypercapnia - pCO2 > 50 mmHg with pH < 7.35 and respiratory symptoms documented

[ ] Acute Respiratory Failure with Hypoxia and Hypercapnia - Hypoxia: ABG pO2 < 60 mmHg or O2 sat of <91% on room air and Hypercapnia: pCO2 > 50 mmHg with pH < 7.35 and respiratory symptoms documented

[ ] Acute Respiratory Failure, unspecified whether with hypoxia or hypercapnia

[ ] Acute and (on) Chronic Respiratory Failure with Hypoxia - pO2 >10 mmHg below baseline or SpO2 < 91% on usual home O2 or O2 ≥ 2L/min over baseline home O2 and respiratory symptoms documented

[ ] Acute and (on) Chronic Respiratory Failure with Hypercapnia - pCO2 >10 mmHg over baseline and pH < 7.35 and respiratory symptoms documented

[ ] Acute and (on) Chronic Respiratory Failure with Hypoxia and Hypercapnia – Hypoxic: pO2 >10 mmHg below baseline

Fig. 8.9 Example of a multiple-choice physician query. (© Ochsner Health)

documentation accuracy perspective. Optimizing queries is a multifaceted and multistep project. With clinical guidelines and coding guidelines constantly evolving, optimizing queries is a journey, not a final destination. The two major steps to optimizing queries are (1) an accurate comprehensive query template and (2) optimal and compliant utilization of the queries by the CDIs.

Query templates must be structured to include all clinical indicators for each query type, with answer options focused to achieve accurate diagnoses coding appropriate for the clinical indicators. Health-care organizations usually set up a designated medical record query committee comprised of experts from the clinical and coding worlds. Each query template may be reviewed by a physician champion. Our internal practice is to have all templates reviewed by a physician champion to

(s) below.

The Medical Record reflects the following:

Supporting Clinical Findings	Location in Medical Record Provider Name
presents with CP associates with Sickle Cell Crisis NO SOB, Resp 20 Sat 97% h/h 8.1/23	ED note 2/8
Pt was seen and examined at bedside. Tm 100 overnight. Took off his oxygen overnight, and became hypoxic around 88%, placed back on oxygen. Overnight 2/12 patient took off his oxygen (he has been taking off his oxygen since admission) and became hypoxic, 88% and he spit up dark sputum. Sputum and CXR ordered. Hgb 2/12 was 6.1 given another unit of pRBC. Tolerated well. Currently on IV Levaquin. CXR worsening. Ac hypoxic REsp Failure Admitted to hospital medicine on 2/8 for sickle cell pain crisis. Started on supportive care with fluids, oxygen, abx and pain meds. Initial CXR fairly unremarkable. Initially denies cp, cough, sputum, dyspnea, dysuria or diarrhea. Spiked a fever while on abx 2/9 however appeared non toxic. CXR done noting possible early infiltrate. Hgb 6 on 2/10, given one unit of pRBC. Overnight 2/12 patient took off his oxygen (he has been taking off his oxygen since admission) and became hypoxic, and he spit up dark sputum. Acute hypoxic respiratory failure - suspecting from above, ?ACS vs CHF pattern - supportive care - will consult hematology for input - BNP and TTE ordered , he has no JVD or LE swelling on eval	HM PN 2/12
Doing well, labs improving and on room air	Hem/Onc Clinical Review 2/13
ON exam, patient was on 4L O2 at 100% Initial CXR showed no abnormalities though was repeat imaging has showed some progression bilateral infiltrates.	Hem/Onc Consult 2/12
CHF/ pulmonary edema pattern. Pneumonitis could have similar appearance	Chest Xray 2/12

Please clarify the diagnosis of Acute Respiratory Failure.

Provider Use Only

[ ] Diagnosis ruled in and additional clinical support/ decision making indicators for the diagnosis include (specify):_____

[ ] Above stated diagnosis has been ruled out

[ ] Above stated diagnosis has been ruled out, other diagnosis ruled in (specify):
[ ] Respiratory Distress with Hypoxia
[ ] Hypoxia Only
[ ] Other:_____

[ ] Other clarification (specify): _____

(Click F2, select 'X' if Clinically Undetermined 27177) **] Clinically undetermined**

Fig. 8.10 Clinical validation query. (© Ochsner Health)

make sure that the queries have the most accurate clinical indicators and answer options. This may include discussion with specialty and subspecialty experts, depending on the nature and type of the query and the clinical condition being queried. Care should be taken to ensure that the verbiage of the answer options in the queries is correct from a clinical perspective and enables compliant accurate coding.

The utilization of queries by CDI holds greater importance than the structure of the query templates. CDIs may issue queries for one or more of the following purposes: need for additional diagnosis documentation based on clinical criteria, conflicting documentation, coding purposes, higher accuracy in coding, clarifications of potential complications, requesting additional specificity for documented

diagnosis and present on admission status. The timing of issuing a query, from the hospital course perspective, is as important as the purpose of and the details in the query. Queries must include all possible clinical indicators and examples of conflicting documentation to present the complete picture to the provider to get the most accurate response.

CDI professionals may consider having a compliant conversation with the provider to discuss the purpose of the query. They should be cognizant and aware of the potential response that they anticipate from the provider. The verbal query process would parallel the thought process that the CDI professionals exercise while contemplating and drafting a query. One example is the situation where clinical indicators exist to suspect that hypertension may be associated with diabetes mellitus. Our team feels that CDI professionals may explain to the physician how such documentation might lead to the assignment of a code not reflective of the patient's actual disease if the physician instead had meant to document that hypertension was a manifestation of diabetes. Speaking with the physician in certain cases thus may be appropriate to explain why queries are written.

8.4.2 Further Defining Medical Record Queries: Process and Timing

Physician queries are real-time-focused (i.e., while the patient is still in the hospital) requests for clarification of information within a provider's documentation. Queries are issued because there is a clinical documentation (nurse's notes, lab reports, etc.) that has not been captured in the provider's documentation. Alternatively, such clinical documentation may conflict with the provider's documentation, again necessitating that a query be issued for clarification. As mentioned, queries are generally issued while the patient is still in the hospital or while documentation is still being actively considered after discharge. In the latter situation, the query would occur between the time of patient discharge and before final billing.

Physician queries are issued by individuals who are not on the patient's care team. Such individuals generally are CDI nurses. In some environments, specially trained professionals such as a performance improvement coordinator, physician advisor, or physician quality director might issue a medical record query, although the usual role for the physician advisor or quality director is provider education.

Queries should ideally be accomplished within the electronic medical record with the capability to track provider responsiveness and coding/CDI loop closure.

8.4.3 What Is Not a (Compliant) Query?

8.4.3.1 Provider Education

Documentation education delivered either to groups of providers is not considered a part of the query process. Likewise, documentation education to a single provider

does not represent a medical record query as long as it occurs outside of the context of an active pre-billed patient. Education of a single provider on an issue concerning documentation on such a patient is discouraged and must not lead or influence the provider.

Discussions Among Providers Discussions between members of a patient's care team (residents, advanced practice providers, or physicians) around a diagnosis or its documentation are not considered queries.

8.4.3.2 Asking for or Prompting Clinical Judgment

An example of this would be when a physician in an administrative role such as a medical director of quality asks for or prompts a clinical judgment to be rendered by a treating provider (e.g., an attending or a specialty consultant in that area), such as whether an adverse patient event was an expected outcome of the procedure or an unexpected complication. Another example would be asking for more specificity related to a diagnosis, such as with verbiage similar to "You wrote CHF, can you be more explicit including whether its acute or chronic, as well as systolic or diastolic – see attached Ochsner clinical guideline?" Or asking for clinical clarification in order to ensure correct capture of acuity such as "You wrote 'AKI'. Was that meant to convey that the patient has renal failure from an acute kidney injury or did the patient have a renal insult that did not result in renal failure?"Or asking about the presence of a diagnosis that likely existed based on record review, but was not documented (e.g., many exclusion diagnoses). Or asking physician/provider for follow up to a prior request such as mentioned earlier or responding to a request for information. As mentioned before, asking physicians or prompting them to document certain diagnoses or aspects of a diagnosis is not compliant. The compliant procedure for clarifying diagnostic information is discussed below.

8.5 Compliance Essentials and Physician Queries [9]

Physician queries must not contain explanations of the impact of one particular response over another – monetary or quality measurement result. To be safe, no mention should even be made of why the issue precipitating the query even came up. Sensitizing the medical staff to the reasons for queries can be safely accomplished through separate medical staff education. Medical record queries should not lead or influence the physician to answer one choice over the other based on how the query format is composed. When answering queries, medical staff should be assured that the choices presented are in random order. To be compliant, queries must not be issued repeatedly to arrive at the desired answer.

A compliant query format includes a "confirmation" query that essentially seeks a yes/no answer, such as "Please confirm if a diagnosis truly existed/was ruled in or out." However, it is prudent to leave the provider a third choice to indicate an alternative diagnosis in case the physician believes that neither a "yes" nor a "no" answer would

be correct. Other compliant query languages may ask providers to "comment on whether the diagnosis was likely present on admission, please indicate" or "indicate if a lesser or more severe level of the condition was present." Any of these formats presuppose that clinical indicators exist in the medical record to justify issuing the query.

For complications, defined as any conditions that occurred during or after surgery or a procedure, physicians can be asked to reflect if this was a complication or a concurrent condition. This is to indicate if the occurrence was expected or inherent in the procedure. Again, clinical indicators must exist to justify issuing a query, such as the documentation in the surgeons' operative note that the patient's anatomy was abnormal and might have led to an enterotomy. In the absence of the surgeon's clear documentation that the enterotomy was a surgical complication, documentation of difficult and abnormal anatomy, such as the presence of extensive adhesions, then may constitute a clinical indicator justifying a query to clarify if a complication had occurred. It is definitely not considered compliant for individuals not using the medical record query format (written or verbal) to suggest diagnoses to the physician, allude to potential adverse effects of documentation, or dissuade physicians from documenting or responding to certain choices within a medical record query. While this can be part of general provider education efforts, it is not compliant to make any of these communications while the patient's coding profile is still being assembled, that is, during the pre-bill period.

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Part II

External Ratings and Complications

9 Public Reporting as a Quality Improvement Strategy: CMS and Other Rating Agencies

E. K. Chacko, D. Kosydar, and A. Schubert

Public reporting involves making provider data available free of charge or at a nominal cost. Public reporting is viewed by state, federal, and other entities as a means to improve the quality of health care by increasing transparency, improving quality, controlling cost, and providing physicians and patients useful information. Robust national comparisons in this context will lead to improved quality of care, improved health outcomes, and improved patient decision-making.

The assumptions underlying the value of public reporting are (1) given choices and information, patients and purchasers will choose higher-quality providers and (2) health-care providers will strive to provide high-quality care when information about their performance is publicly available to patients, their peers, policymakers, and the media [1].

Key Concept
Use of public reporting can be viewed as a beneficial strategy for health-care organizations. Benefits include the engagement of care teams and medical staff who can use these data to understand societal expectations around outcomes for health care.

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Publicly reported data used for comparisons include both clinical data and administrative data, such as billing data. Clinicians debate the accuracy of billing data as a measure of quality because billing data may or may not accurately reflect clinical care when comparing health outcomes between providers. However, such data are viewed as a more acceptable measure if risk adjustment is used to control for differences in patient populations. Additionally, the use of registries specifically for clinical data, which tend to provide more detail on patient outcomes, is on the rise. For example, during the next few years, CMS will use hybrid quality measures that incorporate electronic medical record-derived clinical data such as laboratory values and vital signs into its new digital quality measures requirements.

At Ochsner Health, we believe that public reporting as a quality improvement strategy allows us to target our efforts in areas where we have the opportunity to improve compared to national benchmarks. In this scenario, the patient wins. While the methods of standardizing, normalizing, and risk-adjusting data differ across public reporting and rating methodologies, we believe that many of them ensure reasonable comparisons of performance across different quality measures at similar health-care facilities. According to the American Hospital Association, "Public reporting will continue to improve as hospitals and health systems address their patients' needs and the broader social determinants of health in the communities they serve. This includes societal and environmental conditions such as food, housing, transportation, education, violence, social support, health behaviors and employment" [2].

While there are other rating agencies such as CareChex, IBM Watson, Healthgrades, Becker's, *Consumer Reports*, and Vizient, we focus here on three of the public and widely shared ratings and reports we use at Ochsner Health to gain perspective and guide improvement efforts: Centers for Medicare & Medicaid Services (CMS) Overall Hospital Quality Star Ratings, Leapfrog Hospitals Safety Grade, and *U.S. News & World Report* Best Hospitals Specialty Rankings. A comparison overview of data sources and ratings employed by selected rating agencies is provided in Table 9.1. Please also see Chap. 5 for further discussion of Vizient ratings.

9.1 CMS Overall Hospital Quality Star Ratings

According to the Yale Center for Outcomes Research and Evaluation, "The primary objective of the Overall Hospital Quality Star Rating project is to summarize information from the existing measures on Care Compare in a way that is useful and easy to interpret for patients and consumers through the development of a statistically sound methodology. Consistent with other CMS Star Rating programs, this methodology assigns each hospital between one and five stars, reflecting the hospital's overall performance on selected quality measures" [3, 4].

Table 9.1 Selected reporting agencies

	Care Compare	*U.S. News*	Vizient	Leapfrog	Healthgrades	CareChex comparison	Becker's	IBM Watson/Truven
Type	Government	Commercial	Commercial	Public service organization	Commercial	Commercial	Commercial	Commercial (inactive as of 1/1/21)
Ratings	Star	Best Hospitals; Honor Roll	Q&A	Hospital safety grades A–F	Best Hospitals			Best Hospitals
Data sources	MEDPAR	MEDPAR; NSHN; Survey	MED-PAR; NSHN, member uploads	MEDPAR; member survey	MEDPAR			

Q&A quality and accountability, *NSHN* National Healthcare Safety Network, *MEDPAR* Medicare Provider Analysis and Review

Key Concept
Publicly reported quality data, such as from the CMS Hospital Star Ratings, summarize information about hospitals' performance on selected quality measures. The goal is to do this in such a way that it is easy for patients and families to understand and inform their choices for hospital care.

CMS uses metrics from the Hospital Inpatient Quality Reporting Program and the Hospital Outpatient Quality Reporting Program to develop star ratings for conditions and procedures that:

- Are common in the Medicare population
- May have a significant impact on patients' lives
- Are associated with poor outcomes
- Impose a high burden on the health-care system
- Show variation in outcome rates across hospitals
- Illuminate the opportunity for improvement
- Help patients choose a hospital based on quality performance

New star ratings are released twice per year, in July and December. In 2021, nationwide CMS Star Ratings for hospitals showed that 204 hospitals received a one-star rating, 690 hospitals received a two-star rating, 1018 hospitals received a three-star rating, 988 received a four-star rating, and 455 received a five-star rating. The methodology continues to evolve with the goal to ensure fair comparison across all hospitals. Recently, processes included reweighting infection measures, regrouping measures, and removing winsorization as a technique to limit extreme values.

CMS Star Rating Component Metrics Beginning with the year 2021, the way the Overall Hospital Quality Star Rating is calculated also changed. Three existing process measure groups were combined into one new group (Timely and Effective Care) as a result of measure removals, so that the Overall Star Ratings is now made up of five groups, Mortality, Safety of Care, Readmissions, Patient Experience, and Timely and Effective Care (see Table 9.2).

The Overall Hospital Star Ratings use a composite of distinct quality metrics, depending on which data are available. Hospitals may not report metrics in all five groups. An overall hospital score is calculated by weighting and aggregating the individual category scores. To receive an Overall Star Rating, the hospital must report at least three measures for three measures groups. One of the groups must specifically be the Mortality or Safety of Care group. If a hospital is missing a measure group, the weights are redistributed among the other qualifying groups, and only hospitals that have at least three measures within at least three groups (including one outcome group) are eligible for an overall rating [5].

Table 9.2 Component of CMS Star Rating categories and weights (v4.1) [6]

Category	Category description	Weight (%)	# of metrics	Metric type
Mortality	30-Day risk standardized mortality	22	7 (equally weighted)	Acute myocardial infarction (AMI) Heart failure (HF) Pneumonia (PN) Chronic obstructive pulmonary disease (COPD) Coronary artery bypass graft (CABG) Stroke PSI-4
Readmissions	30-Day readmission rate	22	11 (equally weighted)	For heart failure, pneumonia, COPD, and AMI diagnoses After CABG surgery After THA and TKA surgery OP32; OP35 ED; OP35Adm; OP36
Safety of Care	Risk-standardized complications and hospital-acquired infections	22	8 (equally weighted)	RSCR for THA, TKA CLABSI CAUTI MRSA bacteremia C-Diff infection SSI after colon surgery SSI after abdominal hysterectomy PSI-90
Patient Experience	Patients' perception of inpatient experience (HCAHPS)	22	8 (equally weighted)	Communication with nurses Communication with doctors Responsiveness of hospital staff Communication about medicines Discharge information Care transition Willingness to recommend hospital Cleanliness of hospital environment Quietness of hospital environment

(continued)

Table 9.2 (continued)

Category	Category description	Weight (%)	# of metrics	Metric type
Timely and Effective Care	Immunization, ED timeliness, testing effectiveness	12	14 (equally weighted)	ED-2B: admit decision time to ED departure time for admitted patients IMM-3: health-care personnel influenza vaccination SEP-1 = SEP-1: percentage of patients who received appropriate care for severe sepsis and septic shock OP 10 – outpatient CT scans of the abdomen that were "combination" (double) scans OP 13 – Medicare patients who got cardiac imaging stress tests to screen for surgical risk before low-risk outpatient surgery Other measures hospitals can choose to report on include PC01; OP-3b, 8, 18B, 22, 23, 29, 30, and 33

PSI-4 AHRQ Patient Safety Indicator 4, *PSI-90* AHRQ Patient Composite Safety Indicator, *RSCR* risk standardized complication rate, *COPD* chronic obstructive pulmonary disease, *TKA* elective primary hip arthroplasty, *TKA* elective primary knee arthroplasty, *CAUTI* catheter-associated urinary tract infection, *CLABSI* central liner-associated blood stream infection, *MRSA* methicillin-resistant *Staphylococcus aureus*, *C-diff Clostridium difficile*, *ED* emergency department, *OP-22* percentage of patients who left the emergency department before being seen, *OP-23* percentage of patients who came to the emergency department with stroke symptoms who received brain scan results within 45 minutes of arrival, *OP-29* appropriate follow-up interval for normal colonoscopy in average risk patients, *OP-30* colonoscopy interval for patients with a history of adenomatous polyps – avoidance of inappropriate use, *OP-33* external beam radiotherapy for bone metastases, *PC-01* percentage of newborns whose deliveries were scheduled too early (1–3 weeks early), when a scheduled delivery was not medically necessary, *OP-3b* average number of minutes before outpatients with chest pain or possible heart attack who needed specialized care were transferred to another hospital, *OP-18b* average time patients spent in the emergency department before being sent home, *OP-8* outpatients with low back pain who had an MRI without trying recommended treatments first, such as physical therapy

Validity of CMS Star and Other Ratings Understandable discordance between ratings occurs because of differing purpose, methodology, and outcomes used in ratings. The following discussion should be viewed in this context. The aim is not to set an expectation for perfect correlation but to provide awareness around the necessity for a deeper understanding of each rating and the need for clinical review.

Greater CMS Hospital Compare scores were significantly associated with fewer 30-day readmissions and shorter hospital lengths of stay for specific operative groups [7]. Chau et al. (2014) studied the correlation between publicly reported

hospital metrics and outcomes after pancreatic cancer surgery [8]. Hospital Compare ratings were only weakly (odds ratio < 0.4) correlated with volume and other outcome indicators, with the exception of a slightly stronger correlation with mortality ($r = 0.42$). Halasyamani et al. (2007) examined Hospital Compare scores for core measures related to care for acute myocardial infarction (AMI), congestive heart failure (CHF), and community-acquired pneumonia (CAP) [9]. Using composite scores for core measures, they determined national score quartile cut points and the distribution of Hospital Compare scores for the *U.S. News* Best Hospitals for care of cardiac conditions and respiratory disorders and for Honor Roll hospitals. Fewer than 50% of the Best Hospitals for cardiac care rated in the top quartile of Hospital Compare scores for AMI and CHF. Fewer than 15% of Best Hospitals for care of respiratory disorders scored in the top Hospital Compare quartile for CAP. Only five Honor Roll institutions ranked in the top quartile for the combined core measure score. They concluded that Hospital Compare scores are frequently discordant with *U.S. News* Best Hospital rankings. Similarly, the hospital ratings for the specialties of orthopedics and cardiac surgery by Hospital Compare, *U.S. News*, Healthgrades, and others were found to offer conflicting results with little agreement on higher or lower performance [10, 11].

Key Concept
Publicly reported hospital quality and patient safety ratings correlate poorly with each other. Hospital quality leaders and improvement teams will need to evaluate which rating is most appropriate and useful for them in the context of the stakeholders and communities they serve.

9.2 Leapfrog Hospital Safety Grade

The Leapfrog Group is a nonprofit watchdog organization that sees itself as serving as a voice for health-care consumers and purchasers using their collective influence to foster positive change in US health care. It has collected, analyzed, and published hospital data on safety, quality, and resource use for more than 2700 general acute-care hospitals across the nation for the past 20 years. The Leapfrog Hospital Safety Grade includes more than 30 national performance measures from CMS, the Leapfrog Hospital Survey, and other supplemental data. Safety grades A–F are assigned twice yearly, in the spring and fall, when additional data become available [12].

Key Concept
The Leapfrog Hospital Safety Grade focuses on structure and outcomes that are likely to associate with the safety of hospitalized patients. They include metrics relating to a hospital's ability to provide critical care 24/7, respond quickly and effectively to patients' needs, avoid preventable complications, and have safety protocols in place that are known to protect patients from harm.

Each of the Leapfrog Safety Grade component measures is grouped into one of two domains: (1) process and structural measures or (2) outcome measures, each accounting for 50% of the overall score (see Table 9.3). Process measures represent how often a hospital gives patients recommended treatment for a given medical

Table 9.3 Leapfrog Group data sources, standard measures, and weights [13]

Measure name	Primary data source	Measure weight (%)	Overall weight (%)
Process and structural measures			
Computerized Physician Order Entry (CPOE)	Leapfrog Survey	5.9	50
Bar Code Medication Administration (BCMA)	Leapfrog Survey	5.8	
ICU Physician Staffing (IPS)	Leapfrog Survey	7.1	
Safe Practice1 (SP-1): Leadership Structures and Systems	Leapfrog Survey	3.2	
Safe Practice 2 (SP-2): Culture Measurement, Feedback & Intervention	Leapfrog Survey	3.3	
Safe Practice 9 (SP-9): Nursing Workforce	Leapfrog Survey	4.3	
Hand Hygiene	Leapfrog Survey	4.9	
H-Comp-1: Nurse Communication	Leapfrog Survey	3.1	
H-Comp-2: Doctor Communication	Leapfrog Survey	3.1	
H-Comp-3: Staff Responsiveness	Leapfrog Survey	3.1	
H-Comp-5: Communications about Medicines	Leapfrog Survey	3.1	
H-Comp-6: Discharge Information	Leapfrog Survey	3.1	
Outcomes measures			
Foreign Objects Retained	CMS	4.3	50
Air Embolism	CMS	2.5	
Falls & Trauma	CMS	4.7	
CLABSI	Leapfrog Survey	4.6	
CAUTI	Leapfrog Survey	4.5	
SSI: COLON	Leapfrog Survey	3.4	
MRSA	Leapfrog Survey	4.5	
CDIFF	Leapfrog Survey	4.3	
PSI 3	CMS	4.0	
PSI 4	CMS	2.0	
PSI 90	CMS	15.2	

PSI AHRQ Patient Safety Indicator

condition or procedure. For example, "Responsiveness of hospital staff" looks at patients' feedback on how long it takes a staff member to respond when they request help. Structural measures represent the environment in which patients receive care. For example, "Doctors order medications through a computer" represents whether a hospital uses a computerized order entry system to prevent errors when prescribing medications. Outcome measures represent what happens to a patient while receiving care. For example, "Dangerous object left in patient's body" measures how many times a hospital reports as code of retained foreign object in a patient undergoing surgery, like a sponge or tool, left in the abdomen. Hospitals missing more than six process measures or more than five outcome measures are not graded. Hospitals can voluntarily report additional safety data through the Leapfrog Hospital Survey, but this is not a requirement.

Annually, in January, Leapfrog publishes the data snapshot dates for each of the two Leapfrog Hospital Safety Grade public releases to give hospitals and other stakeholders advance notice so that they can be prepared to submit a Leapfrog Hospital Survey and monitor their performance on CMS measures used in the safety grade. Because of COVID-related data reporting disruptions, several of the Leapfrog component metrics were not updated in recent safety grade releases.

9.3 *U.S. News & World Report* Best Hospitals Specialty Rankings

U.S. News estimates that nearly 2 million hospital inpatients a year face the prospect of surgery or special care that poses either unusual technical challenges or significantly heightened risk of death or harm because of age, physical condition, or existing conditions. The rating agency states that *U.S. News* rankings are a tool that can help these patients find sources of specially skilled inpatient care [14]. It reports the US top 50-ranked hospitals for complex care in 16 specialty areas, 12 data-driven specialties, and 4 expert-opinion-based specialties. Hospitals whose specialties rank in the top 10% are reported as "high performing." Methodology enhancements occur every year, and future modifications to analytic methods will likely account for the impact of COVID-19 on the measures evaluated.

A hospital's overall score reflects performance in three interlocked dimensions of health care: structure, process, and outcomes. A fourth component, patient experience, that overlaps both process and outcomes, and a fifth component, public transparency, within relevant specialties were added recently. These five major components and their weights in the overall score for each specialty are depicted in Table 9.4.

Structure refers to hospital resources related directly to patient care. Examples of structure metrics in the *U.S. News* Best Hospitals rankings methodology include intensity of nurse staffing, availability of desirable technologies and patient services, and special status conferred by a recognized external body, such as designation as a nurse Magnet Hospital by the American Nurses Credentialing Center or as

Table 9.4 2020–2021 components and overall weights for *U.S. News* Specialty Rankings [15]

Component	Cardiology and heart surgery weights (%)	Neurology and neurosurgery weights (%)	Weights, all other specialties (%)
Outcomes	37.5	37.5	37.5
Structure	30.0	30.0	30.0
Process/expert opinion	24.5	25.5	27.5
Patient experience	5.0	5.0	5.0
Public transparency[a]	3.0 (ACC; STS)	2.0 (GWTG)	0.0

[a]Participation in the American College of Cardiology (ACC) and Society of Thoracic Surgeons (STS) registries; participation in the American Hospital Association Get With The Guidelines (GTWG) program

a National Cancer Institute (NCI) comprehensive or clinical cancer center by the National Institutes of Health. Process refers to the delivery of care. In *U.S. News* rankings, it is represented by the expert opinion of a hospital to develop and sustain a system that delivers high-quality care. Such expert opinion is thought by *U.S. News* to indicate an institution's ability to develop and sustain systems that can deliver high-quality care to patients with high complexity. A hospital's expert opinion score is based on the average number of nominations from the three most recent annual surveys of board-certified physicians conducted for the Best Hospitals rankings.

In the data-driven rankings, the primary outcome measure is 30-day survival after an inpatient hospital admission. Starting with the 2019–2020 rankings, "patients discharged to home" was added as an outcome measure. The data-driven specialty areas are cancer, cardiology and heart surgery, diabetes and endocrinology, ENT (ear, nose, and throat), gastroenterology and gastrointestinal surgery, geriatrics, gynecology, nephrology, neurology and neurosurgery, orthopedics, pulmonology and lung surgery, and urology. Each hospital analyzed in the data-driven rankings receives an overall score from 0 to 100 based on four elements [14].

Data for *U.S. News* rankings are taken primarily from the following sources:

- Publicly available indicators. Measures of performance in the public domain were obtained from the websites of Hospital Compare maintained by CMS, STS, and NCI.
- Inpatient Limited Data Set Standard Analytical Files (Inpatient LDS SAF).
- Outpatient Limited Data Set Standard Analytical Files (Outpatient LDS SAF).
- American Hospital Association Annual Survey.
- Hospital Consumer Assessment of Healthcare Providers and Systems Survey.
- Orthopedic Board certification data.
- Total volume data from the American Hospital Directory.

To compare outcomes between hospitals that treat varying diseases among different patient populations, *U.S. News* uses multilevel logistic regression models to

adjust for differences in case mix. The risk adjustment variables used in these models include the following:

- Age at admission
- Gender: male or female
- Inbound transfer status
- Year of hospital admission (since the quality of care tends to improve over time)
- Elixhauser comorbidities
- Medicare status code
- Socioeconomic status (patients with lower incomes are typically sicker when they arrive at the hospital and may face more challenges in obtaining or managing their care after they are discharged)
- ICD version
- Medical cohort risk adjusters
- Surgical cohort risk adjusters
- Source of admission
- History of stroke

For four specialties (ophthalmology, psychiatry, rehabilitation, and rheumatology), ranking is determined by expert opinion only, based on responses from 3 years of surveys of physician specialists who were asked to name the hospitals to which they would be inclined to refer their sickest patients. In addition to its Best Hospitals Specialty Rankings, *U.S. News* also publishes Best Hospitals Honor Roll, Best Hospitals Procedure and Conditions Ratings [16], Best Regional Hospitals, and Best Children's Hospitals.

9.4 Healthgrades

Healthgrades is a for-profit hospital and physician rating agency that makes ratings available to the public. According to the Healthgrades website [17], their aim is to "take the guesswork out of finding the right doctors, hospitals and care" for patients. Healthgrades states that it empowers patients to make decisions based on information, not just instinct, by making health care more transparent. Healthgrades publishes reports entitled America's Best Hospitals (Best 50, 100, and 250) and America's 50 and 100 Best Hospitals for Specialty Care. Specialties or service lines included are cardiac care, coronary intervention, critical care, gastrointestinal care, general surgery, joint replacement, orthopedic surgery, pulmonary care, stroke care, cardiac surgery, and vascular surgery. The organization also publishes hospital Patient Safety Excellence and Outstanding Patient Experience Awards for top honors in this these domains.

In summary, health-care provider organizations are rated by a variety of governmental, community, and commercial agencies. Given the different methods

employed by these agencies and the various challenges with their ratings, hospital quality leaders and improvement teams will need to evaluate which rating is most appropriate and useful for them in the context of the stakeholders and communities they serve.

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10 Centers for Disease Control and Prevention (CDC) Hospital-Acquired Infections

B. A. Lambert, F. Denson, K. Baumgarten, D. Parker, and R. Badakhsh

Hospital-acquired infections (HAIs) are unintended infections that result from patients being exposed to medical care. HAIs put patients at risk for further complications, increase lengths of hospital stays, add to health-care costs, and cause significant patient mortality. HAIs are largely preventable, and reducing HAIs is a goal of every health-care organization as well as the Centers for Disease Control and Prevention (CDC). The CDC National Healthcare Safety Network (NHSN) is a secure web-based surveillance system that sets standards for defining and reporting HAIs. Hospitals must enroll and complete NHSN training to comply with the Centers for Medicare & Medicaid Services (CMS) Hospital Inpatient Quality Reporting (IQR) Program HAI requirements.

Acute-care hospitals are required to report six types of HAIs to CMS. Brief descriptions are given below. Complete surveillance definitions are available at cdc.gov/nhsn. The hospital infection preventionist is responsible for HAI surveillance and NHSN reporting. Surveillance is completed via a review of laboratory results

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and patient medical records. Data reported to NHSN are used to establish national performance benchmarks, to compare patient outcomes among health-care facilities, and to determine when to assess financial penalties and incentives based on the quality of care received. NHSN reports national- and state-level data using standardized infection ratios (SIRs) that are calculated by dividing the reported number of infections by the expected number of infections. The number of expected infections is calculated based on baseline national HAI aggregate data and is adjusted for each facility using variables found to be significant predictors of HAI incidence, such as bed size and teaching facility affiliation.

Key Concept
Hospital-acquired infections (HAIs) reported according to NHSN definitions are based on the review of cultures and medical records. Therefore, metrics based on NHSN HAIs are not derived from administrative data. NHSN HAI SIRs are risk-adjusted and therefore allow benchmarking among health-care organizations.

10.1 Definitions

10.1.1 Definition of Device-Associated HAIs

These are infections with a date of event (DOE) on or after hospital day 3 (where the day of admission is day 1) and an indwelling device was present for more than two consecutive calendar days on the date of event. The devices must still be in place on the DOE or must have been removed the day before or on the DOE. The two device-associated HAIs are

1. Central line-associated bloodstream infection (CLABSI): NHSN defines a CLABSI as a laboratory-confirmed bloodstream infection that is not secondary to an infection at another body site and a central line was in place for more than two consecutive calendar days on the DOE.
2. Catheter-associated urinary tract infection (CAUTI): NHSN defines a CAUTI as a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of ≥100,000 colony-forming units (CFUs)/milliliter and an indwelling urinary catheter was in place for more than two consecutive calendar days on the DOE.

10.1.2 Definition of Procedure-Associated HAIs

These are infections that occur within 30 or 90 days after an NHSN-defined operative procedure (where day 1 is the procedure date) involving deep soft tissues of the incision or any part of the body deeper than the fascial/muscle layer that is opened or manipulated during the operative procedure. The two procedure-associated HAIs included in the CMS IQR Program are

1. Inpatient colon surgical-site infection (COLO SSI)
2. Inpatient total abdominal hysterectomy surgical-site infection (HYST SSI)

10.1.3 Definition of Hospital Onset Laboratory-Identified Events (LabID)

LabID event reporting is designed to be a less labor-intensive method of surveillance to track multidrug-resistant organisms (MDRO) and *Clostridioides difficile* (*C. diff*) infections. It uses laboratory testing data (without clinical evaluation) to provide proxy infection measures for the hospital's MDRO and *C. diff* exposure burden. Infection burden caused by these organisms is based exclusively on laboratory data in relation to admission date. Hospital onset (HO) events are those LabID specimens collected on or after hospital day 4 when the patient does not have a documented community onset (CO) event. Facilities report both HO and CO events to NHSN. The two LabID HAIs included in the CMS IQR Program are

1. Methicillin-resistant *Staphylococcus aureus* bloodstream infection (MRSA BSI): *Staphylococcus aureus* cultured from blood that tests oxacillin-resistant, cefoxitin-resistant, or methicillin-resistant by standard susceptibility testing methods, or any laboratory finding of MRSA in blood [includes but is not limited to polymerase chain reaction (PCR) or other molecular-based detection methods].
2. *Clostridioides difficile* infection (CDI): A positive laboratory test result for *C. diff* toxin A and/or B [includes molecular assays (PCR) and/or toxin assays], tested on an unformed stool specimen (must conform to the container) or a toxin-producing *C. diff* organism detected by culture or other laboratory means performed on an unformed stool sample.

10.2 Central Line-Associated Bloodstream Infections (CLABSI)

It is estimated that patients are exposed to an aggregate of approximately 15 million days of central venous catheter (CVC) use in the United States. Annually, hospitals report 250,000 cases of central line-associated bloodstream infections, of which 80,000 occur in intensive care units (ICUs) [1]. Most ICU patients and many noncritical care patients require the use of CVCs or peripherally inserted central catheters, collectively referred to as central lines (CLs). Having these lines puts patients at risk of CLABSIs. These infections lead to prolonged length of stay, exposure to antibiotics, and medical complications, and they are costly to the facility.

Prevention Standardization is essential for minimizing risk to patients: insertion, maintenance, and removal protocols should be established and implemented across all teams. A standardized supply cart and kits that contain all necessary components for the insertion of nontunneled CVCs will minimize variability in insertion

practice. CLABSI prevention activities can be summarized in an insertion bundle and a maintenance bundle.

The first element of the CLABSI insertion bundle is optimal site selection. The axillary/subclavian site is the preferred site for CL insertions [2, 3]. However, this site might pose a subclavian stenosis risk in patients needing arteriovenous grafting. For those patients, an alternative site needs to be considered. The internal jugular site is preferred to the femoral site; the latter has been associated with higher rates of infection [2]. If a CL is inserted at the femoral site, it should be reassessed daily and removed as soon as possible. Emergently placed femoral CLs should be removed within 24 h, as should any emergently placed CL where sterility cannot be guaranteed. Use a CL with the minimum number of lumens necessary for optimal patient management. More lumens are additional portals to the patient's bloodstream and increase the risk of infection [1, 3]. Per the CDC, providers should not use guidewire exchanges routinely for nontunneled catheters to prevent infection or for suspected infection [1, 3].

The remaining elements of the insertion bundle can be documented on a checklist and in the electronic medical record (EMR):

1. Perform hand hygiene before insertion.
2. Clip all hair around the site of insertion.
3. Adhere to aseptic technique.
4. Use maximal sterile barrier precautions (i.e., mask, cap, gown, sterile gloves, and sterile full-body drape).
5. Perform skin antisepsis with >0.5% chlorhexidine with alcohol and follow the manufacturer's instructions for use.
6. Staff present during insertion should stop a nonemergent CL procedure if proper protocol is not followed or sterility is breached [4].

The CLABSI maintenance bundle revolves around maintaining a clean, dry, intact CL dressing. Some insertion practices can help prevent future maintenance issues. Do not hub the line as this prevents proper placement of the antimicrobial disc during CL dressing changes. Optimally, all lumens should be secured downward or laterally. Downward securement will favor dressing adherence by minimizing the weight of lumens pulling apart dressing components; minimize exposure of dressing and lumens to hair, oral secretions, and other sources of infection; and provide a flatter surface free of skin folds and curvature, thereby promoting dressing adherence. Tubing anchors minimize movement of the CL that may loosen the dressing and can be used on heavier lines or multiple lines at a single anatomic site.

Appropriateness of the CL must be assessed during each shift [1, 3]. All CL dressings must remain clean, dry, and intact. If the CL is suspected to be infected, it should be removed immediately. Dressings should be changed every 7 days at minimum. Infection preventionists and unit-based nurse champions should perform regular bundle audits to ensure compliance. Blood culture draws from CLs should be avoided due to the risk of colonization and false-positive results [4, 5]. Routine catheter tip cultures are not part of the NHSN CLABSI definition, are not clinically useful, and should not be obtained [6].

Concurrent Review and CLABSI Surveillance *Ruling Out Other Sources of Infection:* If NHSN site-specific criteria for other infections are met, the BSI may be considered secondary to that source rather than the CL. When an infection preventionist first identifies a possible CLABSI, the first step is to rule out other possible primary sources of infection. If another source of infection is suspected, there must be diagnostic evidence (culture, imaging evidence, etc.) in order for the BSI to be considered secondary to that infectious source, and therefore not to be considered a CLABSI.

Learning from the Event When a CLABSI is identified at our institution, a number of well-established processes begin. The infection preventionist notifies the nursing unit director, unit-based medical director, and other facility leaders. The event also is mentioned at the health system-wide safety huddle. Unit leaders ensure that the patient's care team are aware that the patient developed a CLABSI, familiar with the CLABSI prevention bundle, and identify missed opportunities to prevent CLABSIs. A deep-dive tool (referred to as a "mini-RCA," see below) is completed by care team members and the infection preventionist to identify opportunities for CLABSI prevention. Unit-specific CLABSI data and risk assessment outcome measures are also provided weekly to key stakeholders, including unit and hospital leaders, licensed independent practitioners, nursing staff, and other clinicians. These data are also routinely reported to the Hospital Infection Control Committee and other internal stakeholders. CLABSI nurse champions meet regularly throughout the year, disseminate evidence-based best practice education to their respective units, and conduct a minimum of 10 CLABSI bundle audits on CLs per month with the bundle audit tool pictured in Fig. 10.1.

10.3 Catheter-Associated Urinary Tract Infections

According to the CDC, 15–25% of hospitalized patients will have an indwelling urinary catheter (IUC) at some time during their hospitalization. Each day the IUC remains, a patient has a 3–7% increased risk of CAUTI. It is estimated that more than 13,000 hospital deaths are associated with UTIs each year, of whom as many as 69% are preventable [1].

Prevention CAUTI prevention requires training on proper insertion technique, maintenance, limiting use of IUCs for only appropriate indications, and appropriate use of urine cultures. A bundle audit tool is used to monitor adherence to evidence-based practices (see Fig. 10.2).

Our facility has adopted a Nurse-Driven Foley Removal Protocol that outlines specific indications for an IUC and gives nurses the authority to remove the IUC without a provider order if one of the below indications is not met:

- *Acute urinary retention*: the patient is unable to pass urine because of an enlarged prostate, blood clots, or an edematous scrotum/penis or is unable to empty the bladder because of neurologic disease/medication effect or neurogenic bladder

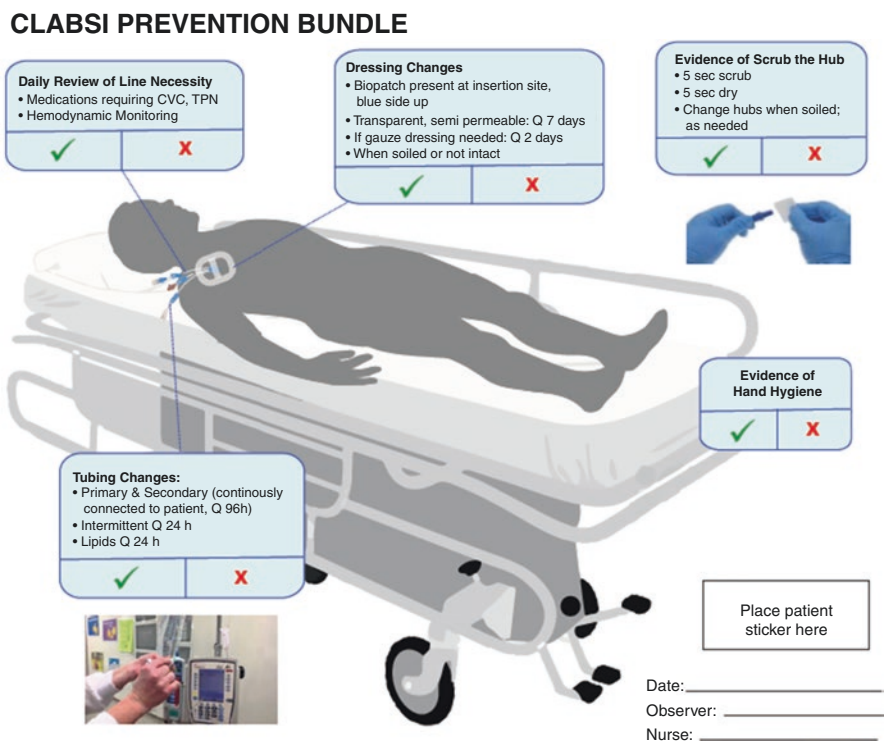

Fig. 10.1 CLABSI prevention bundle audit tool. CVC, central venous catheter; TPN, total parenteral nutrition; sec, seconds; Q, every; h, hours. (© Ochsner Health)

- *Ordered or placed by urology service*
- *Critically ill in ICU and requiring hourly monitoring of urine output*
- *Nonhealing perineal or sacral wounds* related to urinary incontinence to avoid further deterioration of wound and skin
- *Prolonged required immobilization* for trauma or surgery, that is, potentially unstable thoracic or lumbar spine, multiple traumatic injuries such as pelvic fractures
- *Hospice/comfort care or palliative care*
- *Chronic IUC on admission*
- *Selected postoperative cases* such as pelvic surgery and transplants

Patients meeting one of the above criteria should be assessed to determine if an alternative can be used. Our facility has acquired special supplies and equipment to give care teams alternatives to IUC. They include condom catheters, external female catheters, in and out catheterization, and ready availability of bladder scanners. Monitoring IUC usage, often calculated as IUC days, is

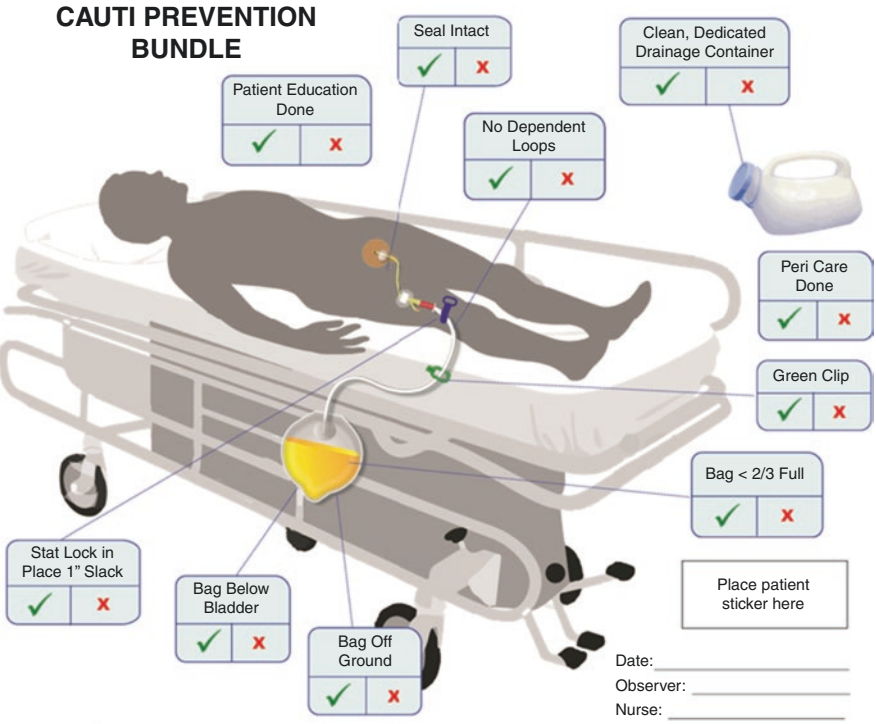

Fig. 10.2 CAUTI prevention bundle audit tool. (© Ochsner Health)

essential for reducing CAUTIs. Utilization should be calculated separately for critical care and noncritical care units. NHSN offers a standardized utilization ratio that shows how a facility's IUC or CL usage compares to other facilities across the country.

Testing Stewardship While reducing IUC utilization can be a nurse-driven task, providers can help in CAUTI prevention through testing stewardship. A positive urine culture is rarely the cause of fever and typically represents asymptomatic bacteriuria rather than a clinical infection [7]. Therefore, urine cultures should be reserved for patients with other site-specific signs or symptoms of UTI, such as suprapubic or costovertebral angle tenderness or >10 white blood cells on urinalysis. This facility addressed urine culture stewardship by creating an order panel in the electronic medical record that guides providers through the decision to order a urinalysis "reflex to culture" (Fig. 10.3). At our hospital, such an order results in the laboratory performing a urine culture only if the white blood cell count in the urinalysis equals or exceeds 10 per high-power field. In addition, medical staff-approved guidelines for fever workup in patients with urinary catheters were created and distributed (Fig. 10.4).

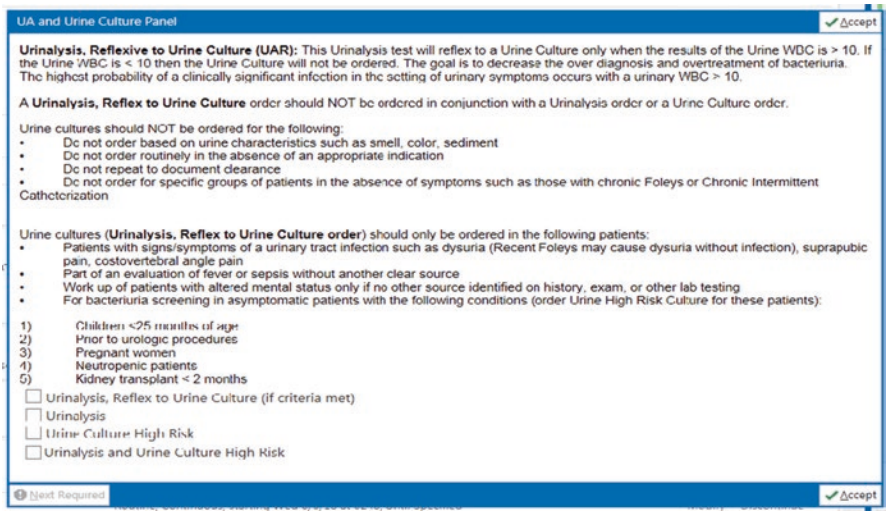

Fig. 10.3 Order panel for urinalysis and urine culture. WBC white blood cell count. (© Ochsner Health)

10.4 Surgical Site Infections (SSI)

Both colon (COLO) and abdominal hysterectomy (HYST) surgeries involve body sites that are colonized with microorganisms that increase the risk of infection after surgery. Various interventions can be utilized to provide an accurate evaluation of COLO SSI and HYST SSI outcomes and reduce SSI risk related to these procedures.

Prevention Some of the most common interventions are preoperative oral mechanical bowel preparation and antibiotics, perioperative skin antisepsis, intraoperative antimicrobial prophylaxis, wound edge protectors, and time out to change instrumentation for wound closure.

One additional element to consider in reducing SSI events is ensuring that the infection preventionist clearly understands how to accurately interpret and apply the NHSN surveillance definitions. At times, clinical documentation makes it difficult to accurately evaluate a patient's medical record when compared with the surveillance definitions.

Case Illustration: SSI Avoided in Patient with Abdominal Pain and Fluid Collection After Colon Surgery

A patient has a COLO procedure and, 17 days later, is readmitted with abdominal pain localized to the operative site that is described as throbbing. She also reports nausea and vomiting. Imaging studies of the abdominopelvic area reveal a fluid collection abutting the anterior abdominal wall incision within the peritoneum, with findings consistent with seroma or hematoma; however, a developing abscess is not excluded. Bowel loops are closely tethered to this

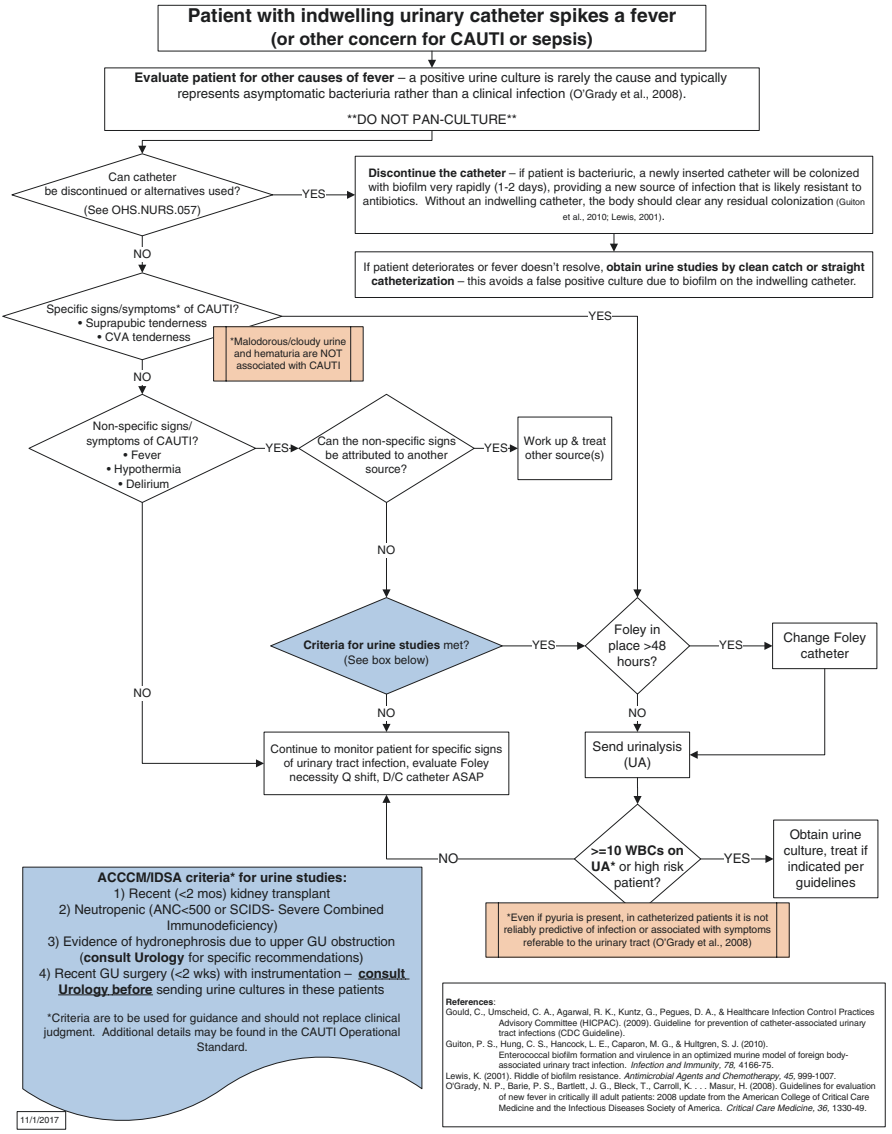

Fig. 10.4 Algorithmic approach to fever workup in patients with indwelling urinary catheters. (© Ochsner Health)

collection. Piperacillin–tazobactam is administered for intra-abdominal (IAB) infection. At first glance, an infection preventionist might easily interpret this as an IAB SSI event. There is clear evidence of infection that involves the organ space (peritoneum) with supportive evidence from imaging studies; however, without a positive fluid culture or purulent drainage from the IAB space or a positive blood culture, this postoperative infection does not meet NHSN criteria and should not be reported as an SSI.

Importance of Medical Record Documentation Clinical documentation of an infection noted during a surgical procedure may not equate to the NHSN present-at-the-time-of-surgery (PATOS) determination. PATOS events are still reported to NHSN but are excluded from reporting to CMS and other quality organizations. To apply PATOS to an SSI event, infection must be visualized during the surgery and documented in the operative report [8]. Providers should be aware of this documentation requirement and appropriately document in operative notes whenever there is evidence of infection during procedures. While wound class alone cannot be used to meet PATOS, correct documentation of wound class will allow NHSN to give an accurate risk stratification when calculating a facility's expected number of infections. Our mini-RCA process (see below) has been beneficial to identify opportunities for greater documentation accuracy. An example from our practice is our ability to use NSHN exclusion criteria to avoid reporting a colectomy SSI for situations where colectomy was part of a complex surgical approach for another condition. A case where a culture specimen is taken from a fluid collection that was not manipulated during the surgical procedure is another example. Of course, only appropriately documented cases may offer such opportunities.

10.5 MRSA BSI

MRSA BSIs are dangerous to patients and costly to health-care facilities. A single hospital-acquired MRSA infection can increase the cost of patient care by $24,015 [9]. The LabID criteria used by NHSN only require a positive MRSA blood culture. Even MRSA BSIs that are secondary to an MRSA infection of another site must still be reported to NHSN. Therefore, reducing MRSA BSIs requires preventing all sources of MRSA. To prevent these infections and protect patients, Ochsner has approved an evidence-based Decolonization Protocol for Patients at High Risk of MRSA Infection. Decolonization is completed via daily chlorhexidine gluconate (CHG) bathing and a 5-day course of twice-daily nasal mupirocin. High-risk groups for MRSA infection have been defined as

1. Patients with a *current or past MRSA infection* (in the past 6 months): Studies showed a 52% reduction in hospital-acquired MRSA BSIs in ICU patients with a previous MRSA infection after implementing a decolonization protocol [8, 10]. Decolonization led to a 30% reduction in HA MRSA infections for all patients [11].
2. *Dialysis* patients [10].
3. Patients with *CLs* and *IUCs***:** In patients with indwelling devices such as CLs, decolonization decreased all BSIs by 32% and MRSA or vancomycin-resistant enterococcus infection by 37% [12].
4. *Patients admitted from other hospitals, postacute care, or congregate living facilities* (nursing homes, rehab, correctional facilities, etc.): MRSA infection rate decreased by 65% in long-term care residents after implementation of a decolonization protocol [13].
5. Patients who are or previously were *intravenous drug users.*

6. Patients admitted to *critical care* units: A cluster-randomized clinical trial in 74 adult ICUs found that decolonization reduced all hospital-acquired MRSA by 37% and hospital-acquired MRSA BSI by 44% [14].

10.6 *Clostridioides difficile* Infections (CDIs)

Clostridioides difficile (*C. diff*) is a Gram-positive, spore-forming anaerobic bacillus that produces two large toxins, A and B, that cause diarrhea and colitis in susceptible patients. According to CDC, more than 200,000 cases and nearly 13,000 deaths occur from this disease annually [15].

Risk Factors and Prevention Antimicrobial therapy is widely accepted as the single greatest risk factor for the development of CDI. Other risk factors are gastric acid-reducing medications, recent exposure to a health-care facility, and previous *C. diff* infection. *C. diff* spores spread easily and can live on surfaces for months if not properly cleaned. Alcohol-based hand sanitizers and disinfectants are not sufficient to kill *C. diff* spores. Handwashing must be performed with soap and water and surface disinfection with bleach or other sporicidal disinfectants. Primary drivers of HO CDI are inappropriate antibiotic use, overuse of gastric acid-reducing medications, inadequate environmental cleaning and hand hygiene, inappropriate testing, and exposure. Acid-suppression therapy has been strongly associated with CDI. We encourage clinical teams to continually reevaluate the need for proton pump inhibitors (pantoprazole, omeprazole) and H2 receptor antagonists (famotidine, ranitidine) daily and discontinue them at the earliest possible time. Some organizations have pharmacist-driven medical staff-preapproved order guidelines that allow conversion of proton pump inhibitor therapy in the absence of a specific medical order. Daily assessment of antimicrobial therapy for opportunities to discontinue and/or de-escalate is paramount to preventing CDI. Avoiding the use of high-risk antibiotics (fluoroquinolones, cephalosporins, carbapenems), unless clinically necessary, is a best practice for reducing CDI risk.

Addressing these drivers requires collaborative efforts with infection prevention, nursing, physicians, pharmacy, laboratory, informatics, environmental services, and administrative leadership. After implementation of several collaborative interventions, our hospital reduced HO CDI by 50% from 104 events in 2017 to 52 events in 2020.

Testing Stewardship It has been our experience that success in testing stewardship is enhanced through a collaborative approach. Communication regarding assessment and testing for *C. diff* among care team members is facilitated with the use of visual aids that are distributed widely among all floors in our hospital. The "Diarrhea Decision Tree" (Fig. 10.5) is now used routinely in our hospital. Testing for CDI should be reserved for patients with clinically significant diarrhea, defined as three or more liquid or unformed stools occurring within a 24-h period. If a patient is known to have CDI, treatment can be started without testing (there is no need to

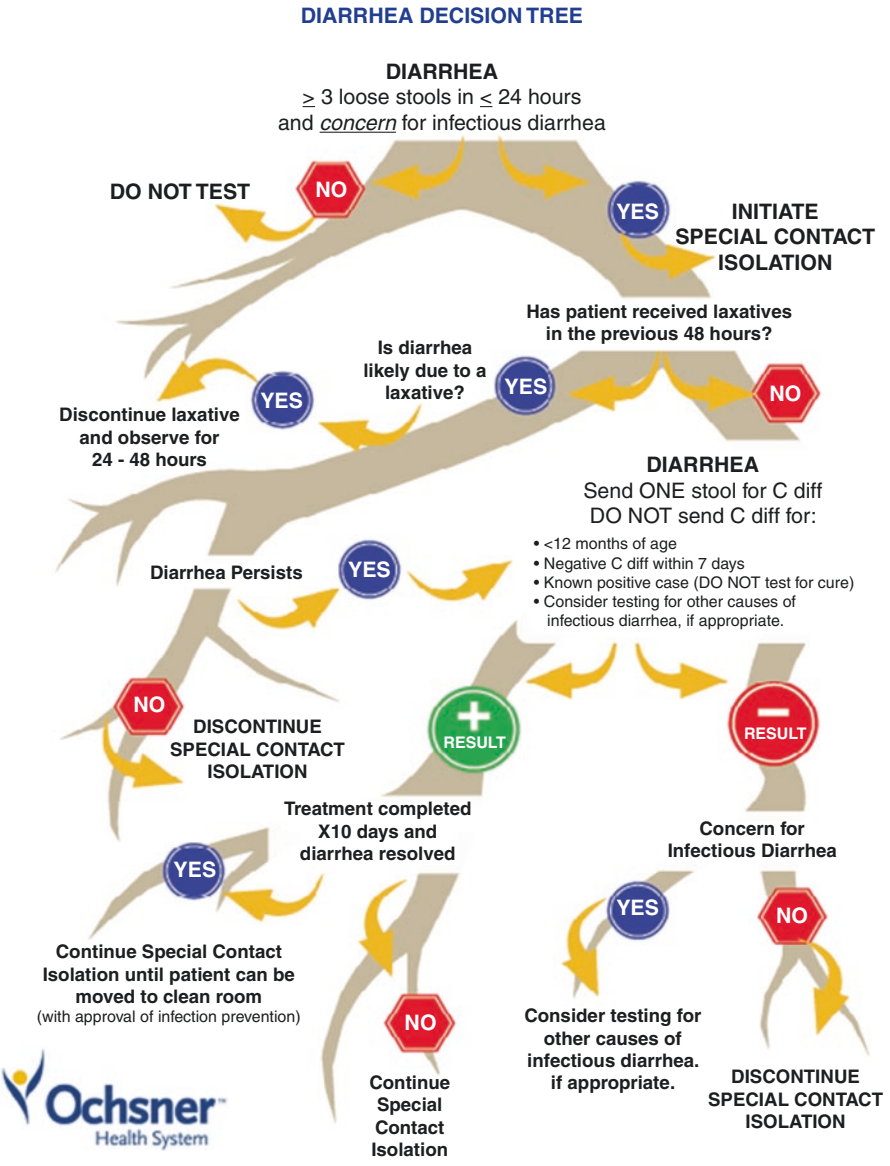

Fig. 10.5 Visual aid for unit nursing personnel to promote a collaborative approach to testing stewardship. (© Ochsner Health)

retest for CDI). Prior to testing, providers should consider other reasons for diarrhea, such as laxative or enema use, lactulose, tube feeds, or intravenous contrast. Laxatives or other causes of diarrhea should be discontinued before testing for CDI. Our organization has developed a suite of decision support tools to assist providers with testing stewardship. They include soft stops when laxatives have been

administered within the past 72 h of an intended *C. diff* stool test, auto-cancellation of *C. diff* testing orders past 24 h, hard stops for retesting, etc. We have adopted a team-based collaborative approach to testing stewardship that includes double checking for adherence to our testing protocol and escalation to unit medical leadership (see Fig. 10.5).

Documentation and Workup on Admission Appropriately documenting CDI when present on admission is key to avoiding the appearance and reporting of an unwarranted HO CDI. When patients are admitted with active diarrhea and other signs and symptoms such as fever, abdominal pain, and leukocytosis, our teams are consistently advised to order the test within 48 h of the admission.

10.7 The Mini Root-Cause Analysis ("Mini-RCA") Process for Infection Events

NHSN surveillance processes offer a standardized tool and uniform method to identify HAIs. Going beyond identification, our teams have sought to use information from our own patients to improve performance in avoiding hospital-acquired infections. We believe it vital to identify and investigate the root cause of HAI events. Our teams have developed the so-called mini-RCA process where patient-facing staff are provided the opportunity to retrospectively review HAI events to better determine the cause of these infections. This process is similar to Dr. Peter Pronovost's Comprehensive Unit-Based Safety Project methodology wherein patient-facing staff are empowered to identify defects in patient care that increase infection risks [16]. At Ochsner Medical Center, unit-based medical directors and nursing directors take the lead in completing mini-RCAs for CAUTI, CLABSI, *C. diff*, and MRSA bacteremia events. Physician and nursing leaders collaborate with staff involved in the patient's care to dive into the medical record. This process also includes interviewing staff across multiple disciplines to understand what can be done differently to prevent the next HAI event. Learnings from our mini-RCA process have contributed to insights regarding documentation opportunities. One example relates to the fact that NSHN definitions allow certain conditions to exclude a bacteremia to be ascribed to the central venous catheter. In the case of central venous catheters, such exclusions include documentation of invasive tampering or manipulation of the line by patients or visitors. Another exclusion applies for cases where a source of the infection is clearly documented and treatment initiated within the appropriate time period.

Outcomes Related to the Mini-RCA Process MRSA bacteremia HAIs were identified at a higher number than in prior years. During the mini-RCA process, many patient care units noted that several MRSA bacteremia events were secondary to other non-blood-related MRSA infections, such as pneumonia, wound, and peripheral IV catheter-site infections. They were often observed in patients with a history of MRSA infections. Clinical pharmacists also evaluated these events and

determined there were no additional antimicrobial interventions to reduce the risk of these patients progressing to MRSA bacteremia infections. Utilizing this feedback, the organization developed a business case to implement proactive interventions related to nasal and skin decolonization for high-risk patients. At present, all high-risk patients receive a 5-day course of nasal mupirocin and daily skin antiseptic bathing using CHG-impregnated cloths [10, 17].

Another example involved an increase in *C. diff* infections in an inpatient internal medicine telemetry unit. After the staff completed a series of mini-RCAs related to these infection events, we learned that many staff were not aware of specimen requirements and clinical practice guidelines for appropriate *C. diff* testing. Education was provided to staff related to specimen collection requirements, including visual cues to determine acceptable stool characteristics prior to submitting for testing (e.g., the "stick" test to assure no solid specimens are sent for testing). Posters were placed throughout the unit to guide staff through the process of assuring that requirements for submission of stool specimens were met. Nursing and laboratory staff were also empowered to cancel orders when patients did not meet specimen collection requirements. The electronic medical record was utilized to add clinical decision support tools during the ordering process.

The knowledge gained from mini-RCAs is imperative to identify opportunities to reduce further infection risk. Unit-level leaders and staff can offer recommendations for providing high-quality patient care. Infection preventionists can assist units and the entire organization with identifying and obtaining resources to reduce infection risks. Input from frontline staff is vital to better understand how infections occur and how best to implement interventions to reduce the likelihood of another patient being harmed by a preventable infection.

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Risk-Adjusted Complications

11

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Complications of medical and procedural care have always been the focus of review in medicine. Only relatively recently have reports on complications become available that allow benchmarking against hundreds of hospitals nationwide. As a health system whose values place patients first and identify excellence as a continuing journey, we view close attention to risk-adjusted complications as an essential component of care improvement. A number of benchmarkable options exist with which hospitals can gauge their performance in the area of complications from care provided. In this chapter, we discuss the metrics available from IBM Watson (formerly Truven), Healthgrades, and Vizient [formerly University HealthSystem Consortium (UHC)]. In this and other chapters (e.g., "From data review …"), we discuss how focus on risk-adjusted complications has improved both the accuracy of documentation and the reliability of care.

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11.1 Vizient (Formerly UHC)

At the time of publication, more than 5000 academic and community medical centers subscribed to the Vizient Clinical Data Base (CDB) to benchmark health-care metrics. The Vizient CDB is fed by data abstracts from each participating organization. It includes many more data strata than are reported federally. Reports from the Vizient CDB can be benchmarked to a variety of preset organizational comparators or on a custom set of health-care organizations. Benchmarking can be performed in many ways, including at the level of single or multiple groupings of DRGs, providers, or hospitals, as well as on predetermined Vizient service lines that are defined by DRG groupings. Since 2014, Vizient has used a set of 9 complications that relate to obstetrics and newborns and a set of 13 complications applicable to adult medical and surgical (Med-Surg) patient patients. Vizient dashboards also contain hospital-acquired conditions, patient safety indicators (PSIs), and Vizient proprietary metrics.

As might be expected from the long history and academic origins of the Vizient databases, Vizient measures have been used extensively in the scientific literature. Vizient data have been used for surgical performance improvement [1]. Data validity has been studied with respect to accuracy at the service line level. Vizient outcomes significantly overstated complications in the Vizient-identified vascular service line because of attribution of nonvascular surgery patients [2]. Rankings from the Vizient Quality and Accountability Study do not correlate well with other public hospital ranking systems such as *U.S. News* Best Hospitals, CMS Star Ratings, Leapfrog Hospital Safety Grade, and the Truven Top 100 Hospitals ratings [3].

11.1.1 Complications Applicable to Adult Med-Surg Populations

These complications are hospital-acquired stroke or intracranial bleed; aspiration pneumonia; gastrointestinal (GI) hemorrhage; acute myocardial infarction; adverse anesthesia events; postoperative infection; infection or inflammation due to grafts, devices, or implants; postoperative shock; *C. difficile* enteritis; and readmissions for various conditions related to prior care (Table 11.1). To trigger a Vizient complication, patients must be aged 18 or older and have these diagnoses identified with a POA status of N or U.

11.1.1.1 Stroke or Intracranial Bleeding

This complication will trigger with codes describing thrombotic, embolic, or other occlusive stroke and subarachnoid or intracerebral hemorrhage. This includes intraoperative and postoperative strokes. Traumatic intracranial bleeding is excluded.

11.1.1.2 Aspiration Pneumonia

The only ICD-10 code that triggers this Vizient complication is J690 Pneumonitis due to inhalation of food and vomit.

Table 11.1 Vizient adult Med-Surg complications

Vizient designator	Complication description
#MS-1	In-hospital stroke
#MS-2	Aspiration pneumonia
#MS-3	GI hemorrhage prevention (GI bleeding)
#MS-4	Hospital-acquired acute myocardial infarction
#MS-5	Adverse events due to anesthesia
#MS-6	Postoperative infection
#MS-7	Infection/inflammation due to internal device, implant, graft
#MS-8	Postoperative shock
#MS-9	Hospital-acquired *C. diff* enteritis
#MS-10	Readmission for infection due to previous care
#MS-11	Readmission for other complications of internal device, implant, graft
#MS-12	Readmission for postoperative hemorrhage, hematoma, or seroma
#MS-13	Readmission for other surgical wound complications

11.1.1.3 GI Bleeding

This list of codes includes GI bleeding from ulcers, perforations, gastritis, and angiodysplasia. Hematemesis is also a triggering code.

11.1.1.4 Acute Myocardial Infarction

Vizient complication codes include both type 1 and type 2 myocardial infarctions (STEMI and NSTEMI), as well as repeat infarctions during the same hospital stay.

11.1.1.5 Adverse Events due to Anesthesia

These are defined as surgical encounters in which an adverse event or overdose involving an anesthetic agent occurred. They include a number of poisoning codes. These codes would be used if a member of the medical staff relates an adverse event to the dose or type of anesthetic used, including local, intravenous, and volatile anesthetics and sedatives. Also included is awareness during anesthesia.

11.1.1.6 Postoperative Infection

The triggering conditions for this complication include postprocedural retroperitoneal abscess, superficial and deep wound infections, and sepsis following a procedure.

11.1.1.7 Infection/Inflammation due to Internal Device, Implant, Graft

This includes infection or inflammatory reaction resulting from vascular grafts, hemodialysis and other catheters, neurostimulators, implanted pumps, heart valves, stents, prostheses, shunts, and internal fixation devices.

11.1.1.8 Postoperative Shock

For this complication to be recorded, shock must be specifically identified in the medical record as postprocedural.

11.1.1.9 *C. diff* Enteritis

This includes both initial and recurrent hospital-acquired *C. difficile* enterocolitis diagnoses.

11.1.1.10 Readmission for Conditions Relating to Previous Care

The readmission must be related to previous hospital care. Specifically included are separate readmission complication categories for previous care; complications of an internal device, implant, or graft; postoperative hemorrhage, hematoma, or seroma; and other surgical wound complications.

11.1.2 The Vizient Academic Medical Center Quality and Accountability Performance Scorecard

This scorecard includes several domains, including efficiency, effectiveness, patient centeredness, mortality, and safety. While the efficiency domain relates to cost and length of stay, all other domains contain important quality and patient safety metrics.

The effectiveness domain includes 30-day readmission rates for different specialties, excess days and process metrics relating to transfusion for hemoglobin >9 g/dl, sepsis care (lactate labs measured within 12 h of admission), and emergency department timeliness measures. Patient centeredness includes a number of Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) components. Mortality is expressed as hospital mortality for different specialty patient groups.

The safety domain includes a larger array of indicators. Domain weights for safety indicators are equally distributed among reported measures within each hospital cohort. These measures include hypoglycemia with insulin use, reported as the percentage of patients who received insulin on the day of or the day prior to having a blood glucose level of ≤50 mg/dL, and warfarin-elevated international normalized ratio (INR), reported as the percentage of patients who received warfarin and have an INR of ≥5 at any point thereafter. Other components of the safety domain include the Agency for Healthcare Research and Quality (AHRQ) PSIs, National Healthcare Safety Network (NHSN) infection surveillance and laboratory ID metrics, and the total hip and knee (THK) complication rate measure.

The Vizient THK surgery complication metric focuses on the adult (18 years and older), all-payer population and differs somewhat from the Centers for Medicare & Medicaid Services (CMS) definition. Vizient THK complications do not include occurrences outside the hospital setting or if they are recorded at a facility other than the hospital that performed the THK procedure. The CMS and Vizient definitions both identify the following complications related to the index and readmission event:

- Acute myocardial infarction – during index admission or within 7 days of admission date readmit
- Pneumonia – during index admission or within 7 days of admission date readmit
- Sepsis/septicemia shock – during index admission or within 7 days of admission date readmit
- Surgical-site bleeding – during index admission or within 30 days of admission date

- Pulmonary embolism – during index admission or within 30 days of admission date
- Death – during index admission or within 30 days of admission date
- Mechanical complication – during index admission or within 90 days of admission date
- Periprosthetic joint infection/wound infection – during index admission or within 90 days of admission date

Vizient takes further steps to ensure that THK surgeries included in its Quality and Accountability ranking are elective. Therefore, cases with the following conditions are excluded from the safety index calculation:

- Femur/hip/pelvic fracture
- Partial hip arthroplasty with concurrent THK
- Revision procedure with THK
- Resurfacing with THK
- Mechanical complication as principal discharge diagnosis
- Malignant neoplasms (lower body) as principal discharge diagnosis
- Removal of implanted device
- Transfers from another facility for THK
- Left against medical advice

Vizient includes several AHRQ PSIs in its safety metric. They were chosen based on consistently showing sufficient variation, incidence, and signal strength to be useful for ranking. Five PSIs are included in the Vizient safety metrics, PSI-3, PSI-6, PSI-9, PSI-11, and PSI-13. Because the 2019 AHRQ PSI reporting methodology now offers all-payer risk adjustment, Vizient metrics in 2020 also feature the all-payer risk adjustment method for reporting PSIs.

The Vizient safety metrics also includes four NHSN surveillance metrics: central line-associated bloodstream infection, catheter-associated urinary tract infection, surgical-site infection (SSI), and *C. diff* infection. They are scored separately for colon procedures and abdominal hysterectomies for the comprehensive academic medical center and large specialized complex care cohorts. For the complex care medical center and community cohorts, the two SSI measures are combined. Each metric is represented as a standardized infection ratio (SIR) that follows the Centers for Disease Control and Prevention guidelines for observed infection identification and an expected infection rate using a standardized population and baseline time period (see Chap. 10 "CDC hospital-acquired infections"), using the updated 2015 baseline for all NHSN metrics. Vizient and CMS definitions for SIR reporting are very similar but focus on adult discharges.

11.1.3 Obstetric and Newborn Complications

Vizient reports for hospitals include complications focusing specifically on the obstetric and newborn patient populations. They are used in Vizient's Pediatric Quality and Accountability scorecard; pediatric cases generally do not impact

Quality and Accountability rankings for Vizient Comprehensive Academic Medical Centers. These complications relate both to conditions arising in the perinatal period (birth trauma and hypoxic-ischemic encephalopathy) and to conditions of pregnancy, childbirth and the puerperium, and newborns and neonates (complications of pregnancy with abortive outcome, adverse events due to anesthesia or sedation, obstetrical trauma, postpartum hemorrhage and/or retained placenta, postpartum infection, obstetrical embolism, and obstetrical wound complications).

11.1.4 Principles for Review

Quality review for Vizient complications is no different in concept than for PSIs and other complication indices. The essential ingredients of a successful review process are the ability to identify QNEs as early during the hospitalization as possible, verify accuracy before submission of the bill, and have the information technology available to do this efficiently. Because Vizient complication metrics include conditions that relate to prior hospital admissions, an additional layer of complexity exists. Software to identify QNEs should have conditional logic that can ferret out records that do not satisfy the readmission criteria used by Vizient. Health systems in which readmission could occur at system hospitals with different provider numbers may need to centralize the reviewer role in order to capture all readmissions within system hospitals. Because Vizient measures rarely have exclusionary conditions, review should focus on establishing the accuracy of diagnoses with respect to their POA status, confirmed presence, and clinical significance.

Key Concept
Review for Vizient complications should focus on establishing the accuracy of diagnoses with respect to their POA status, confirmed presence, and clinical significance. Because Vizient readmission complication metrics include conditions that relate to prior hospital admissions, it is advantageous to have an efficient mechanism to identify records with such conditions that match the index admission.

11.2 Healthgrades

The rating agency and consulting firm Healthgrades publishes a list of the top 50, 100, and 250 hospitals annually. Healthgrades also awards a Best Hospitals for Clinical Excellence designation. To be named in this category, hospitals must rank in the top 5% of all US hospitals, based on performance on 30–40 outcomes and conditions.

The Healthgrades performance measures include both mortality and complications (see Table 11.2). Mortality measures include both in-hospital mortality and 30-day mortality. Thirty-day mortality is weighted heavier (60%) than in-hospital mortality (40%).

Table 11.2 Healthgrades mortality-based procedures and conditions

Mortality-based procedures and conditions		
Bowel obstruction	Esophageal/stomach surgeries	Respiratory failure
Chronic obstructive pulmonary disease (COPD)	Gastrointestinal bleed	Sepsis
Colorectal surgeries	Heart attack	Small intestine surgeries
Coronary artery bypass graft (CABG) surgery	Heart failure	Stroke
Coronary interventional procedures	Pancreatitis	Valve Surgery
Cranial neurosurgery	Pneumonia	
Diabetic emergencies	Pulmonary embolism	

Performance is reported based on a 3-year period, with the most recent data being about 2 years old. For example, rankings reported in 2020 would include data from the years 2016–2018. Each measure is risk-adjusted and reported as actual vs. predicted performance. The Healthgrades risk adjustment model accounts for different hospitals' demographic and clinical risk factors. Each measure then is transformed into a Z-score to determine the overall hospital performance score.

Validation of publicly reported Healthgrades ratings has been undertaken. Altieri et al. (2019) found that greater Healthgrades scores were associated with better clinical outcomes such as shorter lengths of stay and fewer complications, emergency department visits, and readmissions after general surgery [4]. Still, they were unable to find a consistent relationship between publicly reported Healthgrades scores and surgical outcomes that they believed would be useful for patients. For pancreatic cancer surgery, Healthgrades hospital rankings correlated poorly with clinical outcomes such as complications, composite outcomes, and length of stay, but correlated somewhat with mortality [5]. Similar observations were made for radical cystectomy surgery [6].

Healthgrades also publishes Specialty Excellence Awards given to the top hospitals for specific conditions. Conditions or procedures are mapped to 14 specialty areas (Table 11.3). Hospitals qualifying for a Specialty Excellence Award must be in the top 10% within each specialty area, as measured by their Z-score. Among all hospitals that receive at least one Specialty Excellence Award, the top 100 are recognized in 11 specialty areas with the America's Best Hospitals for Specialty Care award. Healthgrades also recognizes the 50 best hospitals in cardiac surgery and vascular surgery with a separate 50 Best Hospitals for Specialty Care award (Table 11.4).

In addition to the above, Healthgrades also publishes the Patient Safety Excellence Award. A hospital must be in the top 80% for clinical quality as measured by a volume-weighted Z-score across all conditions and procedures. Eligible hospitals also must not have any events of foreign objects left during surgery, an AHRQ PSI. This award also evaluates performance in eight core PSIs (see items marked with an asterisk in Table 11.5). Hospitals must have data on at least seven of the eight PSIs. A composite patient safety score is calculated from the mean of the Z-scores for the PSIs during the past three years, weighted by the total number of

Table 11.3 Healthgrades top hospital performance measures

In-hospital complications-based procedures and conditions	
Abdominal aortic aneurysm repair	Pacemaker procedures
Back and neck surgeries (without spinal fusion)	Peripheral vascular bypass
Carotid surgery	Prostate removal surgery
Defibrillator procedures	Spinal fusion
Gallbladder surgery	Total knee replacement
Hip fracture treatment	Transurethral prostate resection surgery
Hip replacement	

Table 11.4 Healthgrades specialty areas, conditions and procedures, and outcomes

Specialty area	Conditions/procedures included	Outcome assessed
Cardiac surgery	Coronary artery bypass graft (CABG) surgery Valve surgery	Mortality
Coronary intervention	Coronary interventional procedures (angioplasty/stent)	Mortality
Cranial neurosurgery	Cranial neurosurgery	Mortality
Critical care	Diabetic emergencies Pulmonary embolism Respiratory failure Sepsis	Mortality
Gastrointestinal care	Bowel obstruction Colorectal surgeries Esophageal/stomach surgeries Gallbladder removal surgery Gastrointestinal bleed Pancreatitis Small intestine surgeries	Mortality and in-hospital complications
General surgery	Bowel obstruction Colorectal surgeries Esophageal/stomach surgeries Gallbladder removal surgery Small intestine surgeries	Mortality
Joint replacement	Hip replacement Total knee replacement	In-hospital complications
Neurosciences	Neurosurgery Stroke	Mortality
Orthopedic surgery	Back and neck surgeries (without spinal fusion) Hip fracture treatment Hip replacement Spinal fusion Total knee replacement	In-hospital complications
Prostate surgery	Prostate removal surgery Transurethral prostate resection surgery	In-hospital complications
Pulmonary care	Chronic obstructive pulmonary disease (COPD) Pneumonia	Mortality
Spine surgery	Back and neck surgeries (without spinal fusion) Spinal fusion	In-hospital complications
Stroke care	Stroke care (to be eligible, a hospital must have a transfer-out rate of less than 10% for the 3 years of data used)	Mortality
Vascular surgery	Abdominal aortic aneurysm repair Carotid procedures Peripheral vascular bypass	In-hospital complications

Table 11.5 Healthgrades patient safety indicators

AHRQ patient safety indicator	Healthgrades report category
Death rate among surgical inpatients with serious treatable complications	Death following a serious complication after surgery
Death rate in low-mortality diagnosis-related groups (DRGs)	Death in procedures where mortality is usually very low
Pressure ulcer rate[a]	Pressure sores or bed sores acquired in the hospital
Iatrogenic pneumothorax rate[a]	Collapsed lung due to a procedure or surgery in or around the chest
Central venous catheter-related bloodstream infection rate[a]	Catheter-related bloodstream infections acquired at the hospital
Postoperative hip fracture rate[a]	Hip fracture following surgery
Postoperative hemorrhage or hematoma rate	Excessive bruising or bleeding as a consequence of a procedure or surgery
Postoperative acute kidney injury reporting rate	Acute kidney dysfunction following surgery
Postoperative respiratory failure rate	Respiratory failure following surgery
Postoperative pulmonary embolism or deep vein thrombosis rate[a]	Deep blood clots in the lungs or legs following surgery
Postoperative sepsis rate[a]	Bloodstream infection following surgery
Postoperative wound dehiscence rate[a]	Breakdown of abdominal incision site
Accidental puncture or laceration rate[a]	Accidental cut, puncture, perforation, or hemorrhage during medical care
Retained surgical item or unretrieved device fragment count	Foreign objects left in body during a surgery or procedure (reported as number of events)

[a]Denotes core patient safety indicators

patients evaluated for each PSI. PSI performance is risk-adjusted using linear regression models to predict the number of patient safety incidents expected based on the hospital's patient mix. Hospitals in the top 10% of this volume-weighted score receive the Patient Safety Excellence Award.

11.3 IBM Watson Expected Complication Risk Index

The Expected Complication Risk Index (ECRI) is based on the IBM Watson (formerly Truven) proprietary risk model and is a ratio of actual to expected complications. It should be noted that, as of January 1, 2021, IBM Watson has ceased supporting the reporting of its ECRI measure. We include the discussion of this risk-adjusted complications measure because it was part of our quality programs for many years. Therefore, we had the opportunity to develop a robust review process and accumulated learnings that are applicable in other environments.

In the IBM Watson/Truven ECRI measure, the expected rate of complications is determined from the proprietary risk model (Truven) and based on the billing codes the hospital submits as part of the claims data. To be considered a complication, numerator codes need to be in the position as a secondary diagnosis, and these codes must have a present on admission (POA) value of N (no) or U (unknown). Only one of these complication codes needs to be present to trigger an ECRI event. A list of the complication types included in this index is provided in Table 11.6.

Table 11.6 List of IBM Watson complications (DataBridge® ECRI Software, version 20)

Postoperative complications relating to urinary tract
Postoperative complications relating to respiratory system except pneumonia
GI complications following procedure
Infection following injection/infusion
Decubitus ulcer
Postoperative septicemia, abscess, and wound infection
Aspiration pneumonia
Tracheostomy complications
Complications of cardiac, vascular, and hemodialysis devices
Nervous system complications from devices/complications of nervous system devices
Complications of genitourinary devices
Complications of orthopedic devices
Complications of other and unspecified devices, implants, and grafts
Other surgical complications
Miscellaneous complications
Cardiorespiratory arrest, shock, or failure
Postoperative complications relating to nervous system
Postoperative acute myocardial infarction
Postoperative cardiac abnormalities except AMI
Procedure-related perforation or laceration
Postoperative physiological and metabolic derangements
Postoperative coma or stupor
Postoperative pneumonia
Pulmonary embolism
Venous thrombosis
Hemorrhage, hematoma, or seroma complicating a procedure
Postprocedure complications of other body systems
Complications of transplanted organ (excludes skin and cornea)

Disruption of operative wound……
Complications relating to anesthetic agents and CNS depressants……
Complications relating to antibiotics……
Complications relating to other anti-infective drugs……
Complications relating to antineoplastic and immunosuppressive drugs……
Complications relating to anticoagulants and drugs affecting clotting factors……

Each of these complications is defined by a qualifier list of one or more inclusion codes. Other lists define exclusionary criteria. While this methodology still uses ICD-9 codes, there are good translators that map ICD-10 codes in use now to their ICD-9 equivalents. Reviewers will need to have access to the ICD-10 codes and diagnosis-related groups (DRGs) likely to result in a quality numerator event (QNE) based on IBM Watson/Truven complication definitions**.** In this context, it is extremely helpful to have ready access to tools that rapidly allow the reviewer to determine if the QNE will trigger. At the very least, reviewers should be able to establish quickly whether the QNE applies, based on the qualifying surgical, cardiac, or medical DRG lists and the exclusion DRG list based on IBM Watson/Truven methodology. This will make the review process much more efficient.

To illustrate the importance of deep knowledge for optimal ECRI review, we provide the example of the ECRI QNE "Postoperative complications relating to respiratory system except pneumonia." This QNE only triggers surgical DRGs (less the Truven exclusion DRGs). Each numerator inclusion code is included in a list of secondary diagnosis codes with POA = N or U, including empyema with/without fistula, pulmonary collapse, acute or acute and chronic respiratory failure, or acute lung edema. The QNE will not trigger unless another diagnosis code is also present, in this case "Other respiratory complications," meaning that the list of triggering conditions will only be considered a complication if medical record evidence allows the coding of this complication code in addition to the triggering diagnosis. The theory behind this is that a provider must have determined that these conditions were complications of surgery (vs. concurrently occurring conditions).

A nuance for reviewers to be aware of is that certain codes can directly trigger an ECRI QNE. These codes are presumed to indicate a complication by their very nature. They are codes for which the documentation includes the word "postoperative" or "following surgery," as in acute respiratory failure, pulmonary insufficiency, and acute and chronic respiratory failure following trauma and surgery.

For this, IBM Watson ECRI methodology further prescribes exclusionary conditions such as a principal diagnosis of trauma and the DRG falling in the respiratory or cardiac major diagnostic category (MDC) (i.e., MDC4 or MDC5).

11.3.1 Frequency of IBM Watson/Truven Complications

Our medical informatics group includes risk-adjusted complications in the widely accessible Tableau data visualizer. During a recent 4-year period, the incidence of complications was just over 1% for all patients, 3% for surgical patients, and 0.3% for medical patients.

To illustrate the distribution of complications at our hospital and health, we analyzed the relative frequencies of the 10 most commonly encountered complication categories during the period of 2016–2020. Hemorrhage or hematoma/seroma complicating a procedure was the most frequent surgical complication, followed by

complications of cardiac or vascular/hemodialysis devices, postoperative septicemia, abscess and wound infection, procedure-related laceration/perforation, wound disruption, venous thrombosis, pulmonary embolism, decubitus ulcer, complication of genitourinary devices, postoperative pneumonia, and respiratory system-related complications. The incidence of hematomas and hemorrhage was roughly twice as high as complications from vascular devices or postoperative sepsis. All other complications occurred at a frequency of one-third to one-fourth of the frequency for hematoma/hemorrhage.

The distribution of complications in medical patients was different. The most frequently recorded complications were hypotension in dialysis followed by decubitus ulcer, venous thrombosis, pulmonary embolism, hemorrhage, hematoma/seroma complicating a procedure, complications of cardiac or vascular/hemodialysis devices, procedure-related laceration/perforation**, c**omplications of GU devices, and complications related to medications.

11.3.2 Principles for Review

It is helpful to have a way to identify the patients with likely QNEs according to IBM Watson methodology. This can be done by using the data definition documents and ICD-9 translators. Alternatively, an information technology-enabled reporting system can identify possible QNE events. Time is of the essence because bill hold for a large number of medical records adversely affects cash flow. Therefore, ECRI QNEs should be identified and reviewed expeditiously.

11.3.2.1 Present on Admission

It will not be a surprise that the first priority in the concurrent case review procedure for ECRI complications is to establish whether the condition was POA. Clinical indicators for POA have been discussed in prior chapters.

11.3.2.2 Was the Diagnosis Supported?

Next, reviewers should seek to establish whether the preliminarily coded diagnosis was confirmed during the medical workup or merely part of a listing of differential diagnoses. A special consideration arises when the condition was clearly present but did not represent a complication. An example is the presence of venous thrombosis near a PICC line. Coding professionals may interpret this as a complication of a vascular device. Yet, without specific evidence from the medical record that the catheter caused the thrombosis, the occurrence of a “complication of vascular device” may need to be clarified via physician query and should only be coded automatically if clear documentation exists linking the thrombosis to the catheter. Moreover, to be counted as a complication, ECRI methodology for postoperative hematoma/seroma requires that the provider must have documented “infection” or “infected seroma” as “postoperative.” In cases where there is unclear documentation, it is appropriate to issue a physician query.

Another example of an IBM Watson/Truven QNE frequently encountered in patients with medical DRGs is hypotension in dialysis. It well worth the reviewer's time to evaulate any clinical indicators that the patient's tendency to become hypotensive during dialysis runs may have been chronic and therefore POA. Clinical indicators may be mentioned during a prior recent hospital admission or the fact that the patient's medication list on admission includes sympathetic stimulants such as the drug midodrine. We also frequently encounter the situation where a critically ill patient who is requiring pressor support (e.g., for treatment of septic shock) becomes transiently hypotensive during sustained low-efficiency dialysis (SLED) runs. On physician review, we noted that such events did not always represent hypotension referable to the dialysis treatment but rather were inherent in and due to the septic shock condition. Such clinically valid points should be communicated to coding and clinical documentation professionals. A tip sheet process can be developed that uses formal medical expert support to legitimize the tip sheet content. Appropriate physician queries should be issued where medical record documentation requires clarification.

11.3.2.3 Clinical Significance

Another dimension of reviewing the condition that may trigger an ECRI complication code is to explore whether the condition was clinically significant. This requires, as mentioned before, whether the condition required evaluation, monitoring, or treatment.

11.3.2.4 Exclusion Diagnoses

Lastly, reviewers should seek to assure the accuracy and capture of potential exclusionary conditions, again specifically based on knowledge of IBM Watson/Truven methodology. It is advised that reviewers be aware of or have access to the specific exclusion diagnoses for each ECRI QNE. In the scope of this chapter, we mention the exclusion diagnoses for the most frequently encountered ECRI complication types (Table 11.4). The following is a list of frequently encountered exclusion diagnoses (Table 11.7).

Trauma: For the ECRI QNEs postprocedure hemorrhage/hematoma, aspiration pneumonia, and postoperative respiratory complications, exclusion criteria are diagnoses that lead to trauma DRGs (including traumatic coma, major chest trauma, fractures, sprains and dislocations, craniotomy for trauma including intracranial bleeding from falls, full-thickness burns, and crush injuries) or constitute trauma codes as secondary diagnoses.

Plegia and paralysis: ECRI exclusion diagnoses for pressure ulcer are paralysis and the plegias (monoplegia, hemiplegia, paraplegia, and quadriplegia). Of note, functional quadriplegia is included in this list of exclusion diagnoses.

Diabetes: Diagnoses indicating the presence of diabetes are exclusions for the ECRI complications of pressure ulcer and infection following injections or infusions.

Table 11.7 Exclusion checklist for ECRI concurrent review (most common complications)

	DRG or MDC	DM	Morbid obesity	Immunocompromised State	Plegia, *paralysis*	IV drug abuse	Admin data	Other
Postprocedure hemorrhage, hematoma/seroma	Trauma as any Dx							
Complications of cardiac or vascular/hemodialysis devices								
Postop septicemia, abscess, and wound infection	Trauma as any Dx							
Procedure-related laceration/ perforation								
Disruption of operative wound		X	X					
Venous thrombosis	PE as PDx							Interruption of vena cava
Pulmonary embolism	DVT as PDx							Interruption of vena cava
Decubitus ulcer	MDC 9	X	X		X	X	Admit source = SNF, LOS>5	
Complication of GU devices	MDC 11, 12, or 13							
Aspiration pneumonia	Trauma as any Dx							Seizures, drug OD
Postoperative pneumonia				X				AIDS, cancer
Postop respiratory system-related complications	Trauma as PDx							
Hypotension in dialysis, other								
Complications related to medications						X		

PDx principal diagnosis, *LOS* hospital length of stay, *Dx* diagnosis, *SNF* skilled nursing facility, *OD* overdose, *DVT* deep vein thrombosis, *PE* pulmonary embolism, *DM* diabetes mellitus

Intravenous drug abuse: This condition provides exclusionary codes for the ECRI complications pressure ulcer, medication-related complications, and infections following injections or infusions.
Seizures: Diagnoses relating to epilepsy can help provide exclusionary data for the complication of aspiration pneumonia.*Drug overdose and poisoning*: These diagnoses may exclude the complication of aspiration pneumonia.

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Severe Hospital-Acquired Pressure Injury (AHRQ Patient Safety Indicator 3)

12

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The Agency for Healthcare Research and Quality (AHRQ) patient safety indicator (PSI)-3 is extremely important to hospitals nationwide. PSI-3 reports the occurrence of hospital-acquired severe pressure injuries. Included are stage 3 and stage 4 pressure injuries, as well as unstageable pressure injuries. PSI-3 commands a substantial weight (16%) within the composite safety indicator PSI-90, which is used to determine if a hospital's annual Medicare revenue should be subject to the Centers for Medicare & Medicaid Services (CMS) Hospital-Acquired Condition Reduction Program penalty. The publicly reported CareChex quality measure uses PSI-3. It also is an important contributor to the Leapfrog hospital safety rating and the Safety of Care domain of CMS hospital star ratings. The ability to avoid the development and progression of pressure ulcers for its patients certainly can influence an

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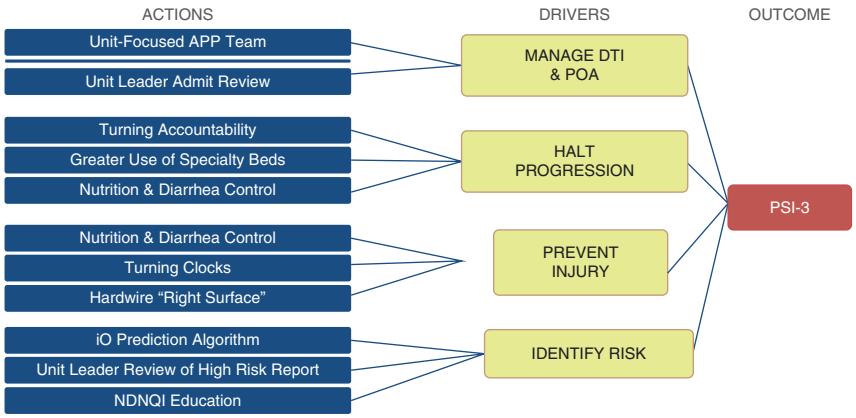

Fig. 12.1 Driver diagram for PSI-3. APP advanced practice provider, DTI deep tissue injury, iO Innovation Ochsner, NDNQI National Database of Nursing Quality Indicators, POA present on admission, PSI patient safety indicator. (© Ochsner Health)

organization's reputation. While the majority of PSIs have improved nationwide, PSI-3 is the only PSI whose performance has worsened nationally over time [1].

The primary drivers of PSI-3 are (1) accurate documentation, (2) measures to halt progression of the lesion, (3) preventive measures such as frequent turning and moisture control, and (4) identification of risk and early recognition of the skin lesion (see Fig. 12.1). Drivers #2–4 primarily relate to clinical practice, while driver #1 aims at optimal accuracy in describing and diagnosing the skin lesion. PSI-3 is one of a number of PSIs for whom an association with race or ethnicity has been reported. In a study of patients in the Veterans Administration health system, African Americans had higher risk-adjusted odds of experiencing severe pressure ulcers captured as PSI-3 events [2].

Discussing the intricacies of clinical prevention and management of pressure injuries is beyond the scope of this chapter. Instead, we focus here on appropriate diagnosis and documentation. Accurate diagnosis of the lesion is key to avoiding incorrectly reported PSI-3s. A substantive number of conditions can be mistaken for pressure injury, especially by incompletely trained and nonprovider personnel. Table 12.1 gives examples of alternative, and in some cases, much more accurate diagnoses for skin lesions referred to as pressure injury, deep tissue injury (DTI), or deep tissue pressure injury (DTPI) by busy clinicians.

The diagnosis and clinical analysis of pressure ulcers can be made and documented by both nurses and providers. However, the coding process is designed to work in a hybrid manner. Only the staging of the pressure injury or pressure ulcer can be coded from a nursing note; the final diagnosis of the skin injury must come from a provider's note in the patient's medical record.

Table 12.1 Skin diagnoses that are and are not pressure injuries

Diagnosis	Pressure injury	Nonpressure injury
Moisture-associated dermatitis	No	Yes
Intertrigo (intertriginous dermatitis)	No	Yes
Gluteal cleft ulcer	No	Yes
Skin shearing	No	Yes
Surgical drain exit wound	No	No
Abrasion	No	Yes
Bruise or ecchymosis (especially in anticoagulated patients)	No	Yes
Skin tear	No	Yes
Skin injury	No	Yes
Lichenification of skin	No	Yes
Venous ulcer	No	Yes
Diabetic ulcer	No	Yes
Ischemic skin lesion (especially in patients with prolonged shock on vasopressors)	No	Yes
Skin changes at the end of life	Yes	No
Kennedy ulcer	Yes	No
Nonpressure skin injury (e.g., ischemic) in moribund patients	No	Yes
Pressure injury	Yes	No
Deep tissue injury	Possibly but at least half are not	Only if ruled out as a pressure injury by a provider
Deep tissue pressure injury	Yes	No
Unstageable pressure injury/ulcer	Yes	No
Device-related injury	Most often	Possibly

12.1 The Process of Arriving at an Accurate Code for the Skin Lesion

Accurate documentation and reporting of the diagnosis and management of skin injuries and pressure ulcers is a collaborative responsibility of nurses, providers, clinical documentation integrity (CDI) team members, and coders. After a review by CDI and coding teams to ensure accuracy, coding is finalized by professional coders. CDI team members must initiate a concurrent review of the documentation of the skin ulcer. While reviewing a case for DTI, the CDI and coder must be cognizant to review notes from floor nurses, wound care nurses, and providers. The overall clinical picture should be taken into consideration during a chart review and preliminary coding. Medical record queries should be written to clarify discrepancies among provider documentation or to seek further specificity of a diagnosis, as applicable. The review must emphasize achieving accuracy of the diagnosis consistent with documentation and clinical indicators present in the complete medical record, staging of the pressure skin wound where applicable, and the present on admission (POA) status.

It is extremely helpful to understand the patient's comorbidities and hospital course when attempting to clarify a skin injury diagnosis either verbally or through a formal written physician query. Where possible, the CDI team should make efforts to discuss the case compliantly with the physician to get the most accurate documentation for the true clinical diagnosis and picture. Caution should be exercised in cases where wounds appear not to have been POA, especially in patients who are at high risk for entering the hospital with a pressure-related injury. Based on our case review and experience, these are patients who have been recently discharged from a hospital, are transferred from a health-care facility, or are bed or wheelchair bound. We have instituted measures to identify and document such lesions on admission and follow up with notification to the clinical teams, managed by our performance improvement department. Inaccurate coding of the diagnosis and POA status can misrepresent the true clinical picture and mistakenly affect the PSI-3 metric because POA lesions are excluded from being counted as a PSI-3 event.

Another example is a patient with severe life-ending illness who is no longer responding to therapeutic interventions. Such patients may be described as being at the end of life, terminally ill, on comfort measures, on comfort care, and have consistent palliative care interactions or orders indicating comfort care, limitation of care (such as partial resuscitation), or withdrawal of care actions. Skin lesions that do not respond to care interventions, occur in multiple areas of the body, and indicate tissue decay could represent the diagnosis of SCALE (skin changes at the end of life) as mentioned in Table 12.1. It should be recognized that the documentation of such lesions or that of a "Kennedy ulcer" commits coders to represent a pressure injury diagnosis. Only if such skin changes are described as non-pressure can coders avoid the diagnostic codes leading to a PSI-3 designation.

Key Concept
Appreciating the clinical context is key to identifying the most accurate diagnosis of a skin lesion. An example is the diagnosis of skin changes at the end of life, which may or may not represent a pressure injury. Careful clinical examination and medical record documentation can result in greater diagnostic accuracy that might prevent some of these lesions from being included in PSI-3 counts.

12.2 Identifying Patients with Skin Lesions at Risk for Being Reported as PSI-3

The hospital should have ways to identify patients for whom a severe pressure injury is likely to be reported. The most effective way to do this is to identify patients at risk for developing pressure injuries early during their hospital stay. This is traditionally done by assigning the patient a clinical risk score such as the Braden score. Our experience has been that certain patients are at particularly high risk of

developing severe pressure injuries. Examples are patients who have been recently discharged, patients admitted from postacute facilities, patients who are bedbound, and patients who have prolonged hospital stays, refuse mobilization, or who undergo procedures of long duration. Systems should be in place to assure that skin lesions are appropriately diagnosed and documented. To facilitate this, the medical record can be reviewed for the presence of partial thickness skin lesions, pressure injury, pressure ulcer, DTI, or DTPI. It is equally important to know in real time (i.e., while the patient is still in the hospital) whether a stage has been assigned to a skin pressure injury.

The reasons for hospitals to have such early warning systems are clear. First, such skin lesions, when identified early, can often be prevented from becoming a true pressure injury or from becoming more severe; the latter is referred to as progressing to a higher stage. Second, when it is known that certain documentation exists that may lead to coding a pressure injury, additional effort can be directed to come to a conclusion about the correct diagnosis and document the same. This process should then also result in the most accurate assignment of diagnosis codes. For clinical personnel, a report identifying such patients might include their location within the hospital, the description of the skin lesion (location, color, size, skin thickness, etc.), presumed POA status, date of admission, and dates of first observation and treatment (such as wound care consultation). Our teams have found it useful to generate such a report from our Epic electronic health records. Nursing unit leaders sort this report first by their unit's location and then by lesion description to focus on prevention of progression (e.g., from partial to full thickness). Patients who exhibit lesions of concern receive unit nursing leader attention via in-person rounding, wound consultation, and communication to the medical team about the lesion.

12.3 Concurrent Review

When a high-severity pressure injury case appears in the facility-specific report or work queue, a medical record review should occur within 24–48 h. This review should address the following points.

1. *Establish whether the skin lesion was present on admission.*

Low-Hanging Fruit Alert
Establishing that a diagnosis of severe pressure ulcer was present on admission will prevent this lesion from being represented as a PSI-3 event.

This is typically done by reviewing the medical record for pertinent documentation at the time of admission and before. Taking a photograph of the skin lesion at the time of admission represents good practice. However, this activity alone cannot establish the diagnosis or the POA status. Clinical indicators of POA status need to

be specifically identified. This entails looking for evidence of a preexistent lesion in emergency department and admission notes, scans, and nursing flow sheets. Recently, it has become possible for clinical documentation improvement specialists to take into consideration clinical indicators from medical records entries predating the current admission [3], such as a discharge summary from a recent admission documenting a prior pressure injury. Such information may be used in determining the need for a physician query. Initial review for POA status can easily be done by a nonprovider team member with clinical background.

2. *Is the diagnosis correct and clinically significant?*

PSI-3 events can occur if a nurse documents a stage for a DTI lesion. This creates the need for a physician query since only pressure injuries should be staged. To clarify then if the DTI was indeed a pressure injury, a medical record query is issued for providers to determine whether a pressure injury existed. Because coders can code from the stage documented by a nurse, once the provider confirms a pressure injury, the code will reflect the presence of a staged pressure ulcer. Frequently, skin lesions such as pressure injuries are first noticed by a nurse or patient care technician (aide) or through interactions with the hospital's wound care team. Given the complexity of definitions and coding rules pertaining to these lesions, we have learned that the best way to establish the most accurate final diagnosis is for nonprovider team members to document by describing only what they see. For example, the skin lesion is described as 3 × 4 cm in size, located along the lateral thigh, and having a purplish hue.

Key Concept
Documenting pressure injury, such as DTI or DTPI, by nonprovider personnel early during hospitalization may lead to a PSI-3 designation. Providers may unwittingly include such terms in their notes, unaware that it leads to a serious publicly reported safety event.

Nonproviders should be discouraged to document skin lesions as a DTI, DTPI, or unstageable pressure injury (some use this term mistakenly to describe their inability to identify the exact nature of the skin injury). The reason for this is that coders are obligated to act on what is documented in the medical record. Coding guidelines specify that such terms be treated as clinical indicators (or evidence) for the presence of a pressure injury. Therefore, in most instances, CDI team members will issue a medical record (or physician) query to the provider who may not be familiar with the diagnostic criteria for pressure-related skin lesions. Worse yet is if the provider unwittingly copies nursing or wound care documentation into their own note. In this case, a diagnosis of pressure injury may be entered into the patient's coding profile without the need to clarify with the provider via query. If the nurse or wound care team member unwittingly made an assessment (gaining the status of a diagnosis if copied into a provider note) that was incomplete or incorrect, a false-positive report of PSI-3 would result (see PSI-3 Case Illustration).

PSI-3 Case Illustration: Severe Pressure Ulcer Complication Avoided by Eliminating Backstaging

Reason for concurrent chart review: This patient's chart was reviewed for PSI-3. The event was identified by 3M. The trigger code for PSI-3 was L89150 pressure ulcer of sacral region, unstageable. The code was identified as not present on admission.

Review summary: A middle-aged woman was transferred from an outside facility for evaluation and treatment of hepatic encephalopathy. Her mentation gradually improved, but she developed hypotension and required vasopressor support for suspected sepsis. She continued to decline and suffered a cardiac arrest and required multiple applications of resuscitate measures. Thereafter, vasopressor requirements continued to increase to maximum dosing; discussions were held regarding her poor prognosis. She was transitioned to comfort care per family wishes. The patient was terminally extubated and expired shortly afterward.

Proposed coding (pre-billing): L89150 – pressure ulcer of sacral region, unstageable with a POA status of "no." L89153 – pressure ulcer of sacral region, stage 3 POA status of "yes."

Quality review reasoning and request: The medical record was reviewed for PSI-3 – pressure ulcer rate with a trigger code of L89150 pressure ulcer of sacral region, unstageable with a POA of "no." The coding profile also documented L89153 pressure ulcer of sacral region, stage 3 POA status "yes." On comprehensive review, the history and physical documented that the sacral wound was present on admission and had the severity level of a stage 3 pressure injury. The wound became covered in exudate with tissue sloughing. A new lesion was then added to the patient coding profile and was coded as an unstageable pressure ulcer of the sacral region, now with a POA status of "no," thus capturing the perceived change in wound status. The history and physical also documented that the wound had recently cultured positive for ESBL and *E. coli*. The case was sent for further review by a senior coder. A request was made to remove L89150 from coding profile. The request was based on coding guidelines that indicate only the highest stage of the wound should be reported if present on admission. PSI-3 or -4 are considered higher stages than unstageable.

Referral for senior physician review: The case was referred for senior physician review. It was agreed that a query should be requested to further clarify the nutritional status of the patient during hospital course, and that the apparent back staging of the pressure ulcer be reviewed.

Coding outcome: The account was reviewed by a senior coder at the request of the quality department. The determination was that changes to the coding profile were warranted. The coding for L89150 pressure ulcer of sacral region, unstageable, was removed. The coding for L89153 pressure ulcer of sacral region, stage 3 was reported with a POA status of "yes." Coding for L89150

with a POA of "yes" does not result in the reporting of PSI-3 event [AHRQ denominator exclusions: all secondary ICD-10-CM diagnosis codes for pressure ulcer stage III or IV (or unstageable pressure ulcer) or deep tissue injury present on admission with POA status of yes].

Even when a query is issued, providers may be unaware of the reason for the query or the consequences of their answers. At our organization, providers predominantly feel that they should defer to the documentation of wound care specialists. Providers may also be inclined not to question the characterization in the record of a "suspected pressure injury."

In general, even with repeated education efforts, providers find the subject of pressure injuries confusing because they encounter these diagnoses very infrequently. First and foremost, providers should pause to establish the correct diagnosis. They may look for clinical indicators that clarify whether the skin lesion is either pressure or nonpressure related. Evidence of nonpressure injury exists when the skin is affected by ischemic, traumatic, or inflammatory processes. Therefore, nonpressure skin lesions may be diagnosed by providers as ischemic ulcers, venous ulcers, skin tears, dermatitis such as moisture-related dermatitis, bruises, or ecchymoses (see Table 12.1). If a lesion is mucosal only, it is important to consider how it could be pressure-related injury without nearby cartilage or bone. Mucosal injuries generally should not be staged [4, 5].

Once a pressure ulcer has been treated with a surgical flap, it should no longer be represented as a pressure ulcer but rather as a surgical wound [4]. If there is evidence of both pressure- and nonpressure-related skin injury, providers should determine which is the primary cause of the skin injury [4]. For example, if the patient has extensive moisture-associated dermatitis but also some areas suggestive of pressure injury, a good question to answer is whether the pressure injury would have occurred without the moisture-associated dermatitis. If the skin lesion is so minor that it is clinically insignificant, the provider should document this. Generally, unless more than routine care measures are deployed (such as routine preventive care), and MEAT criteria were not met, the lesion is considered clinically insignificant. MEAT criteria are met when there is medical record evidence that the condition required repeated Monitoring, Evaluation, Assessment, and Treatment. A diagnostic review must always be done by a provider.

Low-Hanging Fruit Alert
Skin maceration can be caused by moisture from incontinence or diarrhea. A skin lesion that is primarily caused by moisture and documented as such by the provider will not be represented as a pressure injury diagnosis.

3. *Establish whether exclusionary diagnoses are present.*

For PSI-3, AHRQ recognizes only two relevant exclusion diagnoses, exfoliation due to erythematous condition involving >20% of body surface. Burns involving a significant portion of body surface are also exclusionary diagnoses. Providers should look for and document any exfoliatory rash, raw skin, peeling, etc., conditions that cover >20% of body surface (this area generally has to cover at least the surface area the size of one leg). Initial review for exclusion diagnoses can easily be done by a nonprovider team member with a clinical background and should be confirmed by a provider.

12.4 Recently Adopted 6 and 9 Codes: Changes in AHRQ Definition

In October 2019, AHRQ released new codes that allow representation of deep tissue injuries in the patient's coding profile without the need to identify a stage. These ICD-10 codes end in the number 6 and are referred to as pressure-induced deep tissue damage (PIDTD). The 2020 AHRQ definitions of PSI-3 do not include these six codes. As of early 2020, some public rating services such as IBM Watson Health (formerly Truven) were still reporting PSI-3 occurrences and rates that include patients with six codes. Others, such as Vizient, did not include them.

Hospitals have seen an increase in the use of pressure injury codes ending in 6. This seems to have its origin in coding guidelines that no longer stipulate the need for further staging beyond what is documented by a provider as a suspected, possible, or probable DTI or DTPI. This code is also used for mucosal injuries that cannot be staged. It is recommended that medical staff not commit to the diagnosis of DTI or DTPI early during the patient's hospital course as a large number of these lesions may be incorrectly diagnosed because their true nature does not reveal itself until later. The correct diagnosis can be arrived at by observing the clinical course of the lesion; more than 50% of DTIs and DTPIs may not represent a pressure injury or ulcer (defined as injury from crushing soft tissue against bony prominences).

The 2020 release of AHRQ PSI specifications [6] includes only pressure injury codes ending in 3, 4, and 0. Therefore, PSI-3 events were only reported if final coding reflects any diagnosis of stage 3, 4, or unstageable pressure injury. Codes ending in 6 (deep tissue pressure damage) or 9 (unspecified tissue damage) were not included in PSI-3 tallies for organizations, regardless of POA status.

Reviewers should be aware, however, that coding of a stage 3, 4, or unstageable pressure ulcer could still result if the initially described POA DTI lesion is documented as a stage 3, 4, or unstageable pressure injury later in the patient's hospital course. In this situation, coders might assign a 6 code in addition to another code representing the lesion that will trigger a PSI-3. A recent publication [7] describes the dilemma faced by CDI and coding professionals with respect to these new 6 and 9 codes. Three possible ways to handle coding are described for the situation where

a nonspecific pressure injury is documented on admission but later is described as a stage 3, 4, or unstageable pressure injury. The first involves the coding of a nonspecific DTI with POA status. In addition, a stage 3, 4, or unstageable pressure injury is coded. Another option described is to code only the initial DTI. A third option is to code the stage 3, 4, or unstageable pressure ulcer with POA status. After receiving input from peer organizations as well as guidance from coding clinic, our organization adopted the latter approach.

The 2020 update of AHRQ PSI specifications includes nonspecific deep tissue pressure injury ("6" codes) into the PSI-3 definition. Codes describing pressure injury with unspecified stage ("9" codes) remain excluded from being counted as a PSI-3. Reviewers and educators should be aware of this nuance for situations when a skin lesion's stage cannot be determined.

Key Concept
A pressure injury diagnosis cannot be coded without provider documentation. Once a pressure injury is documented by a provider, coding professionals can use nurses' notes to establish the stage, including staging that would lead to a PSI-3.

12.5 Medical Staff Education

Medical staff frequently rely on nursing or wound care documentation to identify wound diagnoses. Providers should not copy and paste a nursing-generated entry into their progress or discharge notes unless it accurately reflects the patient's skin lesion diagnosis. In some environments, this could lead to many skin lesions being misdiagnosed and potentially even subpar treatment plans being developed if the diagnosis is not correct. Therefore, medical staff need to have a basic understanding of their capability to make a wound diagnosis and the consequences of doing this accurately or not. In academic medical centers and large hospitals, it may be possible to develop a medical consultation service that assists with correct diagnostics and direction of treatment for skin lesions. We educate our medical staff to consult our organization's resources to assure an accurate diagnosis, before committing to a pressure injury diagnosis in the medical record (or on physician query). One such resource is an identification badge insert (see Table 12.2).

Key Concept
Provider documentation determines coding. Before committing to a pressure injury diagnosis in the medical record (or on physician query), medical staff should consult their organization's resources to assure an accurate diagnosis.

Table 12.2 Medical staff identification badge insert resource for accurate documentation of potential pressure injury

Tips for Provider Skin Integrity Diagnosis & Documentation
STOP: When getting a query relating to Pressure Injury, DTI or DTPI
GET HELP to answer the query correctly
FIRST – Need to determine accurate dx: Is skin lesion is "pressure" or not?
Determine if the lesion could be a non-pressure diagnosis such as moisture associated dermatitis, intertrigo, tear, shear injury, venous ulcer, intergluteal cleft ulcer, diabetic skin lesions, etc.
Don't commit to pressure diagnosis too quickly as the true nature of the lesion may not yet be evident
SECOND: *Document* on query if skin lesion was likely, possibly, probably present on admit ("POA")
Never pull in a wound "LDA" into your note from nursing or wound care nursing; determine the diagnosis yourself after consultation
Never delegate making the diagnosis to nursing – in Louisiana this is not in the nursing scope of practice
When in doubt, describe appearance of the skin lesion before committing to a pressure diagnosis

At the very least, providers should be aware of the consequences of false-positive pressure injury diagnoses and be able to question such a diagnosis when it is suggested by a member of the care team (see Table 12.1). When uncertain, a brief discussion with an expert team member is advisable. This could include specially trained wound care champions [8], who are often specially trained unit nurses, such as exemplified by the Ostomy Wound Liaison (OWL) program at University of Florida [9], specially trained wound care nurses, or members of the medical staff with interest and experience in this area. At our hospital, a dedicated skin integrity advanced practice provider and medical director of wound care function in this role.

Specific education regarding diagnostic approaches to documenting skin lesions may also be helpful. For example, we emphasize that providers must document their findings and clinical indicators for coders to represent the diagnosis in the patient's coding profile. We frequently hear from providers that they often are not certain of their diagnosis. Teaching that it is not necessary to be 100% certain of the finding or diagnosis has helped. Even if a diagnosis is deemed probable or likely or even suspected, it will be sufficient for coders to take into consideration when establishing the final coding profile [10]. For example, when a provider writes "sacral pressure injury likely present on admission, per conversation with family member," coders will code the condition as POA unless there is other provider documentation to the contrary, in which case a query to the provider in charge is still required to clarify the accuracy of the diagnosis. To assure that such diagnoses are coded without further query, we emphasize that providers should briefly document the reasons (i.e., clinical indicators) for their diagnostic impression.

Key Concept

For coding purposes, it is sufficient that the provider documents suspected, probable, or likely diagnoses. When such qualifiers are used (such as in "likely represent moisture dermatitis" or "sacral pressure injury likely present on admission"), it is helpful to include supporting clinical evidence, such as mentioning the role of incontinence or documenting "per conversation with family member."

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13 PSIs of Lesser Frequency: Retained Foreign Items (AHRQ Patient Safety Indicator 5), In-Hospital Falls with Hip Fracture (AHRQ Patient Safety Indicator 8), and Postoperative Kidney Injury Requiring Dialysis (AHRQ Patient Safety Indicator 10)

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While the Agency for Healthcare Research and Quality (AHRQ) patient safety indicators (PSIs) 5, 8, and 10 occur at a relatively low frequency in most acute-care hospitals, they are components of several publicly reported ratings and safety risk scores. For example, while PSI-5 is not a formal component of many scoring methodologies, retained foreign object occurrences enter the Leapfrog Hospital Safety Grade calculations because they also represent a Center for Medicare and Medicaid Services (CMS) hospital-acquired condition (HAC). PSI-8 (hip fracture from a hospital fall) is a component of the CareChex scoring methodology. Moreover,

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occurrences feeding into PSI-8 reporting are included in the Leapfrog Hospital Safety Grade calculations via the CMS HAC Falls and Trauma category. PSI-8 and PSI-10 are also components of the AHRQ composite PSI-90 measure, although their weights within PSI-90 are low (1% and 6%, respectively).

The validity of these PSIs has been investigated. In a study using the newer ICD-10 diagnostic classification, the positive predictive value for PSI-5 was found to be 62.5% [1]. In a Veterans Administration population, investigators found that retained foreign items can occur in both medical and surgical procedures [2]. The incidence of PSI-5 is reported to be between 0.14 and 0.31 per 1000 records [2, 3].

13.1 AHRQ PSI-5: Retained Surgical Item or Unretrieved Device Fragment Count

PSI-5 is intended to be a measure of items unintentionally left behind during invasive procedures. It refers to the number of patients whose coding profile identifies a retained surgical item or unretrieved device fragment as a secondary diagnosis (defined by AHRQ list FOREIID; Methodology | Agency for Healthcare Research and Quality (ahrq.gov)). It applies to surgical, medical, or obstetric DRGs in patients of ages 18 years and older. Excluded are cases with a principal diagnosis of retained surgical item or unretrieved device fragment and cases where this condition is present on admission (POA) as a secondary diagnosis.

Reviewers should assure that the condition was accurately documented and coded. In some situations, a device or fragment is intentionally left behind because the risk of extraction outweighs the risk of retention. In such cases, detailed surgical/procedural documentation should be present to accurately identify if the retained item is inherent in the procedure. One example from our practice is the coding of a retained item when in fact the incident represented a device failure (see Case Illustration).

Case Illustration: Retained Item That Was Found to Represent Device Failure

Reason for concurrent chart review: This patient's chart was reviewed for PSI-5 and HAC 01. The triggers for PSI-5 were the proposed code of T81508A (Unspecified complication of foreign body accidentally left in body following other procedure, initial encounter).

Review summary: This patient underwent a peripheral insertion of a central catheter. The catheter broke off. This was immediately recognized; a tourniquet was applied to prevent proximal movement, and then the fragment was removed by vascular surgery in a continuous procedural process.

Proposed coding (pre-billing): T81508A (Unspecified complication of foreign body accidentally left in body following other procedure, initial encounter).

Quality review reasoning and request: The catheter fragment was not "left accidentally" behind. Rather, immediate steps were taken to retrieve the

fragment. The removal procedure occurred on the same day as the procedure, substantiating the contiguity of the removal process with the original insertion procedure. A request was made to change the T code to reflect the failure of the catheter device. A referral was made for senior physician review.

Referral for senior physician review: Senior physician review showed that the catheter broke off despite the inserting team following proper procedure and the standard of practice. While a complication of the procedure, this event neither represented a retained item nor an unretrieved device fragment since the catheter fragment was removed concurrently.

Coding outcome: After senior coding review, it was determined that the complication code should be changed to T82.514A (Breakdown (mechanical) of infusion catheter). An unwarranted report of PSI-5 and HAC 01 was avoided.

Another example is damage control surgery, where return to the operating room and ultimate retrieval of the item are planned in advance. Damage control surgery is used as a life-saving intervention to reduce the risk of death in severely injured critically ill patients and is planned with several sequential stages [4]. This may happen in an exploratory laparotomy performed for blunt abdominal trauma where laparotomy sponges are left packed in the abdomen to attain hemostasis so that the patient may be further resuscitated prior to return to the operating room for re-exploration. Damage control surgery has also been employed for uncontrolled bleeding during elective surgery from severe gastroduodenal ulcer disease, as well as for peritonitis, acute mesenteric ischemia, or other causes of abdominal sepsis. In such cases, the number of retained items and their purpose should be clearly documented. Surgeons should document their intent to return to the operating room with the index and subsequent operations.

13.2 AHRQ PSI-8: In-Hospital Falls with Hip Fracture

PSI-8 intends to measure in-hospital falls resulting in hip fracture. The population is defined as hospital inpatients of ages 18 years and older who have hip fracture as a secondary diagnosis. The incidence of postoperative hip fracture is low (0.08 per 1000 records) but is associated with increased duration of hospitalization and mortality [5]. Patients with epilepsy are at increased risk for incurring a PSI-8 event [6].

Per AHRQ methodology (Methodology | Agency for Healthcare Research and Quality (ahrq.gov)), exclusionary conditions are (1) a principal diagnosis or secondary POA diagnosis of conditions predisposing to falls and trauma such as seizures, syncope, stroke, occlusion of cerebral arteries, coma, cardiac arrest, poisoning, trauma, delirium or other psychoses, anoxic brain injury (see AHRQ lists SEIZUID, STROKID, DELIRID, TRAUMID, SYNCOID, COMAID, CARDIID, POISOID, ANOXIID); (2) metastatic cancer, lymphoid malignancy, bone malignancy (see

AHRQ lists METACID, LYMPHID, BONEMID); (3) MDC14 (pregnancy, childbirth, and puerperium); and (4) admission for hip fracture or hip fracture diagnoses that are POA.

Low-Hanging Fruit Alert
Because this list of exclusionary diagnoses is so extensive, the opportunity to avoid PSI-8 is substantial.

Reviewers should carefully ascertain the completeness of the coding profile. Common diagnoses on the above AHRQ lists should specifically be screened for and clinical indicators sought for potential use in generation of medical record queries. Recently, joint prostheses-associated fracture codes have been added as exclusionary conditions. These are designated as periprosthetic fractures or femur fractures following insertion of an orthopedic implant, joint prosthesis, or bone plate. A special case arises when a fracture is first encountered during surgery, often a result of the quality of the bone or a combination of surgical intervention and bone quality. A new code added as an AHRQ exclusion for PSI-8 was intraoperative fracture associated with prosthesis. If a PSI-8 triggers because of a fracture related to surgical fixation, it will be important to assure that this code is used appropriately.

Case Illustration: POA Status Changed – Avoiding PSI-8 and HAC 5
Reason for concurrent chart review: This patient's chart was reviewed for PSI-8 and HAC 5. The triggers for PSI-8 were the proposed procedure codes of M9702XA (Periprosthetic fracture around internal prosthetic left hip joint, initial encounter) and S72122A (Displaced fracture of left femur). This case also triggered HAC 5 (falls and trauma).

Review summary: This patient was admitted to observation status and underwent elective left hip arthroplasty. On the following day the nurse responded to a bed alarm and found the patient lying on the floor. She was stabilized and evaluated with an X-ray of the hip and CT of the head. The hip X-ray showed a new left periprosthetic fracture on the left, as well as a displaced femur fracture on the same side. The patient was then admitted to inpatient status on 11/15 in order to perform an operative revision of the hip arthroplasty.

Proposed coding (pre-billing): The codes M9702XA (Periprosthetic fracture around internal prosthetic left hip joint, initial encounter) and S72122A (Displaced fracture of left femur), POA = no.

Quality review reasoning and request: Per the timing of this patient's inpatient admission order, the fall and fracture would have a POA of yes, which would exclude the PSI-8. This is based on a review of the AHRQ definition of PSI-8 (Exclude cases with a principal ICD-10-CM diagnosis code or secondary diagnosis present on admission, for hip fracture; list of diagnoses identified in HIPFXID file). A request was made to change the POA status of the hip fracture diagnoses from no to yes. A referral was made for senior physician review.

Referral for senior physician review: Senior physician review showed that the second fracture was present on inpatient admission, based on the date and time of the inpatient admission order.

Coding outcome: The reason for inpatient admission was the periprosthetic fracture. The diagnosis (S72122A) was advanced to the principal diagnosis position on conversion from outpatient to inpatient status [citing Coding Clinic guidance from 4th quarter 2016: If the reason for admission/encounter is the fracture, the specific type of fracture (traumatic or pathological) should be sequenced first and the periprosthetic fracture code should be sequenced as a secondary diagnosis code]. The codes S72122A (Displaced fracture of left femur) and M9702XA (Periprosthetic fracture around prosthetic hip joint) were changed to POA = yes. Also, on review, the codes N179 (Acute kidney injury) and G9349 (Other encephalopathy) were added with POA = yes, based on medical record documentation.

13.3 AHRQ PSI-10: Postoperative Acute Kidney Injury Requiring Dialysis

PSI-10 is reported when postoperative acute kidney injury requires dialysis in elective surgical patients of ages 18 years and older. To qualify for this PSI, patients must have a secondary (POA = no) diagnosis code for acute kidney failure (identified by AHRQ list PHYSIDB*) and a procedure code for dialysis (identified by AHRQ list DIALYIP).

The validity of this PSI improved to 74% with the wide adoption of POA coding [7]. PSI-10 is particularly frequent (at a rate of 1.4%) in patients having undergone open abdominal aneurysm repair [8].

Excluded are patients with a principal diagnosis (or secondary POA diagnosis) of acute kidney failure (AHRQ list PHYSIDB), cardiac arrest (AHRQ list CARDIID), cardiac dysrhythmia (AHRQ list CARDRID), shock (AHRQ list SHOCKID), chronic kidney failure (AHRQ list CRENLFD), solitary kidney disease (AHRQ list SOLKIDD), or urinary tract obstruction (AHRQ list URINARYOBSID). Also excluded are cases where a dialysis procedure or dialysis access procedure occurred before or on the same day as the first operating room procedure (AHRQ lists DIALYIP and DIALY2P), patients with a procedure code for partial nephrectomy (AHRQ list PNEPHREP), and obstetric cases (MDC14).

Low-Hanging Fruit Alert
Because this list of exclusionary diagnoses is so extensive, accurate documentation on inpatient admission offers substantial opportunities to avoid unwarranted PSI-10.

As with PSI-8, reviewers should carefully ascertain the completeness of the coding profile. Common diagnoses on the above AHRQ lists should specifically be screened for and clinical indicators sought for generation of medical record queries or substantiation of diagnosis coding. More prevalent conditions such as chronic renal failure and dysrhythmia diagnoses should be checked for and documentation sought appropriately.

Case Illustration: PSI-10 Excluded with MDC14

Reason for concurrent chart review: This patient's chart was reviewed for PSI-10 (Postoperative acute kidney injury requiring dialysis). The trigger for PSI-10 was the code of N17.0 (Acute kidney failure with tubular necrosis) and the procedure code 5A1D90Z (Performance of urinary filtration, continuous, greater than 18 h per day).

Review summary: This patient presented to the hospital with severe preeclampsia. The decision was made to deliver twin babies by C-section. Two days later, the patient began to have respiratory distress. She was started on oxygen with adequate response. She also developed worsening renal function; as urine output continued to decline, the patient became anuric. Nephrology was consulted and initiated continuous renal replacement therapy (CRRT) over the next 3 days. She continued to improve and was taken off CRRT 6 days after delivery.

Proposed coding (pre-billing): The codes N17.0 and 5A1D90Z were proposed to be coded.

Quality review reasoning and request: Chart reviewed for PSI-10 (Postoperative acute kidney injury requiring dialysis). This case was identified by 3M. Review of the PSI-10 definition showed that cases with MDC14 (pregnancy, childbirth, and the puerperium) are excluded.

Referral for senior physician review: Case was not referred for senior physician review due to exclusion criteria (MDC14).

Coding outcome: N17.0 and 5A1D90Z were correctly coded; PSI-10 was avoided due to the exclusion criteria of MDC14. The 3M software version in use was unable to screen this case out as its PSI-10 logic was not able to recognize the MDC exclusion.

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Iatrogenic Pneumothorax (AHRQ Patient Safety Indicator 6)

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Patient safety indicator (PSI)-6 is well represented in publicly reported indices of care quality and safety. It is part of the ratings used by Leapfrog and CareChex and is also a component of the Agency for Healthcare Research and Quality (AHRQ) PSI-90, where it has a 3% weighting. PSI-6 applies to patients of ages 18 years and older with medical or surgical diagnosis-related groups (DRGs) and a secondary diagnosis of iatrogenic (postprocedural) pneumothorax. The validity of this PSI is in question as its positive predictive value has been found to be low [1].

The review process for PSI-6 is fairly straightforward. It is usually not difficult to determine the relevant information from the medical record as iatrogenic pneumothorax is diagnosed in close temporal proximity to a procedure. Here is a suggested approach.

14.1 Approach to Review

Establish Present on Admission Status This should be easily apparent from the emergency department notes or the admission history and physical. If the patient had an outpatient procedure (e.g., an outpatient central line placement or lung

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biopsy) and was admitted for monitoring and treatment of this occurrence, such as for the development of hypoxemia due to the pneumothorax, the diagnosis of pneumothorax should be considered present on inpatient admission.

Was the Pneumothorax Iatrogenic or Inherent in the Procedure? Reviewers will want to make certain that this important distinction is accurately reflected in the coding profile, consistent with the patient's medical record. There are specific groups of patients whose postprocedural pneumothorax may be considered inherent in the following procedures: surgeries close to or involving the diaphragm, thoracic surgery, and, in some cases, lung biopsy procedures. In planning the care for these procedures, a pneumothorax may be expected; coding accuracy is improved if this expectation is well documented. Prospective monitoring and diagnostics may then be instituted if clinicians expect its occurrence. Such proactive steps can serve as clinical indicators of pneumothorax being inherent in the procedure. The literature confirms the nearly routine occurrence of pneumothorax after lung biopsy, liver transplant, thoracic spine, and diaphragmatic surgery [2–4]. Occult pneumothorax, which is frequently clinically insignificant, occurs in 5–15% of hospitalized trauma patients [5]. Postprocedural or iatrogenic pneumothorax should not be routinely coded without (1) the physician specifically linking the pneumothorax to the procedural intervention or (2) a query that confirms such linkage.

Was the Pneumothorax Clinically Insignificant? Not infrequently, our reviewers encounter the situation where a small apical pneumothorax is found on imaging. No further treatment or follow-up diagnostics were deemed necessary, and the patient is observed on routine oxygen therapy. Monitoring for the patient's underlying condition (such as serial chest X-rays for pneumonia) can be mistakenly attributed to represent monitoring for pneumothorax. In such cases, and especially with confirmatory provider documentation, it is likely that clinical significance can be clarified through a medical record query.

What Are the Applicable Exclusionary Conditions? Reviewers need to consider whether the medical record contains clinical indicators of potential exclusionary conditions. As defined in the AHRQ methodology (Methodology | Agency for Healthcare Research and Quality (ahrq.gov)), exclusionary conditions are (1) chest wall trauma such as rib fracture, (2) pleural effusion or hemothorax (identified by the AHRQ list PLEURAD), (3) thoracic surgery (AHRQ list THORAIP), including procedures such as lung biopsy, pleural biopsy, and diaphragmatic repair, (4) transpleural cardiac procedures (AHRQ list CARDSIP), (5) cases with a principal diagnosis of iatrogenic pneumothorax, and (6) obstetric cases (MDC14).

Provider documentation often fails to identify pleural effusion as a separate diagnosis and corresponding treatment specific to the effusion. At the same time, pleural effusion is a radiographic finding and may be mentioned parenthetically in certain medical record areas. Because pleural effusion is an exclusionary diagnosis and is frequently present in patients in whom the circumstances leading to pneumothorax

occur, reviewers need to assure that this diagnosis is adequately reflected in the coding profile. Sometimes it will appear as though the pleural effusion was not separately treated or evaluated as a medical condition. This is because providers look upon pleural effusion almost always in the context of another diagnosis. Treatment and monitoring of the pleural effusion therefore frequently are covered by the treatment for the other medical condition, such as during workup for lung cancer. In addition, the very procedure that may have resulted in a small pneumothorax, such as throracentesis, is a mode of treatment for pleural effusion. Unless the provider has linked the pneumothorax to the procedure, a medical record query should be issued to clarify these complex diagnostic and therapeutic processes.

It is further of great importance that the coding profile reflects the nature of procedural care. Since a number of procedure codes exclude PSI-6, it is worth assuring that the proper codes are selected, for example, 0BTF4ZZ Resection of Right Lower Lung Lobe, Percutaneous Endoscopic Approach, for an excisional lung biopsy in that region. When iatrogenic (i.e., postprocedural) pneumothorax is coded in the setting of surgical procedures that are not listed as exclusionary conditions, such as upper abdominal surgery involving organs close to the diaphragm, reviewers should look for clinical indicators that might suggest that the pneumothorax was inherent in the procedure.

Case Illustration: Pneumothorax After Spine Surgery: Pleural Effusion Added as an Exclusionary Condition After Consideration of Clinical Significance

Reason for concurrent chart review: This patient's chart was reviewed for PSI-6, identified by 3M (Iatrogenic pneumothorax rate). The trigger for PSI-6 was the proposed code of J95811 (Postprocedural pneumothorax).

Review summary: A female patient with current smoking history, scoliosis, rheumatoid arthritis, and COPD underwent elective L1–L5 lateral discectomy and cage fusion. The surgical dissection included the 11th and 12th ribs and necessitated evacuation of a small amount of air from the pleura with a red rubber catheter. Pulmonary medicine consultation was obtained to evaluate a possible pneumothorax after surgery. The consult note indicated the presence of a new pleural effusion and volume loss on the left side on chest X-ray. The chest computed tomogram (CT) showed a small (10%) anterior apical pneumothorax and a small left effusion with left basilar consolidation. This was summarized in the medical record as (1) left-sided pneumonia vs. atelectasis, (2) left pleural effusion-possible hemothorax, and (3) left pneumothorax with subcutaneous emphysema status post-lumbar fusion. The plan was to place the patient on high-concentration oxygen to help resolve the pneumothorax and monitor with chest X-ray. No thoracentesis for pleural effusion was recommended as it was too small to tap. Treatment for pneumonia with antibiotics was also planned. The pneumothorax was no longer visible the next day, but continued oxygen and incentive spirometry therapy were necessary for improving atelectasis. In the discharge summary, the physician documented

that the patient had a postoperative pneumothorax after spine surgery requiring oxygen, but that it was too small to require a chest tube.

Proposed coding (pre-billing): The code J95811 (Postprocedural pneumothorax) was proposed by CDI because the physician documented postoperative pneumothorax in the medical record. The coding of this diagnosis was supported by evidence in the medical record that treatment (high-concentration oxygen) and monitoring (chest X-ray) were being provided. The initial coding profile did not encompass any exclusionary diagnoses such as pleural effusion.

Quality review reasoning and request: The pneumothorax appeared clinically insignificant. No chest tube was required; it was evident only on CTA, not on plain films; and it resolved completely within 1 day. Moreover, the patient had low oxygen saturation at baseline due to preexisting COPD, requiring oxygen therapy. At discharge, the patient qualified for home oxygen (with a room air oxygen saturation 80%), suggesting that the hypoxemia experienced during hospitalization was not due to pneumothorax. Despite these facts, documentation in the medical record supported the coding of pneumothorax because treatment and monitoring for this condition were rendered, however briefly.

The focus of the review shifted to identifying support for exclusionary diagnoses. The quality reviewer requested addition of the documented diagnosis of pleural effusion and requested a second-level coding review for code J90 (Pleural effusion). The reason for this was the description of the pleural effusion in the pulmonary consultation note and its compressive effect on the lung on the same side, indicated by the appearance of possible atelectasis.

Another approach would have been to explore whether the small pneumothorax was inherent in this surgical procedure. Support for such an approach would have come from the operative note that indicated that the operative dissection required incision of periosteum and mobilization of the 11th rib and adjacent pleura. It described that a small rent in the intercostal muscle was left open to be closed later over a red rubber drain. This indicated that the operative procedure required dissection involving the ribs in close proximity to the pleura. Because of this clinical indicator of inherence, a query would have been justified to clarify whether the pneumothorax was a complication or inherent in the procedure.

Referral for senior physician review: Senior physician review was not needed here because sufficient provider documentation existed in the medical record to code the exclusionary diagnosis of pleural effusion. However, the senior physician prospectively educated relevant physicians regarding the importance of accurate documentation.

Coding outcome: The account was reviewed by a second-level coder at the request of the quality department. The determination was to add the code of J90 (Pleural effusion). This was justified because pleural effusion was noted on chest X-ray and CT. More importantly, it was acknowledged by the pulmonary medicine specialist as being present, too small to tap but possibly compressing the lung.

14.2 Medical Staff Education

Prevention of iatrogenic pneumothorax begins with appropriate training of medical personnel performing a procedure that might result in this complication, such as the placement of central lines. This can be done by engaging the medical staff in periodic skills refreshment, such as with simulation-based approaches. Another way to encourage a reduction of these events is technology-guided placement of small-bore feeding tubes. Placement of these devices is associated with iatrogenic pneumothorax. Greater utilization of peripherally inserted central catheters may be helpful as well. Such a multifaceted approach has been previously described [6]. Another example is the preferential performance of lung biopsies using an ultrasound-guided transbronchial approach over CT-guided percutaneous needle biopsy, where the former is associated with a substantially lower rate of pneumothorax [7, 8].

Some procedures carry a certain risk of pneumothorax regardless of how experienced and careful the operator is. An example is image-guided diagnostic percutaneous lung biopsy. Operative or procedural note templates should contain reminders for providers to address whether pneumothorax is expected with the procedure. Medical staff education also should be directed to assuring that the operative note identifies patient conditions (such as scarring or altered anatomy) that led to the pneumothorax (vs. being an unanticipated complication of surgery). Alternatively, as was relevant in one of the case examples, the operative note could describe how surgical dissection near the pleura was required as part of the procedure and that a small pneumothorax would likely be expected.

Equally important is for medical staff to remember to document the clinical significance of a small pneumothorax (or lack thereof) and clarify further when pneumothorax is likely unrelated to the surgical procedure. To be able to capture exclusionary diagnoses accurately, medical staff should address conditions like pleural effusion or hemothorax as distinct problems with treatment or monitoring plans for each. It also may be helpful for the organized medical staff to establish criteria for documentation of pneumothorax and pleural effusions.

Case Illustration: PSI-6 (Iatrogenic Pneumothorax) Avoided Through Documentation of Pleural Effusion

Reason for concurrent chart review: This patient's chart was reviewed for PSI-6. The event was identified by 3M (Iatrogenic pneumothorax). The trigger for PSI-6 was J95811.

Review summary: A middle-aged female with a history of anemia, coronary disease, diabetes type 2, pulmonary embolism, and chronic kidney disease presented with a 2-day history of cough, fatigue, and diarrhea. She was admitted to the ICU for viral pneumonia due to COVID-19 with hypoxemic respiratory failure requiring continuous BIPAP at 100% FIO_2. Nephrology was consulted for acute kidney failure, and continuous renal replacement therapy was initiated 2 weeks into the hospital course. She required central venous access, and a central line was placed. Post procedure, she was noted to

have a right tension pneumothorax, and a right chest tube was placed. In addition to the pneumothorax, the patient developed atrial fibrillation with rapid ventricular response and was treated accordingly. Her health continued to decline and per family request she was transitioned to comfort care and extubated. She expired shortly after.

Proposed coding (pre-billing): J95811 (Postprocedural pneumothorax).

Quality review reasoning and request: A bill hold review for iatrogenic pneumothorax was requested. It was noted during chart review that the patient had several progress notes documenting pleural effusions without representation of this diagnosis on the coding profile. No history or current documentation for heart failure was noted in the medical record. In addition, several attempts to treat the effusion with diuretics and fluid removal by CRTT were documented. A request to consider adding the diagnosis of pleural effusion was made.

Referral for senior physician review: The case was not escalated for senior physician review because this workflow and reasoning had been established previously with our coding team.

Coding outcome: The account was reviewed by a senior coder at the request of the quality department. The determination was that coding changes were needed. J90 was added to the coding profile. PSI-6 is excluded from reporting with any listed coding for pleural effusion (PLEURAD).

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Central Line–Associated Bloodstream Infection (AHRQ Patient Safety Indicator 7)

15

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Patients for whom a patient safety indicator (PSI)-7 designation is reported have longer lengths of hospital stay and greater hospital costs. According to a 2007 statistical brief from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project, patients with PSI-7 had hospital lengths of stay 19.2 days longer than similar patients without infection, and their hospital cost was $43,000 higher [1]. PSI-7 is not a component of PSI-90, likely because the Centers for Medicare & Medicaid Services uses National Healthcare Safety Network (NHSN) data to compare hospitals' performance with regard to central line bloodstream infections. PSI-7 is still a component of the scoring methodology used by CareChex. PSI-7 applies to inpatients of ages 18 years and older who develop a central venous catheter-related bloodstream infection as a secondary diagnosis. All patients with medical, surgical, or obstetric diagnosis-related groups are included.

PSI-7 is based only on medical record documentation and the resulting billing code assignment. It is not influenced by the NHSN definition of central line-associated bloodstream infection (CLABSI). It will be reported as a PSI (and a

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CMS hospital-acquired condition used for DRG payment reduction) even if the patient did not meet NHSN criteria for CLABSI. It is therefore relatively pointless to base review activity on NHSN criteria unless the medical staff have adopted a guideline for diagnosis and documentation of CLABSI that requires NHSN criteria. The rationale for coding based on medical record documentation is that physicians are given the latitude to diagnose CLABSIs they deem to be clinically suspected, likely, or probable.

Key Concept
This PSI is reported when a physician documents the presence of a central line infection. PSI-7 can therefore be reported even for patients whose clinical course does not satisfy the NHSN criteria for a CLABSI.

Lack of an evidence-based criterion for coding this hospital-acquired complication leaves this PSI metric open to much critique [2]. Its positive predictive value is only 54–79% [3, 4], and it did not meet the standard identified for validity [5]. There is little concordance between the very stringently defined NHSN metric for CLABSI and AHRQ PSI-7 [6]. In fact, fewer than 10% of patients reported as having had a hospital-acquired CLABSI were reported by both NHSN and AHRQ criteria. Interestingly, PSI-7 may require race-specific covariate adjustment. This was based on the finding of a high degree of variability in racial disparities of the risk factors for PSI-7 [7]. Despite these concerns, other work indicates that PSI-7 is correlated to other AHRQ PSIs and could serve as a surrogate indicator of hospital patient safety [8]. Moreover, the introduction of present on admission (POA) codes may have improved the validity of PSI-7.

Review for this PSI should focus on establishing whether the CLABSI was POA, whether the diagnosis was truly ruled in by the treating provider (or just mentioned as part of a differential diagnosis), and whether exclusionary diagnoses were present. Not ruling out a diagnosis has been identified as a potential contributor to PSI reporting bias [9].

15.1 Approach to Review

1. Present on Admission: Patients who were admitted with a central line in place (including peripherally inserted central catheters and tunneled lines) may have clinical indicators of infection that could be linked to the central line. Reviewers should look for indications in the medical record from blood cultures, cultures that may have been taken from the line itself, and absence of other obvious sources of infection. For example, we encountered a patient who was transferred to us from another facility with an indwelling central line with evidence of sepsis based on positive blood cultures and altered mental status. Because there was no other obvious source for this patient's sepsis, we issued a query that confirmed that sepsis was likely due to the central line, and the CLABSI was coded POA.

2. Accuracy of the Diagnosis: It is frequently not possible for providers to determine the source of bacteremia or sepsis right away. A differential diagnosis is documented in the medical record, which may provide the indication to add the code of CLABSI to the patient's coding profile. If the source of sepsis is later determined to be the patient's pneumonia, it may not be clear from the medical record that CLABSI was ruled out. A medical record query should be issued to clarify the final determination. Another variant of this theme involves the documentation of bacteremia but not infection. The provider may have written "bacteremia, likely due to central catheter – will treat prophylactically." Unless an infection is documented, the CLABSI code should not be used without further clarification, although some coding guidelines indicate that bacteremia is considered the equivalent of infection in coding parlance.
3. Exclusionary Conditions: Excluded are cases with a principal diagnosis of a central venous catheter-related bloodstream infection, cases with a secondary diagnosis of a central venous catheter-related bloodstream infection POA, cases with inpatient stays less than 2 days, cases with a diagnosis or procedure code associated with immunocompromised states (as defined by AHRQ Appendix I), or cases with cancer diagnoses (as defined by AHRQ Appendix H). Reviewers should assure that all appropriate cancer diagnoses and immunocompromised states are accurately reflected in the coding profile. Clinical indicators for their presence and active management [i.e., MEAT (monitoring, evaluation, assessment, and treatment)] should be sought and pointed out to the clinical documentation and coding teams.

15.2 Medical Staff Education

Medical staff education should be directed to assuring that documentation of central line-associated infection or sepsis is correct. It may be helpful for medical staff to understand the risk factors for CLABSI that go beyond the classically taught areas of emphasis. In addition to the risks associated with insertion technique, line location, and line utilization, it may also be helpful to understand epidemiological risk factors. In a >5 million patient study of racially disparate risk factors, younger or middle-aged Black Medicare patients were at greater risk for PSI-7 if they were admitted emergently or for a trauma diagnosis [10]. In contrast, white middle-aged patients who were at highest risk had heart failure diagnoses. Weight loss was a risk factor across races.

If the line might be infected on admission (such as when central lines have been inserted emergently or at the femoral site), medical staff should understand that it is important to document this suspicion in the admission history and physical while pursuing appropriate treatment. Our medical staff adopted a standard operating procedure that asks providers to consider nontunneled lines originating at another hospital to have a high likelihood of being infected. Likewise, education should be directed toward providers clarifying in the medical record whether the patient merely had bacteremia or actually had an infection. Finally, providers should

attempt to summarize the results of their investigation and workup of the bloodstream infection and document if another source was more likely than the central line. We have found it helpful to promote consultation with infectious disease specialists to assist in finding and documenting the source of infection. Organizations may also benefit from standardized definitions of central line–associated bloodstream infection and adoption of medical staff-approved documentation protocols. This might be particularly helpful if the agreed-upon definitions are used as part of physician medical record queries seeking to clarify inconsistent medical record documentation.

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16 Perioperative Hemorrhage or Hematoma (AHRQ Patient Safety Indicator 9)

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Although patient safety indicator (PSI)-9, perioperative hemorrhage or hematoma, is not heavily weighted within PSI-90—accounting for 4% of the total PSI-90—it is one of the most frequently reported PSIs. PSI-90 is a component of the Leapfrog Hospital Safety Grade. PSI-9 is also used in the CareChex hospital quality measure. Because of its relatively high prevalence, unless this condition is accurately reported, the number of PSI-9 quality numerator events (QNE) relating to perioperative bleeding could quickly add up to an unfavorable public reporting profile. The overall incidence of a PSI-9 event is approximately 4 per 1000 inpatient hospital admissions [1, 2]. PSI-9 represents hematoma in about 70% and hemorrhage in 30%; it is associated with a 7% mortality rate [2]. Interestingly, Mull and colleagues, reporting on Veterans Administration hospital data, also identified nearly an equal rate of these bleeding complications after hospital discharge [1]. Vascular surgery patients have a relatively high incidence of PSI-9 [3]. In this patient population, the occurrence of PSI-9 is associated with a threefold increase in mortality and a doubling of the cost of hospitalization [4]. The ability of PSI-9 to predict an actual postsurgical hematoma or major bleeding event is limited, with a positive predictive value (PPV) of 75% [2]. Reasons for falsely positive reported PSI-9 events included events present on admission (POA), hemorrhage or hematoma controlled during the original surgery, and postoperative bleeding that did not require a procedure. The PPV of PSI-9 may have improved with the adoption of POA codes.

PSI-9 is very well defined in the relevant Agency for Healthcare Research and Quality (AHRQ) document, Patient Safety Indicators Technical Specifications [5].

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It requires a surgical diagnosis-related group (as defined in AHRQ Appendix E), a specific code for the hematoma or hemorrhage (AHRQ code list POHMRI2), and a code for a procedure employed to treat it (AHRQ code list HEMOTH2P; (Methodology | Agency for Healthcare Research and Quality (ahrq.gov)). The latter codes describe a large list of procedures with the descriptors of drainage, destruction, extirpation, occlusion, repair, or revision. When a hemorrhage or hematoma occurs intraoperatively, there is opportunity for miscoding and overreporting bias. Note that in this context, the interventions of blood transfusion or fluid resuscitation are not considered a procedure to treat hemorrhage or hematoma.

Exclusionary conditions are also fairly well defined. They include the hematoma or bleeding being POA or occurring prior to the surgical procedure, as well as cases where treatment of the bleeding or hematoma was the only surgical procedure. Presence of coagulopathy represents another exclusionary condition often overlooked. It is defined by a set of AHRQ exclusionary codes (COAGDID).

Key Concept
This important PSI is very well defined and many opportunities exist to improve the accuracy of reporting. The most important are to establish whether the bleeding was clinically significant and was inherent in the procedure, and whether an exclusionary condition exists.

16.1 Approach to Review

Because PSI-9 is so well defined, a review process can be established that can easily be followed by performance improvement coordinators or other similarly trained clinical personnel. Table 16.1 describes the standard operating procedure used by our teams to identify the QNE, while the patient is still hospitalized, using surveillance software (3M), and complete the review in the EPIC medical record, using the coder's view. This procedure can also be used for other QNEs identified in the surveillance software (see Chap. 7).

Case Illustration: PSI Avoidance Through Accurate Documentation of POA Due to Initial Outpatient Status
Reason for Concurrent Chart Review: This patient's chart was reviewed for PSI-9, identified by 3M (Perioperative Hemorrhage or Hematoma Rate). The trigger for PSI-9 was post-procedural hemorrhage of a genitourinary system organ (N99820) following a genitourinary procedure, not present on admission.

Review Summary: This patient was placed in observation status prior to having an elective myomectomy operation. The procedure was completed at 10:06 AM. Total estimated blood loss was 500 mL. The physician's order to

admit to outpatient extended recovery was placed at 10:59 AM. In the afternoon of the same day, the patient became tachycardic but was otherwise stable with only mild abdominal pain. A small amount of bloody drainage was present on the dressing. A blood test showed a hemoglobin level of 6.9 g/dl. An hour later, the patient was noted to be pale and sleepy but fully oriented. Shortness of breath increased and blood was administered along with albumin. Blood pressure was 86/52 mmHg and the heart rate had increased to 145/min. At 2:00 PM, concern for abdominal bleeding led to return to OR after establishment of continuous arterial blood pressure monitoring. The hemoglobin concentration was now 6 g/dl. The operative note documented the presence of 1500 mL intra-abdominal blood. The uterus was intact with no evidence of bleeding. A small bleeding perforating vessel in the broad ligament was identified. The takeback procedure was started at 14:21 PM and was completed at 15:39 PM. The inpatient admission order was timed at 15:48 PM.

Proposed Coding (Pre-billing): The diagnoses of post-procedural hemorrhage of a genitourinary system organ (N99820), post-procedural hypotension (I9581), acute post-hemorrhagic anemia (D62), hemoperitoneum (K661), and other shocks (R578) were all proposed to be coded as not POA.

Quality Review Reasoning and Request: Documentation indicated that post-procedural hemorrhage, post-procedural hypotension, acute post-hemorrhagic anemia, hemoperitoneum, and shock all happened prior to inpatient admission. The request was to change to POA of yes.

Referral for Senior Physician Review: The quality reviewer referred this case for senior physician review because the bleeding episode did not occur during the present hospital inpatient admission. Senior physician review was confirmatory.

Coding Outcome: The account was reviewed by a senior coder at the request of the quality department. The determination was that coding changes were needed to change the status of the above diagnoses to POA = yes.

Table 16.1 Standard operating procedure for concurrent clinical review for perioperative hemorrhage/hematoma in an epic electronic medical record environment and 3M software

Review Step	Procedure
Prework	When a PSI-9 case appears in the facility-specific Epic work queue list (work queues – Pre-bill complication review in Epic dropdown menu): Copy the HAR # from the EPIC "Acct" field Enter HAR # into 3M Enter the chart in 3M Click on Indicator tab, then click on Final Code Summary in 3M Look for AHRQ Quality Indicators (The PSIs or HACs will appear in blue) in 3M Enter Epic (in coders' view, using HAR#) to review the case with focus on the quality indicator(s)

(continued)

Table 16.1 (continued)

Review Step	Procedure
Chart Review (in Epic coders' view) *to Establish POA Status*	1. Go to "Coding" tab, then select the "ADT Info" section. 2. Determine if there is a significant difference between admission and inpatient admission date and time. The reason is that a hematoma/hemorrhage may be POA because the procedure was done in outpatient status and the patient was converted to inpatient status after the hematoma/hemorrhage occurred. 3. In the "Doc(ument) Review" section, clinical indicators for POA evidence may be found under "History & Physical" and "ED Summary," as well as "Discharge."
Chart Review (in Epic coders' view) *to Establish Clinical Significance*	Look for indicators of clinical insignificance (e.g., small hematoma, no need for transfusion, no need for surgical intervention, no evidence of monitoring interventions beyond routine postoperative surveillance). In other words, it is important to establish if any of the MEAT (monitoring, evaluation, assessment, and treatment) criteria were met.
Chart Review (in Epic coders' view) *to Establish Exclusionary Diagnoses*	For PSI-9, exclusionary diagnoses are listed below. Look for clinical indicators of low platelet count (labs section), anticoagulant use, elevated PT/PTT/INR, clinical mention of coagulopathic state, diffuse oozing, etc. Look in operative note, procedure note, or progress notes. Hemorrhagic disorder due to extrinsic circulating anticoagulants Drug-induced pancytopenia Acquired coagulation factor deficiency Pancytopenia Coagulation defect, unspecified Qualitative platelet defects (such as seen in ESRD) Disseminated intravascular coagulation Thrombocytopenia, unspecified (but not secondary thrombocytopenia) Hemorrhagic condition, unspecified

ESRD end stage renal disease, *HAC* hospital acquired condition, *PSI* patient safety indicator, *HAR* health account record, *PT* prothrombin time, *PTT* partial thromboplastin time, *INR* international normalized ratio, *ED* emergency department

Physician reviewers need to look for examples of overt or implicit documentation in surgeons' operative reports and postoperative notes that link the bleeding event to coagulopathic conditions. Coagulopathic states need not always be supported by laboratory testing but can be based on clinical impressions, using terms such as "diffuse oozing." When present, laboratory tests can provide clinical indicators of coagulopathy, such as a low platelet count or an elevated INR or PTT. Even in the absence of laboratory evidence, the use of heparin infusions, thrombolytics, and other anticoagulants near the time of the surgical intervention can serve as clinical indicators for query generation. The object of such a query would be to clarify whether the bleeding event should be more appropriately linked to the effect of such medications as opposed to representing a surgical complication. One goal of medical staff education should be to increase awareness of the reason for queries attempting to link bleeding to anticoagulant administration or other conditions likely to case bleeding.

16.2 Medical Staff Education

Physician education should emphasize that not every postoperative bleeding episode or hematoma will result in a PSI-9 event. Physicians should document when, in their judgment, bleeding is related to coagulopathy, whether it is intrinsic to the patient's state of health or if it is due to administration or prolonged effect of anticoagulant medications. This diagnostic linkage should also be kept in mind when answering medical record queries. All too often, the easiest and quickest response is simply to agree with the first choice given in the query format (i.e., to confirm the bleeding as a surgical complication) or to check a choice that may read "clinically undetermined" or similar. In answering such queries, surgeons and their medical staff team members should be advised to read queries carefully. They should also be educated about the potential impacts of inaccurately or hastily answered queries. In the following paragraphs, we discuss examples of topic areas for concurrent review and resulting opportunities for timely feedback and education to the medical staff.

Medical staff education should also address documentation needs for occurrence of seroma and the significance of queries relating to this diagnosis. If the patient experienced a condition that more likely represented a seroma, medical staff should seek to represent this diagnosis should accurately. For example, if the medical record indicates fluid collection or swelling along the wound edges without a definitive description of bleeding or hematoma, a query may be needed to clarify the condition because diagnostic codes for seroma, such as "postprocedure seroma of the skin and subcutaneous tissue" (L7634), do not trigger a PSI-9. Medical staff should understand the need to answer such queries with the highest degree of specificity, as the response may be the difference between an unwarranted PSI-9 event being reported or avoided.

Medical staff should also be aware of the situation where a radiology report or the results of a radiology report copied into a provider note might present evidence of a postoperative hematoma, resulting in a special dilemma. For example, on a postoperative computed tomography scan of the abdomen, a fluid collection is identified but cannot be fully characterized. The report may state that the collection could represent either ascites, an abscess or a hematoma. Depending on the full clinical picture, one may be more likely than the other. If the collection is ultimately drained, its character (i.e., fluid, infection, or blood) would be proven. However, it is conceivable that before this happens, a medical record query is sent, with providers unwittingly confirming the query choice of a postoperative hematoma. Provider education should identify such situations, and clinical documentation partners may need to issue a query to clarify the situation, choosing the appropriate time so that providers are not pushed to make diagnostic determinations too early during the hospital course. Provider education should emphasize the importance of documenting the overall clinical picture to indicate whether the bleeding was clinically significant as defined by the presence of MEAT. Collecting case examples with these considerations can enrich the specificity and relevance of physician education efforts.

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Patient Safety Indicator-11 (Acute Perioperative Respiratory Failure)

17

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Patient safety indicator (PSI)-11 is one of the four most heavily weighted components of the Agency for Healthcare Research and Quality (AHRQ) PSI-90, representing 24% of the total weight of PSI-90. PSI-11 is also included in the scoring methodology for the CareChex and Leapfrog hospital quality measures (as a component of PSI-90). PSI-11 has been examined with respect to its positive predictive value (PPV), i.e., its ability to identify true events. Borzecki et at. [1] reported a PPV of 67% in a veteran population and concluded that this metric can be used for screening. Higher PPV values had also been reported [2]. Still, PSI-11 is known to be subject to frequent over-reporting bias. Nguyen et al. [3] saw a 31% coding and documentation error rate. Furthermore, of the remaining cases that met the AHRQ definition of postoperative respiratory failure, these investigators determined a 62% false-positive rate. The PPV of PSI-11 for preventable postoperative respiratory failure was only 38%. Recently, with improvements in AHRQ indicator criteria and clinical documentation improvement programs, greater accuracy has been reported [4].

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Only elective surgical patients over 18 years of age who develop respiratory failure as a complication of surgery are subject to being reported as a PSI-11. The respiratory failure trigger for PSI-11 can occur by two main mechanisms. First, PSI-11 triggers if there is a diagnosis of acute or acute on chronic postoperative respiratory failure (defined as respiratory failure as a complication of surgery). A medical record entry or provider query response specifically associating the respiratory failure as a complication of surgery is required. In many situations, respiratory failure occurs after surgery but is a concurrent condition related to a cause unrelated to surgery. Such respiratory failure could be an exacerbation of a preexisting pulmonary condition or due to the effect of fluid or medication. In either case, postoperative respiratory failure should not be reported unless it is specially documented as such or linked to the procedure. The other way that PSI-11 triggers is by a procedure code. The procedure codes triggering a PSI-11 are ICD-10-Procedure Coding System codes for a mechanical ventilation lasting 96 consecutive hours or more (PR9672P) that occurs 0 or more days after the first major operating room procedure (basically any time during the postoperative inpatient stay), a mechanical ventilation for less than 96 consecutive hours (PR9671P) that occurs 2 s or more days after the first major operating room procedure (basically a condition requiring reintubation more than 2 days after surgery but requiring only a shorter course of mechanical ventilation), or a reintubation (PR9604P) that occurs 1 or more days after the first major operating room procedure. This means that reintubations on the day of surgery associated with mechanical ventilation lasting less than 4 days do not trigger a PSI-11 event. Reviewers have a clearcut workflow for this PSI. We discuss the facets that need to be addressed during such a review, in order of importance.

17.1 Approach to Review

Timing of Mechanical Ventilation If the PSI is being driven only by a procedure code of mechanical ventilation or reintubation, it is imperative to check the accuracy of the timing and duration of these procedures. As mentioned, if reintubation or mechanical ventilation occurred within the first 24 hours of the procedure and the patient needed only a short period of mechanical ventilation, a PSI-13 will not trigger. This is certainly the case for reintubation on the day of surgery and is applicable if the duration of mechanical ventilation is limited to less than 96 hours. It is as important to check the documentation of initiation of mechanical ventilation as it is to verify its duration.

Low-Hanging Fruit
Because one of the triggers for this PSI is related to the initiation and duration of mechanical ventilation, concurrent review should assure the documentation and coding accuracy of these events.

Diagnostic Accuracy and Concurrent Disease Acute respiratory failure may not be the most accurate description of the patient's condition. Reviewers will seek to identify clinical indicators for alternative diagnoses such as pulmonary edema or interstitial lung disease, as applicable. As mentioned, respiratory insufficiency or failure can occur after elective surgery and may not be a complication of surgery. Patients with preexisting chronic respiratory disease may have an acute exacerbation. Unless acute respiratory failure can be linked directly to a surgical or medical interventional procedure, acute postoperative respiratory failure should not be coded. Because the factors leading to respiratory failure postoperatively can be difficult to sort out, can be multifactorial, and require medical judgment to determine accurately, a medical record query should be issued prior to coding acute postoperative respiratory failure. The only exception would occur when respiratory failure is clearly documented by the physician or provider as having been caused by or be the direct result of the surgical procedure. An example would be unexpected respiratory failure in a previously respiratory-healthy patient following a surgical procedure for which a plausible mechanism of injury exists, such as injury of the phrenic nerve with neck surgery.

Exclusion Diagnoses Aside from the procedural exclusions, these come in two buckets: neuromuscular disorders and neurologic conditions. Neuromuscular diagnoses we look for are critical illness myopathy, myasthenia, myopathy, myotonia, and others. Degenerative neurologic disorders that commonly provide exclusion conditions involve acute delirium, various forms of dementia including Alzheimer disease, and organic brain syndrome.

Inherent in the Procedure Many complex surgical interventions, especially thoracic, cardiac, and upper abdominal procedures, require postoperative mechanical ventilation for the respiratory system to recover from the impact of surgery and intraoperative fluid resuscitation. Other procedures such as extensive head and neck dissection and prolonged surgery in the prone or steep head-down position require postoperative intubation and mechanical ventilation to protect from compromised patients' airways. For cranial neurosurgical procedures and extensive spine surgery, similar considerations may apply because the surgical procedure has the potential to affect the patient's ability to protect their airway or to affect spinal cord- or brainstem-related respiratory control. Recently, false positives in PSI-11 reporting were found to occur primarily due to patients requiring intubation for airway protection, although patients did not have respiratory failure [2]. Therefore, operative teams should routinely assess the need for postoperative mechanical ventilation in case planning. For such procedures, the need for mechanical ventilation should be documented in the medical record. Postoperative respiratory failure should not be routinely coded in such situations, and, in the case of unclear documentation, a medical record query would be needed to clarify whether respiratory failure is inherent in the surgical procedure and expected postoperative care plan.

Presence on Admission This is the least important aspect for a PSI that only applies to elective surgery. The only time this may be helpful

is when the patient is newly admitted for a postoperative respiratory complication. Reviewers should also verify medical record documentation substantiating the elective (vs. urgent) nature of the procedure.

Case Illustration: Delirium Added as an Exclusionary Condition

Reason for Concurrent Chart Review: This patient's chart was reviewed for PSI-11, identified by 3M (postoperative respiratory failure). The trigger for PSI-11 was the procedure code of 5A1955Z.

Review Summary: This is a patient with a history of enlarging pancreatic neuroendocrine tumor with gastroesophageal reflux disease. He underwent central pancreatectomy, Nissen fundoplication, portal vein repair, and common bile duct exploration. The patient had several returns to the operating room and an extended hospital stay. While the patient was in the intensive care unit (ICU), the physician included delirium in the problem list. Multiple physician progress notes provided documentation for diagnoses to include (1) acute hypoxemic respiratory failure, (2) long-term ventilator dependence, and (3) delirium. Further, the use of olanzapine was documented as a recommended treatment.

Proposed Coding (Pre-billing): The procedure code is 5A1955Z (mechanical ventilation for >96 hours) without an exclusionary diagnosis code for PSI-11. A diagnosis for delirium was not coded.

Quality Review Reasoning and Request: The diagnosis of delirium was documented in the physician's progress notes although not mentioned in the patient's discharge summary or included in the final active diagnosis list. The physician's documentation included treatment with medication. Therefore, a second-level coding review was requested to add the diagnosis code for acute delirium F05, which is an exclusionary condition for PSI-11.

Referral for Senior Physician Review: Physician review was not needed here because sufficient provider documentation existed in the medical record to code the exclusionary diagnosis of delirium.

Coding Outcome: The account was reviewed by a senior coder at the request of the quality department. The determination was that the diagnosis of delirium due to known physiologic condition (F05) would be added. The justification for this change was that the patient was in the ICU for the majority of the hospital stay, and ICU delirium was noted in the physician progress notes. In addition, a medication (olanzapine) was mentioned as being used for treatment of this condition.

17.2 Medical Staff Education

The medical staff can definitively assist in avoiding unwarranted complication reporting. Operative note templates can be modified with medical staff approval to include the need for or high likelihood of postoperative mechanical ventilation. Medical staff documentation champions can develop documentation guidelines,

which can then be linked to physician queries and used in medical staff education. An example of such a guideline and accompanying query is provided in Figs. 17.1 and 17.2.

Post Procedure Respiratory Failure

Guideline for Documenting and Coding

The diagnosis of respiratory failure following surgery has profound regulatory and quality of care implications. *This guideline will set standards to assist providers in managing, documentation, and coding of Post procedure Respiratory failure.*

The intent of this document is to serve as a system guideline, not replace the provider's clinical judgment

- Respiratory failure "postop," "due to," or "complicating" a procedure, is classified as one of the most severe, life-threatening reportable surgical complications a patient can have.
- To validate the diagnosis, the patient must have acute pulmonary dysfunction requiring non-routine aggressive measures.
- A patient who requires mechanical ventilation during surgical recovery that is usual or expected following the type of surgery performed does not have acute respiratory failure
    - Thus, being **purposely maintained on the ventilator** after surgery because of usual care, weakness, chronic lung disease, massive trauma or when **intubated for airway protection without evidence of respiratory distress** for angioedema, stroke, trauma **are NOT considered a complication nor should they be coded as respiratory failure**.

- To qualify for the diagnosis of postop failure, the patient must have:
    - Acute pulmonary dysfunction requiring non-routine aggressive measures **or**
    - Required post procedural support that was unexpected or unusual for the procedure preformed **or**
    - Required post procedural care beyond routine care **and**
    - There must be a cause-and-effect relationship between the procedural care provided and the respiratory failure - an indication in the documentation that it is a complication

- Special Considerations
    - Patient who require >96 h of mechanical ventilation immediately after surgery, and those who require <96 hours of mechanical ventilation if started 2 or more days after surgery are considered for having the diagnosis (unless excluded for the conditions below)
    - **Patients requiring BIPAP** should not automatically be considered as having respiratory failure
    - Patients who require reintubation one or more days surgery are considered for this diagnosis – conversely, **patients reintubated on the day of surgery should not automatically be considered as having postprocedure respiratory failure**

Documentation Tips (to facilitate appropriate attribution of post-procedure respiratory failure):

1. Document if a preexisting medical condition such as COPD, CHF, a neuromuscular disorder or degenerative neurological disorder, is the cause of or contributing to acute respiratory failure following surgery. Keep in min that ***"Acute respiratory failure in the postop setting is primarily due to preexisting CHF"***
2. Document all neuromuscular disorders if present and suspected to be contributing. Examples: Guillain-Barre, myasthenia gravis and rheumatoid myopathies
3. Document all degenerative neurological disorders. Examples: vascular dementia and Alzheimer's disease

Although coding language is based on medical terminology- they are NOT equivalent.

Fig. 17.1 Ochsner medical staff documentation guideline for postprocedural respiratory failure. (© Ochsner Health)

By submitting this query, we are merely seeking further clarification of documentation. Please utilize your independent clinical judgement when addressing the question(s) below:

The Medical Record contains the following:

	Indicators	Supporting Clinical Findings	Location in Medical Record
	Surgery or Procedure performed		
	Anesthesia type		
	Acute/Chronic Illness		
	Respiratory failure documented		
	Mechanical Ventilation		
	Difficulty wearing or prolonged wearing documented		
	Reintubation documented		
	BiPAP, CPAP, or Oxygen administration post-extubation		
	Treatments		
	Other		

Ochsner Health approved diagnostic criteria for Postprocedural Respiratory Failure:
• Acute pulmonary dysfunction requiring non-routine aggressive measures
or
• Required postprocedural support that was unexpected or unsual for the proedure performed
or
• Required postprocedural care beyond routine care
and
• Respiratory Failure that is due to surgery/procedure

The clinical guidelines noted above are only a system guideline. It does not replace the provider's clinical judgment

Please clarify if the_____is

[ ] Inherent to the procedure, expected or usual for that procedure
[ ] Due to condition other than surgery-Unexpected or unsual for that procedure but a pre-existing medical condition is present and is contributing. Please specify condition:_____
Common examples: COPD, CHF, a neuromuscular disorder or degenerative neurological disorder
[ ] Complication of surgery of procedure
[ ] Complication of anesthesia
[ ] Other explanation with details (Please specify):_____
[ ] Clinically undetermined

Please document in your progress notes daily for the duration of treatment, untill resolved, and include in your discharge summary.

Reference:

Fig. 17.2 Medical record query regarding postoperative respiratory failure. (© Ochsner Health)

Medical staff education should emphasize that providers need to clarify whether respiratory failure is directly referable to the surgical or procedural intervention or whether other causes are likely. The coding of acute respiratory failure and pulmonary insufficiency after surgery has been found to be variable [5]. Therefore, medical staff education should be aimed at clearly identifying the cause of respiratory failure in the postoperative period. Education should always include the "why," i.e., notion that documentation determines coding accuracy, which again results in avoidance of unwarranted and incorrect complication reporting. We have found that provider education has resulted in greater documentation accuracy for PSI-11 events not triggered from procedure codes.

Likewise, when surgical patients are co-managed by medical staff members, it is important for hospitalists and medical specialists to understand that using the

diagnosis of postoperative respiratory failure without further specification may result in over-reporting of respiratory failure as a surgical complication. Medical staff should also understand the common exclusionary diagnoses for this PSI, such as neuromuscular and neurological conditions.

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Perioperative Pulmonary Embolism and Deep Vein Thrombosis (AHRQ Patient Safety Indicator 12)

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Patient safety indicator (PSI)-12 is one of the four most heavily weighted PSIs within PSI-90. Weighted at 18%, PSI-12 accounts for almost one-fifth of the weight within PSI-90. PSI-12 is also a component of other public rating agency measures such as CareChex® and Leapfrog®. The positive predictive value of PSI-12, based on ICD-10 hospital discharge abstract data, has been reported as being fairly high at close to 90% [1]. Studies conducted in Veterans Administration hospitals indicated the lack of surveillance bias in the hospital setting [2]. At the same time, a recent review indicated that only 11% of cases identified as PSI-12 had protocol deviations from evidence-based care. This casts doubt on its usefulness as a metric for identifying quality of care issues [3].

PSI-12 applies to all inpatients, elective or non-elective, ages 18 years and older. It is one of the most difficult to review for because of the following challenges. First, many patients are likely admitted with preexisting deep vein thrombosis (DVT) or even chronic pulmonary embolic disease, but these conditions are not routinely screened for on admission. Routine screening for DVT, while capable of identifying present on admission (POA) status for coding purposes, is not recommended in the absence of symptoms. This quandary is especially prevalent in practices where a large proportion of patients are admitted from another facility or are admitted for

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conditions that predispose to venous thrombosis such as stroke. Second, even if DVT had been previously diagnosed, coders are generally not empowered to utilize medical record documentation from outpatient treatment or prior hospitalizations to establish the POA status of diagnoses, but could use such information to generate a medical record query. Recent guidance from professional organizations of clinical documentation excellence professionals, however, has allowed the generation of medical record queries based on such prior medical record documentation [4]. Third, there are only a few uncommonly occurring exclusionary diagnoses for PSI-12.

18.1 Approach to Review

Recommended review procedures to achieve optimally accurate coding might include the following:

Establishment of POA Status As mentioned above, this determination is difficult. However, we recommend a review of clinic visit notes, documents from originating facilities, and medical records from prior hospital admissions to establish the likelihood that the DVT or pulmonary embolism (PE) found during the index hospitalization might have been POA. In our experience, this is especially helpful in situations where a diagnostic test such as a venous ultrasound or perfusion scan of the lung shows a relatively small DVT or PE, often of questionable clinical significance and with lack of clarity with regard to its onset.

Clinical Significance In our review experience, it is worth looking closely at the changes in medical therapy following the diagnosis of a DVT or PE in the hospital. On occasion, one encounters a situation where no or insignificant changes in the care plan were made. This allows the question to be asked if the DVT was truly clinically significant or if substantially all medical interventions (such as ongoing anticoagulant therapy) were already in place and simply were continued after the DVT was found.

Diagnostic Accuracy—deep vs. superficial venous thrombosis In recognition of the high prevalence of venous thrombosis in hospitalized patients, superficial, upper extremity, and isolated distal calf vein thromboses are excluded from PSI-12 reporting. Only proximal DVT will trigger a PSI-12. It is important to assure that these diagnoses are accurately represented in the patient's coding profile.

Exclusionary Conditions These are uncommon conditions and are restricted to (1) inferior vena cava filter placement on the day of or before the procedure, (2) extracorporeal membrane oxygenation, (3) pulmonary artery thrombectomy that occurs before the index operating procedure, (4) acute brain or spinal injury, such as non-traumatic subarachnoid hemorrhage, head trauma, brain contusion, or traumatic brain

hemorrhage (identified in the Agency for Healthcare Research and Quality list NEURTRAD), (6) a principal diagnosis of PE or proximal DVT, or (7) obstetric cases (MDC14). MDC stands for Major Diagnostic Category; NEURTRAD is the name of a list of exclusionary diagnoses in the AHRQ methodology (Methodology | Agency for Healthcare Research and Quality (ahrq.gov)). Reviewers will want to double check the coding and dates of any exclusionary procedures, as well as the accuracy of diagnoses relating to acute brain or spinal injuries. Single-segment PEs (such as single subsegmental PE without acute cor pulmonale, coded as I2693) do not trigger a PSI-12. Reviewers should assure that the code accurately describes the pulmonary circulation affected by the PE.

Case Illustration: Small Pulmonary Emboli Occurring After Outpatient Surgery Before Inpatient Admission

Reason for Concurrent Chart Review: This patient's chart was reviewed for PSI-12. The event was identified by 3 M (Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate). The trigger code for PSI-12 was I26.99 (Bilateral pulmonary embolism).

Review Summary: A middle-aged female with asthma, arthritis, and diabetes underwent a total left knee arthroplasty. She was admitted to outpatient extended recovery. On the morning of postoperative day 2 a physician's progress note documented low oxygen saturation (93%) and tachycardia with activity. Although the patient was initially thought ready for discharge, a computed tomography angiogram (CTA) of the chest was obtained. The report showed possible small bilateral pulmonary emboli, with low degree of certainty. A pulmonary consultant's note two hours thereafter indicated that the CTA findings were consistent with pulmonary embolism but because of the quality of the study, it could represent a false-positive finding. Anticoagulant therapy was started, and close monitoring via telemetry and pulse oximetry were continued. The patient was admitted to inpatient status later that day.

Proposed Coding (Pre-billing): Bilateral Pulmonary embolism (I26.99), not present on admission

Quality Review Reasoning and Request: The patient's inpatient admission occurred after the diagnosis of small pulmonary emboli was established and therefore should be represented as present on inpatient admission. The quality reviewer requested a revision of the admission status of the diagnosis of pulmonary embolism to POA.

Referral for Senior Physician Review: The review was not escalated for senior physician review because this workflow and reasoning had been established previously with our coding team.

Coding Outcome: The account was reviewed by a senior coder, at the request of the quality department. The determination was that coding changes were needed to adjust the admission status of the diagnosis of pulmonary embolism to POA. The rank of this diagnosis on the coding list was also changed to become the principal diagnosis for inpatient admission.

18.2 Medical Staff Education

The prevention of thrombotic complications in hospitalized procedural patients is largely evidence-based. Most hospitals have standardized postoperative orders to allow evidence-based thrombo-prophylaxis to be applied routinely. Medical staff education should emphasize the importance of documenting PE or DVT conditions on admission, and to pursue the diagnosis as appropriate on admission. In addition, medical staff can help clarify the extent and clinical significance of a newly diagnosed PE or DVT. In some situations, ongoing anticoagulant therapy may be sufficient to address the newly diagnosed thrombosis or embolic phenomenon. Medical staff can clarify this by indicating if the new DVT or PE is not sufficiently clinically significant to warrant additional changes in therapy and evaluation.

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Postoperative Sepsis (AHRQ Patient Safety Indicator 13)

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Patient safety indicator (PSI)-13 is the most heavily weighted component of PSI-90. It accounts for 22% of the entire weight of the PSI-90 measure. The validity of this metric has been questioned. The positive predictive value (PPV) for PSI-13 is low based on a study of VA and community hospital data, at 53% and 41%, respectively [1]. Based on ICD-10 hospital discharge abstract data, PPV was even lower at 12.5% [2]. The reasons for such low predictive performance included infections that were present on admission (POA), difficulty distinguishing elective from urgent or emergent cases, failure to document having ruled out the diagnosis of sepsis, and attribution of nonspecific shock in postoperative patients to a septic etiology. PSI-13 requires elective surgery and age greater than 18 years to be triggered. Therefore, it is important for the review team to assure that the admission type is correctly documented as elective, because urgent or emergent admission status would exclude reporting for PSI-13.

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Key Concept
PSI-13 is a real zinger! It represents nearly a quarter of the weight of PSI-90. Performance in PSI-13 could make the difference in whether a hospital is assigned a HAC penalty!

19.1 Approach to Review

Below are our recommendations for concurrent review:

Establish Whether Sepsis Was Present on Admission (POA) As is true for almost every other PSI, presence on admission excludes from reporting. Therefore, chart review should always include a thorough assessment to establish the correct POA Status. If the admission was not elective, nothing further is required to review. Clinical indicators for urgent or emergent hospital admission should be screened for. They could appear in the admitting physician's clinic note, emergency department notes, or admission history and physical. One aspect of determining POA status includes assessing whether the inpatient admission day and time are different from the initial admit time and date. This may occur when a patient is admitted initially for observation, for example after outpatient urologic surgery. If persistent fever and sepsis make it necessary to upgrade to inpatient status, sepsis was likely POA. Clinical indicators for POA evidence of sepsis may also be found in the

Case Illustration: Postoperative Sepsis and Correction of Elective Admit Status
Reason for Concurrent Chart Review: This patient's chart was reviewed for PSI 13. The event was identified by 3 M (Postoperative Sepsis). The trigger for PSI-13 was the code A419 (sepsis, unspecified organism), the procedure code for insertion of balloon pump (33967) and the admission type was initially recorded as elective.

Review Summary: A middle-aged man with cardiomyopathy, coronary artery disease, hypertension, and asthma was transferred from an outside facility for acute on chronic congestive heart failure (CHF) for consideration of advanced heart failure treatment options. He had been on home dobutamine infusion and other medications for advanced heart failure. An intra-aortic balloon pump (IABP) was placed upon admission and the patient admitted to ICU. Two days later he developed ventricular tachycardia and required intubation with mechanical ventilation for the duration of his hospital course. After stabilization, the IABP was replaced with a Tandem heart. The hospital course included aspiration pneumonia treated with a ten-day course of antibiotics. He continued to have leukocytosis and vancomycin was resumed. He later became stable enough for Tandem heart removal. He developed anuria with escalating vasopressor support. Sepsis was believed to be the cause of the patient's

decline. Later the same day he developed cardiopulmonary arrest and could not be resuscitated.

Proposed Coding (Pre-billing): A419 sepsis, unspecified organism

Quality Review Reasoning and Request: A bill hold review for sepsis was requested. It was noted that the patient was listed as an elective transfer in the ADT section of the medical record. Since the patient required an IABP for hemodynamic stability with vasoactive infusions, a request was made to change his admission status to urgent based on his instability and the need for direct ICU admission.

Referral for Physician (VPMA) Review: The review was not escalated for senior physician review because this workflow and reasoning had been established previously with our coding team.

Coding Outcome: The account was reviewed by a senior coder, at the request of the quality department. The determination was that ADT changes were needed to clarify the severity of illness and urgency of admission for advanced cardiac treatment options. Emergent or urgent admissions are excluded in the PSI-13 methodology and therefore this case was not reportable as a PSI-13 event.

provider's history & physical, emergency department documentation, early progress notes, and possibly even the discharge summary.

Validate the Diagnosis of Sepsis This is best done in close collaboration with the physician reviewer and aided by expert specialty reviews such as by an intensivist or infectious diseases specialist. In the simplest terms, a diagnosis of sepsis requires both the presence of infection and organ dysfunction. Septic shock denotes sepsis associated with hemodynamic instability. To establish a diagnosis of sepsis, the physician reviewer will look for evidence of positive blood cultures, need for large volume fluid administration, newly occurring organ dysfunction, such as acute kidney injury, and lactic acidosis. Other clinical indicators supporting a diagnosis of sepsis would be activation of a hospital sepsis protocol or use of a sepsis order set. Clinical indicators of septic shock are persistent hypotension and use of vasopressor mediations.

Sepsis is often mentioned in the provider's differential diagnosis early on during a patient's hospital course. It is not uncommon that the patient has another condition such as pneumonia without sepsis or a systemic inflammatory response (SIRS) to surgery [3]. Physician reviewers should look for clinical indicators that sepsis was ruled in or out. A rule-out determination may not have been explicitly documented, but clinical indicators of a clinical rule-out decision may be evident. They might include a sudden stoppage of antibiotic coverage, discharge from the critical care setting, or lack of positive laboratory test abnormalities mentioned above. The contribution of this issue (not ruling out a diagnosis of sepsis or bloodstream infection) has been identified as a potential contributor to PSI-13 reporting bias [4].

Case Illustration: Sepsis Found Ruled Out After Concurrent Review Prompts Physician Query

Reason for Concurrent Chart Review: This patient's chart was reviewed for PSI 13. The event was identified by 3 M (Postoperative Sepsis). The trigger for PSI-13 were the codes of A419 (sepsis, unspecified organism) and R6521 (severe sepsis with septic shock); the procedure code was for Coronary Artery Bypass Graft (CABG; 33510) and the admission was identified as elective.

Review Summary: A 50-year-old man was admitted with newly diagnosed depressed left ventricular systolic function with multi-vessel coronary disease. Past medical history included congestive heart failure and coronary artery disease. The patient underwent an elective three-vessel CABG and mitral valve replacement. He later required right- and left-sided ventricular assist devices. Three weeks into his hospital course the patient had a sudden neurological event, diagnosed as a large cerebral intraparenchymal hemorrhage with severe intracranial mass effect. This was determined to be a non-survivable injury. Comfort measures were requested by the family and the patient expired shortly afterward.

Proposed Coding (Pre-billing): A419 sepsis, unspecified organism, R6521 severe sepsis with septic shock.

Quality Review Reasoning and Request: A bill hold review for sepsis and severe septic shock was requested. It was noted that the patient had no positive cultures during the hospital course. An infectious disease consultation had indicated that the patient's condition most likely reflected cardiogenic shock with no mention of sepsis or septic shock. Sepsis was only mentioned as part of the differential diagnosis early in the hospital course. A query was requested to clarify whether sepsis and severe septic shock were ruled in or out.

Referral for Senior Physician Review: The review was not escalated for senior physician review because this workflow and reasoning had been established previously with our coding team.

Coding Outcome: The account was reviewed by a senior coder, at the request of the quality department. The determination was that a query was warranted to rule in or out sepsis and severe septic shock. The query response indicated that sepsis and severe septic shock were ruled out. The codes of A419 and R6521 were removed, which eliminated the PSI-13 designation.

Review for Clinical Significance and Concurrent Disease The review team should also look for indicators of clinical significance. Reviewers may find that there was no need for additional medical intervention beyond therapy already instituted for other diagnoses, i.e. that there was no change in treatment directly relating to a presumed diagnosis of sepsis. This would suggest that the MEAT criteria for sepsis were not met, and that therefore this diagnosis should not be coded; as indicated above, this situation can also occur when sepsis is mentioned as part of a differential

diagnosis but could not be ruled in definitively. Hospitalized patients can develop sepsis whether they have surgery or not. Therefore, the mere occurrence of sepsis in the postoperative period ideally should not lead to a PSI-3. PSI-13 is meant to describe a clinical situation where sepsis developed as a complication or direct result of the surgical or procedural intervention. Despite these considerations, AHRQ PSI-13 methodology provides that any secondary sepsis code (from the AHRQ Methodology list SEPTI2D) will trigger PSI-13 reporting in the elective surgical patient unless that diagnosis is present on admission. Therefore, it becomes doubly important that the elective surgical status of the patient is correctly recorded, that the diagnosis is well supported by documentation, and that all exclusionary conditions are accurately documented.

Review to Establish Exclusionary Diagnoses For PSI-13, the only exclusionary diagnoses are infections or sepsis that are POA. Reviewers should look for these in the history and physical, emergency department notes, early progress notes, or the discharge summary. Some diagnoses may be overlooked as being considered infections in the surgical patient. POA infections therefore may include conditions that likely could be infections, such as any infection or sepsis, pressure ulcer, osteomyelitis, cellulitis, cystitis, colitis, or entero-atmospheric fistula. Reviewers should look for completeness of the coding profile with respect to these conditions and their POA status.

19.2 Medical Staff Education and Engagement

Provider education should focus on these points for proceduralists and surgeons, and their clinical teams who manage medical record documentation and respond to medical record queries. The most important educational points are (1) if sepsis was initially mentioned as part of a differential diagnosis, providers should document whether the condition was eventually ruled in or out; (2) in particular, the procedural specialist should be able to indicate if the condition more likely represented SIRS or true sepsis and (3) infectious conditions including chronic or indolent infections should be documented on admission or shortly thereafter. A reduced incidence of postoperative sepsis, as represented by PSI-13 events, has been linked to greater utilization of root cause analyses [5]. This suggests that surgical practices that use the principles embedded in such case review and RCA action generation might be more successful in reducing PSI-13 events.

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Postoperative Wound Dehiscence (AHRQ Patient Safety Indicator 14)

20

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Agency for Healthcare Research and Quality (AHRQ) patient safety indicator 14 (PSI-14) was developed as a metric of hospital quality. Deployment of hospital resources, such as nurse staffing, is known to be associated with patient safety from postsurgical complications such as deep vein thrombosis, pulmonary embolism, sepsis, and wound dehiscence [1]. At the same time, there is evidence that patients with a PSI-14 designation also have significant comorbidities. Therefore, doubt has been raised with respect to this quality indicator's ability to measure both hospital safety performance [2] or surgical outcomes [3]. Among the AHRQ PSIs, PSI-14 has one of the highest positive predictive values and was able to identify true cases of wound dehiscence well [4]. Still, it may be relatively insensitive to detect the occurrence of cases where true surgical dehiscence occurred, but was not identified by the coding algorithms leading to a PSI-14 designation. For example, 32% of high-risk cases were found to represent such false negatives [5].

PSI-14 is a component of PSI-90, although it is among the components with the lowest weight (1%). It is, however, also part of the scoring methodology for both CareChex and Leapfrog.

True surgical dehiscence is characterized by internal disruption of a wound (see below) and is often referred to in surgical parlance as fascial dehiscence or evisceration. True surgical dehiscence is markedly less common, more severe, and more

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consequential to patients than superficial wound separation. Superficial wound events (also sometimes referred to as skin separation, superficial surgical site infection, or suture/staple problems) should not be included in this PSI.

Dependence on text searches for the word 'dehiscence' by documentation experts often leads to overcoding, as this term is used by many ancillary staff to describe wounds with any degree of opening or problem. As with all PSIs, a single word should not stand alone in the record; clarification should be sought via query. Such knowledge also represents an opportunity to educate patient-facing care team members, including wound care teams, nursing professionals, physical therapists, nurse practitioners, physician assistants, and physicians.

PSI-14 applies to patients with surgical diagnosis-related groups (DRGs) who are ages 18 years and older undergoing abdominopelvic surgery (defined by AHRQ Methodology lists ABDOMIPOPEN for open procedures or ABDOMIPOTHER for other than open procedures). Patients must have had a diagnosis of disruption of internal surgical wound (defined by AHRQ list ABWALLCD) that required a reclosure procedure (defined by AHRQ list RECLOIP). It is important to understand that to trigger a PSI-14, the patient also must have undergone an operating room procedure, defined in AHRQ's Appendix A.

20.1 Approach to Review

Review procedures Review procedures should aim to establish present on admission (POA) status, assure accuracy of the DRG and surgical procedure, confirm that internal disruption of a surgical wound actually occurred, and assure that exclusionary conditions are captured.

Present on Admission Although not common, it is possible for patients to be admitted with what could be considered a disrupted surgical wound. This is particularly applicable in patients with entero-atmospheric fistulas and draining wounds from recent surgery from outside facilities.

Timing PSI-14 does not apply to patients with a length of stay (LOS) of less than 2 inpatient days. Timing can become an issue in cases where inpatient admission occurred after an outpatient procedure. Reviewers should assure that inpatient length of stay does not include the period of time the patient spent in outpatient status. Also, because cases where the abdominal wall reclosure occurs on or before the day of the first abdominopelvic surgery are excluded, reviewers should double check that the date of the reclosure procedure is accurate.

Low Hanging Fruit Alert
A double check on the timing of reclosure procedures, inpatient admission timing, and discharge time may yield a quick win in avoiding unwarranted PSI-14 reporting.

Accuracy of the Diagnosis of Disruption of Internal Surgical Wound Reviewers should ascertain whether the wound disruption was truly internal, such as occurs in disruption of deep fascial planes. A superficial wound opening that includes only skin-level disruption should not be coded as an internal wound disruption. Likewise, reviewers should specifically look for and confirm that the wound was not intentionally left open by the operating surgeon. Clinical indicators are the presence of retention/stay sutures, wicks, and negative pressure wound therapy (also commonly referred to as 'wound vacs'). The value of expert surgical review in such situations cannot be overemphasized.

PSI-14 Exclusions As mentioned above, patients with a LOS of less than 2 days are excluded from PSI-14 reporting. In addition, if reclosure occurs on the same day or before the index abdominopelvic procedure, PSI-14 does not apply. Until the 2021 revision of the AHRQ technical specifications for PSIs, exclusions for PSI-14 were possible if diagnoses indicative of immunocompromised states are documented. Therefore, this exclusion no longer exists.

20.2 Medical Staff Education

Provider education should focus on these points for proceduralists and surgeons and their clinical teams who manage medical record documentation and respond to medical record queries. The most important educational points are (1) careful documentation of wounds, especially if associated with recent surgical procedures, and assessment of fistulas for their role in wound disruption POA; (2) documentation in the operative note when a wound was intentionally left open for second look procedures or to heal by secondary intention; (3) documentation of situations where wound opening would be expected to occur after surgery such as during grossly contaminated cases; and (4) accurate documentation of the true nature of the wound opening. The greatest opportunity lies in the accurate documentation of wound closure or intentional lack thereof. It also may be advisable to include this information in medical record note templates and automated documentation assist reminders.

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21 Unrecognized Abdominopelvic Accidental Puncture or Laceration (AHRQ Patient Safety Indicator 15)

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Patient safety indicator (PSI)-15 is a component of several publicly reported hospital quality and safety indicators, including Leapfrog and the Agency for Healthcare Research and Quality (AHRQ) PSI-90 where it is weighted at 4%. It is also a component of the Leapfrog Hospital Safety Grade. PSI-15 applies to patients ages 18 years and older who have undergone an index abdominopelvic procedure and who require a second abdominopelvic procedure one or more days after the index procedure. The validity of PSI-15 has been discussed extensively in the literature [1]. Based on ICD-10 hospital discharge abstract data, the positive predictive value is reported to be high at 84.6% [2]. One important limitation is the need for individual physicians to determine and document whether the procedure resulted in an accidental and clinically important complication that warrants coding, in the absence of adequate coding guidelines [3]. Utter et al. noted in a retrospective cross-sectional study that the reporting of PSI 15 is highly predictive of the occurrence of an accidental puncture, but is less predictive of its clinical importance. They conclude that significant proportion of cases represented relatively inconsequential injuries or injuries for which the risk may have been acceptable given the goals of the procedure [3]. The former University Health System Consortium published a consensus statement to enhance the quality of PSI performance data. The recommendations were for surgeons to proactively document whether puncture, tear, or laceration events were expected or inherent in the procedure and therefore should not be

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considered accidental. Also recommended is that coders query surgeons to ascertain this distinction and to indicate whether the event significantly impacted the patient's care [4]. Another recommendation was to refer the medical record for review before releasing it for billing. We recommend the following process for concurrent review:

21.1 Approach to Review

Present on Admission Review procedures need to concentrate on identifying if the puncture or laceration was present on admission (POA). Although rare, an example that is easily overlooked involves a patient who was admitted as an inpatient after an outpatient procedure during which a laceration or puncture injury occurred.

Case Illustration: Abdominopelvic Accidental Puncture or Laceration Avoided Because It Was Found to be Present on Inpatient Admission

Reason for Concurrent Chart Review: This patient's chart was reviewed for PSI-15. The event was identified by 3 M (Abdominopelvic Accidental Puncture or Laceration). The trigger for PSI-15 was diagnosis code K9171 (Accidental Puncture and Laceration of a Digestive System Organ or Structure During a Digestive System Procedure).

Review Summary: A middle-aged female with anemia, hypertension, and a prior gastric sleeve operation presented with nausea and dark urine. Workup showed dehydration with the elevation of liver enzymes and bilirubin levels. She underwent a laparoscopic cholecystectomy with intraoperative cholangiogram and was noted to have a small hepatic laceration created during dissection, resulting in mild bile leak that was easily controlled with clips. An endoscopic retrograde cholangiogram was attempted with unsuccessful cannulation of the common bile duct. Interventional radiology was consulted for percutaneous biliary drain placement. She was discharged home with drains and follow-up care.

Proposed Coding (Pre-billing): K9171, Accidental Puncture and Laceration of a Digestive System Organ or Structure During a Digestive System Procedure.

Quality Review Reasoning and Request: A bill hold review was requested for this PSI event. Case review revealed documentation for significant omental adhesions to the anterior abdominal wall, liver, and gallbladder. A senior physician review was requested based on the suspicion that the hepatic laceration may have been inherent in procedure given the significant omental adhesions.

Referral for Senior Physician Review: A senior physician review identified that the patient previously had had extensive abdominal surgery in the same area (Roux-en-Y gastric bypass). The surgeon further documented significant omental adhesions in the gallbladder and liver areas. It was also noted that the puncture had occurred in the outpatient setting and led to inpatient admission after completion of the outpatient procedure.

Coding Outcome: The account was reviewed by a senior coder at the request of the quality department. The determination was that coding for K9171 would be designated as POA. A PSI-15 reporting event was avoided because the triggering diagnosis K9171 would now be correctly listed as POA (AHRQ denominator exclusions: secondary diagnosis POA for Accidental Puncture or Laceration During a Procedure - TECHNI15D).

Ascertaining if the Injury was Inherent in the Procedure The second and extremely important aspect of a concurrent quality review is to establish whether the puncture or laceration was unrecognized. A thorough analysis of the documentation provided in the operative note is indispensable. If the laceration was recognized and repaired, the codes containing the language "accidental laceration" or "accidental puncture" should not be used, particularly if, as described in the operative note, the laceration was due to the patient's abnormal anatomy, such as caused by cancer invasion, radiation changes, prior surgery, aberrant anatomy or extensive adhesion. In such cases, the code for accidental laceration should not be used. An example of evidence in an operative note that the injury was inherent in the procedure is when a serosal tear is described as occurring during a difficult dissection for extensive adhesions.

Timing PSI-15 is meant to capture unrecognized injuries. If return to OR is undertaken on the same day as the original procedure, it is presumed that the injury was recognized. Therefore, it is vitally important to assure that the date of the second procedure is verified as correct. In some cases, return to the OR could occur close to midnight. In such cases, the date of the procedure may be identified as the same or the next day. If the procedure is coded as having occurred on the next calendar day, the PSI-15 definition applies.

Case Illustration: Abdominopelvic Accidental Puncture or Laceration Removed Because the Operative Note Did Not Support Its Occurrence

Reason for Concurrent Chart Review: This patient's chart was reviewed for PSI-15. The event was identified by 3 M (Abdominopelvic Accidental Puncture or Laceration). The trigger for PSI-15 was diagnosis code I9752 (Accidental Puncture of a Circulatory Organ).

Review Summary: A middle-aged female with end-stage renal disease, type I diabetes mellitus, and coronary artery disease had recently been started on peritoneal dialysis. She then was admitted for kidney and liver transplant. Her postoperative course was complicated by hypotension. An exploratory laparotomy was performed on postoperative day 1, and free blood was noted in the abdomen with no identified source. Ultrasound revealed a clot in the portal vein, and bleeding was controlled. She progressed well and was transferred to the stepdown unit. Pancreatic enzymes were labile and rising. A

postoperative decrease in hematocrit was noted with bloody drainage from surgical drains. She required further transfusions and was taken back to the OR, where she was noted to have a partially occlusive thrombus within the splenic artery. Postoperatively, it was decided to stop anticoagulation due to the high risk of bleeding. Blood loss stabilized, and she was monitored closely for bleeding and perfusion. She was discharged home after a 2-week hospital course.

Proposed Coding (Pre-billing): I9752, Accidental Puncture of a Circulatory Organ.

Quality Review Reasoning and Request: A bill hold review for the I9752 diagnosis was requested. It was noted that the patient had returned to the OR for a bleed coded as 06C50ZZ. Case was escalated to the senior physician for higher level of medical review.

Referral for Senior Physician Review: A senior physician review identified that, although a return procedure occurred, no puncture or laceration was discovered. The medical record showed that bleeding was linked to systemic anticoagulation due to argatroban. Coding for D6832, Hemorrhagic Disorder due to Extrinsic Circulating Anticoagulants was requested.

Coding Outcome: The account was reviewed by a senior coder at the request of the quality department. The determination was that coding for the accidental puncture/laceration code was not supported by documentation. This diagnosis was removed from the patient's coding profile. Furthermore, the code for D6832, Hemorrhagic Disorder due to Extrinsic Circulating Anticoagulants, was added due to the documented linkage of argatroban to bleeding. PSI-15 reporting was avoided because the triggering coded I9752 was removed. Adding the code of D6832 excluded the case from being reported as a PSI-9 event (post-procedural hemorrhage).

Exclusionary Conditions Excluded from reporting are cases with accidental puncture or laceration as a principal diagnosis (as defined by the code in the AHRQ Methodology TECHNI15D list), cases with accidental puncture or laceration as a secondary diagnosis that is POA, and obstetric cases (i.e., with diagnosis-related groups in the MDC14 domain). While not excluded in the AHRQ definitions, the trauma population represents another special situation where caution should be exercised before assigning PSI-15. Fox et al. demonstrated an overall false-positive PSI (assigned as a PSI in error) rate of 40% for all PSIs in their trauma center. For PSI-15, the positive predictive value was 30% in the trauma setting. False-positive PSIs were most often the result of coding error (78%), POA status (17%), and documentation error (5%) [5].

21.2 Medical Staff Education

Surgeons have the unique experience and knowledge of disease processes to allow for considerate evaluation of true complication events such as punctures, lacerations, tears, or leaks. As such, they are the group of providers to ask for clarification of these events where appropriate.

Key Concept
Not all intraoperative events such as enterotomies represent a surgical complication. Documentation should address the extent of anatomic complexity and establish the cause of the event as either inherent in the procedure/disease site or as a complication of the procedure.

Such clarification efforts can be challenging conversations, as most surgeons are trained to view any and all deviations from a perfect operation or postoperative course as complications. This dogma could systematically influence how quality metrics are reported. For example, if all events that related to difficult surgical anatomic conditions were identified as complications, overreporting of PSI-15 events may occur. Educational one-on-one case reviews and surgeon-to-surgeon conversations by surgical documentation champions can help surgical teams to better understant the questions that appear on physician queries. Examples of such questions are whether an intraoperative event was an untoward or unexpected finding (i.e., a complication), or whether it was inherent to the patient's disease state or abnormal anatomic complexity. The American College of Surgeons statement can be a useful framework for these discussions [6]. Another useful framework to use during educational efforts, is to ask surgeons if the procedure in question (e.g. a colectomy for cancer in a patient with adhesions) could have been completed safely without the "accidental laceration" (e.g. enterotomy)? Often, the answer will be a resounding "NO" and sound logic would conclude that this is not an accident, but rather an inherently necessary part of the operation.

Standard operative note templates can help clear up these questions from the beginning. Operative note templates often contain the header "Complications." Surgeons understand the importance of the operative note and want to make a concerted effort to communicate the intraoperative events to facilitate ongoing patient care. Unfortunately, the "Complications" header is a common landing area for surgeons to communicate operative findings such as enterotomies during complex adhesiolysis, bleeding from raw surfaces in coagulopathic patients, or need for additional unplanned procedures based on operative findings. Enhancing the header "Complications" with language such as "Observations," "Occurrences," or "Operative Findings" may facilitate a more thoughtful documentation of intraoperative events, if consistent with regulatory requirements. Medical staff education should therefore be directed to assuring that the dictating surgeon, when appropriate, links the tear or puncture to the patient's preexisting abnormal anatomy or

pathologic conditions such as adhesions, scarring, or absence of normal surgical tissue planes. The surgeon should also indicate whether the occurrence affected the patient's subsequent care or resulted in a substantial increase in resource utilization. When the condition truly represents a complication of the surgical procedure, this should be documented clearly.

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Birth and Vaginal Delivery Trauma (AHRQ Patient Safety Indicators 17, 18, and 19)

22

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These three Agency for Health Quality and research (AHRQ) patient safety indicators (PSIs) relate exclusively to obstetric and perinatal practice. Birth-related trauma is a cause of mortality and morbidity, occurring in 1.9 per 1000 live births in the United States [1]. In 2005, the rate of birth trauma, assessed with patient safety indicators (PSIs), was 2.45/1000 births [2]. Data from the British National Health Service indicate an incidence of 91.2/1000 births during instrumented deliveries and 33.4/1000 births when Iinstrumentation was avoided [3], suggesting that the PSI method or surveillance may underrepresent the incidence of these complications. In addition to potential distress to infants, patients, and their families, such injuries sustained during birth may cause increased resource utilization such as longer hospital stays or utilization of a higher level of care. The economic impact of birth trauma in the United Kingdom has been estimated at £14.5 million annually [3].

The rate of maternal birth trauma is dependent on the mode of delivery; instrument-assisted vaginal delivery has a higher rate of obstetric PSIs compared to vaginal delivery managed without the use of instruments. Cesarean delivery is associated with lower rates of birth trauma [2]. Birth trauma can also affect the neonate. Multiple other factors increase the possibility of sustaining birth trauma. Overall, birth trauma should be reported so that awareness of its prevalence, combined with education, team training, simulation, and process improvement, can lead to better outcomes [4].

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The process of gathering birth trauma-related data is mainly from physician documentation and billing data. Accurate documentation is vital for many reasons. Medical documentation accuracy helps promote safe and effective care. There may also be financial and reputational consequences for the hospital and its physicians related to these complications. Appropriate documentation is key to the avoidance of coding errors and reporting of false- positive complications. Clinicians are generally not skilled in clinical data improvement (CDI) rules, and most are unaware of exclusion criteria for AHRQ PSIs. We use a team-based approach to bridge this gap and educate our clinicians on proper documentation methods. Team members include CDI nurse, coding specialist, performance improvement (PI) nurse, and a senior physician as the medical reviewer. In this chapter, we offer case examples to illustrate the opportunities gleaned from a coordinated review process, which we refer to as concurrent quality review. When a PSI related to obstetric practice is identified to have occurred, based on the medical record documentation, the PI nurse and/or senior physician review the medical record to confirm the presence of the diagnosis that would trigger a PSI. They also review for conditions that represent exclusion criteria. If such conditions were present but not expressly documented, an opportunity may exist to issue a medical record query. If the treating physician confirms the exclusionary condition, the PSI may be rightfully avoided. Answers to a physician query may confirm or refute the complication. In some situations, we use the physician's response as an educational opportunity. For example, when the response to a medical record query is clearly inconsistent with the results of the concurrent review, the senior physician takes the opportunity to point out opportunities to more accurately document for subsequent cases.

22.1 PSI-17: Birth Trauma – Injury to Neonate

Birth injuries occurring during vaginal delivery may have a long-term impact on the neonate. Therefore, they are captured and reported. AHRQ PSI-17 triggers for any code of birth trauma (AHRQ Methodology list BIRTID). Excluded are preterm infants with a birth weight less than 2000 g and cases with osteogenesis imperfecta.

An injury to a neonate is a complication that should not be taken lightly. The subcategory diagnosis P15.4 (Birth Injury to Face) generally accounts for most PSI-17 cases. This diagnosis is identified and coded from an initial assessment documenting facial bruising. Other injuries can be intracranial, splenic, or constitute bone fractures. Medical record queries seeking to further clarify the condition help identify whether the injury was a complication caused by the delivery process; this is marked even if no clinical or diagnostic treatment or extended lengths of stay are observed. Medical staff can select other query options such as "due to routine birth process," "not clinically significant," "present, but not due to birth injury/trauma," and "clinically undetermined". Review for this PSI includes the following steps.

Present on Admission Since trauma occurs during the birthing process, review for presence on admission has no impact on rates of occurrence.

Clinical Significance Occurrences during the birthing process can artificially contribute to the rate of observed occurrences. Review of the procedure can assist in identifying conditions that are challenging outside of the normal delivery process. Reviewers will need to ascertain whether documentation was present showing that the condition needed monitoring, serial assessment, or specific treatment; or if the condition caused the expenditure of additional resources, such as prolonging hospitalization.

Ascertaining if the Injury Was Inherent in the Procedure Review here will focus on evidence that the injury was not unrecognized or unexpected. In certain clinical situations, the physician may elect to perform an episiotomy to facilitate delivery and prevent a laceration. Accurate documentation of these circumstances is helpful when describing the resultant injury.

Exclusions Cases excluded from reporting are preterm infants with a birth weight of less than 2000 g (as defined by the Agency for Healthcare Research and Quality [AHRQ] list of diagnosis codes called PRETEID), and coding for osteogenesis imperfecta (as defined by ICD-10 code Q780). Accurate documentation of and review for birth weight is paramount and should be translated into the appropriate ICD-10 code.

The following case illustrates how PSI-17 can be avoided with accurate documentation in the medical record.

Case Illustration: PSI-17 Triggered by the diagnosis of P15.9 (Birth Injury, Unspecified) and avoided due to lack of clinical significance

Reason for Concurrent Chart Review: This patient's chart was reviewed for PSI-17 (Birth Trauma Rate – Injury to Neonate), identified by 3M. The trigger for PSI-17 was the proposed code of P15.9 Birth Injury, Unspecified.

Review Summary: Per the admission history and physical (H&P), the infant female was born at 39 weeks via spontaneous vaginal delivery. The physical exam documented no tufts or dimples, no scoliosis or masses, clavicles intact, and equal grip and strength in both arms. The extremities were described as well-perfused, warm and dry, with no cyanosis. The skin was documented as without rashes or jaundice. Some bruising was noted on the left forearm, but without tenderness to palpation or obvious deformity. In the discharge summary, the bruising to the baby's left forearm was noted to be improving.

Proposed Coding (Pre-billing): The proposed code was P15.9 Birth injury, Unspecified due to H&P documentation of bruising to left forearm.

Quality Review Reasoning and Request: Concurrent quality review identified the bruising to the left forearm to be described as clinically insignificant and was improved at discharge without monitoring or intervention. Additionally, the review found that bruising of the forearm was not

documented on the initial newborn assessment flowsheet or in nursing notes and did not require any treatment. The baby's hospital stay was extended by one day; this was clearly documented to be due to the need for phototherapy. A request was made to remove the code P15.9 Birth Injury, Unspecified, and referred for senior physician review.

Referral for Senior Physician Review: The senior physician review indicated that the bruising as described in the medical record did not represent birth trauma as it appeared to be minimal bruising and did not impact the clinical course.

Coding Outcome: A physician query was issued for the provider to clarify if left forearm bruising is considered birth injury or trauma. The query was answered indicating that the bruising occurred due to a routine birth process and was not clinically significant. The P15.9 code was deleted, and the PSI-17 was avoided.

22.2 PSI-18: Obstetric Trauma – Vaginal Delivery with Instrumentation

PSI-18 attempts to capture trauma to the perineum and vulva during delivery. It applies to instrument-assisted vaginal deliveries with third- or fourth-degree trauma. It is often associated with an episiotomy procedure and documented as a perineal tear or laceration. The ICD-10-CM diagnosis code for this trauma can be found in the AHRQ methodology noted as OBTRAID. Considerations for concurrent review include the following.

Present on Admission Only in very rare cases might these diagnoses be present on admission, such as after emergent transfer from another facility.

Clinical Significance As advanced degree lacerations these injuries are considered clinically significant by virtue of their occurrence. Third- and fourth-degree perineal lacerations are accurately reported in hospital administrative data which confirm the validity of related AHRQ PSIs [5].

Ascertaining if the Injury was Inherent in the Procedure Coding for perineal trauma is based on the documented trauma. The link between causative factors has no impact on the codes utilized to report the condition. The presence of a third- or fourth-degree perineal tear/laceration with the use of instrumentation for a vaginal delivery qualifies as a reportable occurrence. The need to repair an episiotomy (a deliberately performed incision to aid vaginal delivery) should not be coded as a laceration.

Exclusions No relevant ICD-10-CM codes are exclusionary for the reportable event. Only cases with ungroupable diagnosis-related group (DRG) (999), missing gender, age, quarter, year, or principal diagnosis are excluded from reporting.

22.3 PSI-19: Obstetric Trauma – Vaginal Delivery Without Instrumentation

PSI-19 attempts to survey for severe lacerations and is expressed as a rate per 1000 vaginal deliveries. Excluded are cases with instrument-assisted delivery. This PSI applies only to vaginal deliveries managed unassisted by instruments, where a third- or fourth-degree laceration occurs. Clinical documentation of a third- or fourth-degree perineal laceration repair is then coded as a complication. The ICD-10-CM diagnosis codes that result in PSI-19 designation can be found in the AHRQ methodology in a table referred to as OBTRAID. The considerations for concurrent review are similar to those for PSI-18.

Present on Admission As would be the case for PSI-18, these diagnoses would almost never be present on admission, the exception possibly being an emergent transfer from another facility.

Clinical Significance As above, these injuries are considered clinically significant by virtue of their occurrence.

Ascertaining If the Injury was Inherent in the Procedure As before, coding for perineal trauma is based solely on the documented degree of laceration. The presence of a third- or fourth-degree perineal tear or laceration noted after vaginal delivery qualifies as a codable complication.

Exclusions No relevant ICD-10-CM codes are exclusionary for the reportable event. Only cases with ungroupable DRG (999), missing gender, age, quarter, year, or principal diagnosis are excluded from reporting.

22.4 Medical Staff Education

Obstetricians, obstetric advanced practice providers, and midwives are uniquely experienced in and knowledgeable of the delivery process. This expertise is often relied upon for the consideration and evaluation of complication events. Educational opportunities lie in demonstrating the importance of accurate and complete documentation and reporting of complications from resultant diagnosis codes.

Many practitioners are unaware that the terms used to describe the difficulty of the delivery or abnormal conditions observed are qualifying terms that are coded

and lead to reportable complications. Routine birthing processes should be described as such. Terms like "complicated by" should be avoided unless the physician is describing an error or omission that occurred during the delivery process. Consideration for clinical significance should be emphasized. Educating providers should include the importance of accurately documenting the severity of the condition as well as its clinical significance in the medical record entry. Terms such as "due to routine birth process," "not clinically significant," and "present but not due to birth injury/trauma" provide coding professionals clarity in identifying the correct code selection to report the observed condition. Quality improvement is driven in part through practitioner education and transparent data sharing. By reviewing our data on obstetric trauma and discussing trends with our providers, awareness was increased and improvement processes began, such as greater attention to guidance on the prevention and management of obstetric lacerations at vaginal delivery. Third- and fourth-degree tears are reduced with the practice of warm compresses, birthing positioning, perineal massage, and perineal support [6].

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Centers for Medicare and Medicaid Services Hospital-Acquired Conditions

23

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Centers for Medicare & Medicaid Services (CMS) hospital-acquired conditions (HACs) are defined as conditions that occur during the hospital course that could have reasonably been prevented through application of evidence-based guidelines [1]. These conditions are known to increase cost and are associated with longer lengths of stay. This chapter focuses on the review of HACs from a quality and value perspective.

23.1 Definition and Impact of CMS HACs

The individual HACs used by CMS for payment adjustment are listed in Table 23.1. Each HAC is defined by a list of one or more diagnosis codes [2] that trigger when not coded as POA. In an effort to limit payments associated with such potentially preventable conditions, the Centers for Medicare & Medicaid Services (CMS) instituted changes to the Inpatient Prospective Payment System (IPPS) by creating definitions and codes to identify HACs that were not present on hospital admission [3]. Therefore, in 2008, CMS required all hospitals paid under the IPPS system to add a present on admission (POA) indicator to the International Classification of Diseases (ICD). This indicator is reported with one of five possible values: Y for present on admission, N for not present on admission, W for clinically undetermined, U for insufficient documentation, and 1 for exempt (used by hospitals exempt from POA

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Table 23.1 2021 List of hospital-acquired conditions (HACs)

	HAC descriptor	Related reporting	Quality activity
HAC 01	Foreign object retained after surgery	AHRQ PSI-5	RCA; surgical checklist & debrief
HAC 02	Air embolism	SOS	RCA
HAC 03	Blood incompatibility	SOS	RCA
HAC 04	Stage III and IV Pressure ulcers	NHSN	Mini-RCAs
HAC 05	Falls and trauma	NHSN	Mini-RCA
HAC 06	Catheter-associated urinary tract infection	SOS, NSHN	
HAC 07	Vascular catheter-associated infection	AHRQ PSI-7	Mini-RCA
HAC 08	Surgical site infection – mediastinitis after coronary bypass graft	NA	Focused review
HAC 09	Manifestations of poor glycemic control	NA	Improvement project; order sets
HAC 10	Deep vein thrombosis/pulmonary embolism with total knee or hip replacement	AHRQ PSI-12	Improvement project; order sets
HAC 11	Surgical site infection – bariatric surgery	NSQIP	Improvement project
HAC 12	Surgical site infection – certain orthopedic procedures of spine, shoulder, and elbow	NSQIP	Improvement project
HAC 13	Surgical site infection following cardiac implantable electronic device procedures	NSQIP	Improvement project
HAC 14	Iatrogenic pneumothorax with venous catheterization	PSI-6	Focused review

SOS safety on site (Ochsner safety occurrence reporting system), *PSI* AHRQ patient safety indicator, *NSQIP* national surgical quality improvement program, *NA* not applicable, *RCA* root cause analysis

reporting). If the Medicare Severity Diagnosis Related Group (MS-DRG) grouper encounters a POA indicator of N or U on a diagnosis that is not exempt, that diagnosis code is ignored in the MS-DRG assignment, causing the discharge to be grouped to the MS-DRG that would have been assigned if the condition had not been documented on the claim [1]. The initial CMS payment provisions included 10 categories of HACs that have since been expanded to 14 (Table 23.1). In 2020 only HAC 01, HAC 02, HAC 03, and HAC O5 were publicly reported [4].

The effect of this program is to adjust payment for DRG that would have been more expensive if the HAC diagnosis code had elevated its value to a DRG with CC or MCC. It has been estimated that CMS saved nearly $150 Million because the agency is not paying for DRGs whose value would have been elevated by HAC diagnosis codes [1]. Although this is a large sum in aggregate, the financial impact at the individual hospital level is limited. CMS HAC designations are not widely used in hospital quality ratings although codes that trigger a HAC likely will also trigger other quality metrics, especially Agency for Healthcare Quality and Research (AHRQ) PSIs (See Table 23.1).

23.2 Concurrent Review for CMS HACs

Concise, complete, accurate documentation has become essential to ensure quality outcomes. Quality metrics such as PSIs and HACs are derived from the medical bill through medical coding. Medical coding is a system used for classifying diseases, injuries, signs and symptoms, abnormal findings, circumstances, and external causes of disease or injury. Ochsner's concurrent review process seeks to improve medical documentation and reflect the most accurate representation of a patient's hospital course. As mentioned in the chapter "A Comprehensive Program for Concurrent Review", this is done through a comprehensive review of the medical record and coding profile to identify complications. As is done for AHRQ PSIs, HACs are identified through flagging with internal and external software from diagnostic billing codes identified during clinical documentation improvement and coding operations.

Key Concept
While CMS HACS are reported from administrative data, review for most of the CMS HACs also affect other value-based publicly reported metrics.

Incomplete or inconsistent medical documentation can impact hospital quality. Clinical conditions not clearly represented in the medical record may unintentionally reflect hospital complications as both PSIs and HACs. It is important for reviewers to know the conditions and qualifications that indicate the complication. As is apparent from Table 23.1, except for HAC 02, HAC 03, HAC 08, and HAC 09, all CMS HACs also impact other components of value-based indicators and payment systems. Methodology pertaining to HAC definitions is not complex.

Low-Hanging Fruit
Review for accuracy of present-on-admission status and presence of the diagnosis is key to avoiding incorrectly reported HACs.

Review is focused on ascertaining whether the condition represented in the coding profile is accurate and supported by the medical record. The second important aspect to review is POA status. If the condition actually occurred, reviewers will want to look for clinical indicators that the condition may have been POA. The process of review is illustrated by two real-life examples from our organization. They describe how cases of incidentally discovered subdural hemorrhage and hyperglycemia were reviewed. In one case, an HAC was avoided by more precisely linking a subdural hemorrhage to a coagulopathic condition (vs. a fall). The other case shows how improvement in the accuracy of POA status representation led to avoidance of HAC 09.

Case Illustration: Avoidance of Falls and Trauma HAC Through Linkage to a Nontraumatic Condition

Reason for Concurrent Chart Review: This patient's chart was reviewed for HAC 05. The event was identified by 3 M as HAC 05 Falls and Trauma. The trigger for HAC 05 was S065X0A Traumatic Subdural Hemorrhage Without Loss of Consciousness, Initial Encounter, Not Present on Admission (POA).

Review Summary: A middle-aged male was admitted for treatment of relapsed AML. Hospital course was complicated by abdominal pain and diarrhea and concerns for colitis. Mentation changes were observed; a CT scan showed a small subdural hemorrhage. The subdural hemorrhage was documented to be incidental and his mentation improved with rest. He required intermittent transfusions throughout his hospital course. The patient was discharged to home, feeling well with no complaints.

Proposed Coding (Pre-billing): S065X0A Traumatic Subdural Hemorrhage Without Loss of Consciousness, Initial Encounter, With a POA Status of N.

Quality Review Reasoning and Request: A comprehensive chart review was performed. It was noted in the electronic medical record that medical coding had linked a patient fall with the development of a subdural hemorrhage. After reviewing the medical record, a computed tomography (CT) scan of the head after the fall indicated no acute intracranial hemorrhage or new abnormal parenchymal attenuation. The abnormal CT scan was performed several days after the fall. The attending provider had linked the development of subdural hemorrhage to a low platelet count that required platelet transfusion. A request was made to query for clarification of the nature of the hematoma.

Referral for Senior Physician Review: Case was referred for senior physician review. It was agreed that a query should be requested to further clarify circumstances relating to the subdural hemorrhage during the patient's hospital course.

Coding Outcome: The account was reviewed by a senior coder at the request of the quality department. The determination was that a query was warranted to clarify the nature of subdural hemorrhage. Query response indicated that subdural hemorrhage was nontraumatic. Coding for S065X0A (Traumatic Subdural Hemorrhage Without Loss of Consciousness, Initial Encounter, With POA of N) was removed from the coding profile and replaced with I6201 (Nontraumatic Acute Subdural Hemorrhage). The removal of triggering code S065X0A eliminates the reporting of HAC 05, Falls, and Trauma.

Case Illustration: Manifestations of Poor Glycemic Control

Reason for Concurrent Chart Review: This patient's chart was reviewed for HAC 09. The event was identified by 3 M as HAC 09 Manifestations of Poor Glycemic Control. The trigger for HAC 09 was E1110 Type 2 Diabetes Mellitus with Ketoacidosis Without Coma, and a POA Status of N.

Review Summary: A middle-aged female with a medical history of peripheral vascular disease, deep vein thrombosis, chronic kidney disease, stroke, diverting colostomy, diabetes mellitus – type 2, and recurrent UTIs was admitted for treatment of acute kidney injury and suspected urinary tract infection. She underwent a cystoscopy with urethral stent exchange. She was briefly admitted to the ICU for euglycemic diabetic ketoacidosis (DKA) managed with an insulin drip. She was discharged to home to complete her antibiotic course.

Proposed Coding (Pre-billing): E1110 Type 2 Diabetes Mellitus with Ketoacidosis Without Coma, and a POA Status of N.

Quality Review Reasoning and Request: A comprehensive chart review was performed. It was noted in the electronic medical record that the patient was transferred to the ICU for change in mentation with DKA. Several clinical indicators for DKA were noted as being present in the preadmission workup. These included an anion gap of 18, presence of ketones in the urinalysis, a base excess of minus 24, bicarbonate level of 6, and a beta-hydroxybutyrate level of 4.9 within 12 hours of admission.

Referral for Senior Physician Review: The case was referred for senior physician review. It was agreed that several clinical indicators were present in the ED workup to support DKA as POA. A request for a senior coder review was made.

Coding Outcome: The account was reviewed by a senior coder at the request of the quality department. The determination was that sufficient clinical indicators were present to support a coding change to E1110 (Type 2 Diabetes Mellitus with Ketoacidosis Without Coma, With a POA Status of Y). This coding change eliminates HAC 09 from reporting.

23.3 Medical Staff Engagement and Improvement Activity

Based on PSI and HAC data review an opportunity to improve procedural safety was identified at our medical center. The opportunity presented itself to eliminate the occurrence of HAC 01 -Foreign Object Retained After Surgery. Medical leadership of our organization set a "Line in the Sand" goal of zero retained foreign objects and zero wrong site/wrong side procedures. Working in concer (cooperation) with the statewide Louisiana Surgical Quality Collaborative [5], our medical and surgical staff adopted an advanced, mindful procedural safety checklist approach that includes preoperative, intraoperative, and end-of-case debriefing components. The mindful checklist approach was adopted not only in our operating rooms but also in procedural areas such as the gastrointestinal endoscopy suite. This approach has been found to reduce surgical mortality and complications by promoting team communication and collaboration [6]. At the time of writing, Ochsner's primary academic medical center had completed nearly 2 years without a "Line in the Sand' event. Our experience highlights how publicly reported quality indicators can help drive improvement initiatives across a complex organization.

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CMS Core Measures: Which Are Still Important for Public Quality Reporting?

24

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The landscape of core measures has changed drastically in the last 10 years. What were once strictly chart-abstracted measures around troublesome clinical conditions have now morphed into electronic clinical quality measures (eCQM) with only a few remaining chart abstracted measures. Core measures were aimed at reviewing the process of care for specific clinical conditions (e.g., pneumonia, acute myocardial infarction, stroke) and were a requirement for an organization to receive the annual payment update from the Centers for Medicare & Medicaid Services (CMS). With the inception of programs such as the Medicare Value-Based Purchasing (VBP) Program and the Hospital-Acquired Condition Reduction Program (HACRP), process measures became less important and patient outcomes were brought to the forefront for organizations.

24.1 Residual CMS Core Measures Requirements

In their current form, the Inpatient Quality Reporting (IQR) Program and the Outpatient Quality Reporting (OQR) Program have minimal core measures requirements [1]. The IQR Program is currently comprised of the following chart-abstracted measures: Elective Delivery (PC-01), Severe Sepsis and Septic Shock, and Admit Decision Time to ED Departure Time for Admitted Patients (ED-2). The OQR Program has minimal chart-abstracted measures as well: Fibrinolytic Therapy Within 30 Minutes of ED Arrival, Head CT or MRI Within 45 Minutes for Patients with Acute Ischemic or Hemorrhagic Stroke, and Appropriate Follow-up for Normal

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Table 24.1 Required Electronic Clinical Quality Measures

Abbreviated measure designation	Measure description
AMI-8a	Primary PCI received within 90 minutes of hospital arrival
CAC-3	Home management and plan of care document given to patient/caregiver
ED-1	Median time from ED arrival to ED departure for admitted ED patients
EHDI-1a	Hearing screening prior to hospital discharge
PC-05	Exclusive breast milk feeding
STK-02	Discharged on antithrombotic therapy
STK-03	Anticoagulation therapy for atrial fibrillation/flutter
STK-05	Antithrombotic therapy by the end of hospital day two
STK-06	Discharged on statin medication
STK-08	Stroke education
STK-10	Assessed for rehabilitation
VTE-1	Venous thromboembolism prophylaxis
VTE-2	Intensive care unit venous thromboembolism prophylaxis

Colonoscope in Average Risk Patients. As electronic health records began to interface with external platforms, eCQMs relieved the core measures burden for most organizations. At the time of compiling this document, eCQMs were not available for the general public to review organizational performance. Table 24.1 outlines the eCQMs required to be submitted as part of the IQR Program.

24.2 CMS Hospital Star Ratings and Core Measures

CMS employs a five-star quality rating to rank participating hospitals throughout the United States, as described in Chap. 9. The CMS Hospital Star Ratings are built from a composite of both outcome and process measures (Table 24.2). They are reported on the governmental Hospital Compare website [2]. The process measures used in Star Ratings are a selection of CMS core measures. It is important to understand that hospitals have a choice on which measures to report. Still, to be eligible to receive a star rating, hospitals must report at least three measures in three measure categories (Table 24.2). At least one of the three categories, that hospitals must report to be eligible for a star rating, must be the "Mortality" or "Safety of Care" categories (see also Chap. 9).

Key Concept
CMS core measures have taken somewhat of a back seat to outcomes measures that primarily drive value-based payments. Still, core measures account for up to 36% of the measures in the publicly reported CMS Hospital Star Ratings.

Table 24.2 Core measures used in CMS hospital star ratings (v4.1) [3]

Category	Category description	Weight	# of metrics	Core measures
Readmissions	30-day readmissions	22%	11	EDAC-30-AMI: acute myocardial infarction excess days in acute care EDAC-30-HF: heart failure excess days in acute care EDAC-30-PN: pneumonia excess days in acute care OP-32: facility 7-day risk-standardized hospital visit rate after outpatient colonoscopy OP-35 ADM: admissions visits for patients receiving outpatient chemotherapy OP-35 ED: ED visits for patients receiving outpatient chemotherapy OP-36: hospital visits after hospital outpatient surgery
Timely and effective care	Immunization, ED timeliness, testing effectiveness, etc.	12%	14 (equally weighted)	ED-2B: admit decision time to ED departure time for admitted patients IMM-3: healthcare personnel influenza vaccination SEP-1: percentage of patients who received appropriate care for severe sepsis and septic shock OP-10: outpatient CT scans of the abdomen that were combination (double) scans OP-13: medicare patients who got cardiac imaging stress tests to screen for surgical risk before low-risk outpatient surgery Other measures hospitals can choose to report on include PC01 and OP-3b, 8, 18B, 22, 23, 29, 30, and 33

ED emergency department, OP-22 = Percentage of patients who left the emergency department before being seen, OP-23 = Percentage of patients who came to the emergency department with stroke symptoms who received brain scan results within 45 minutes of arrival, OP-29 = Appropriate follow-up interval for normal colonoscopy in average-risk patients, OP-30 = Colonoscopy interval for patients with a history of adenomatous polyps – avoidance of inappropriate use, OP-33 = External beam radiotherapy for bone metastases, PC-01 = Percent of newborns whose deliveries were scheduled too early (1–3 weeks early), when a scheduled delivery was not medically necessary, OP-3b = Average number of minutes before outpatients with chest pain or possible heart attack who needed specialized care were transferred to another hospital, OP-18b = Average time patients spent in the emergency department before being sent home, OP-8 = Outpatients with low back pain who had an MRI without trying recommended treatments first, such as physical therapy.

24.3 Core Measure Optimization

Congruent with the shift from process to outcomes measures in public reporting, our organization has benefitted from the reduced requirement to collect and report core measures. Still, we have found it useful to align major improvement initiatives with certain core measures. Two examples are optimization of access to care in the ED and the medical management of sepsis. Using internal reporting methodologies, data are captured to assess adherence to these ED and SEP-1 metrics and identify gaps for continued refinement. Reports are generated into various dashboards daily and weekly to assess progress and identify revisions needed to the organization's plan. These dashboards are shared among the executive leadership level for continued oversight. This strategy has been particularly effective when managing conditions that cross multiple facets, such as sepsis and septic shock.

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Part III

Mortality

Importance of Risk-Adjusted Mortality in Hospital Quality Rankings

25

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Publicly available hospital quality and safety information has diversified and proliferated significantly during the past two decades. A growing number of media, including CMS Hospital Compare, USNews, and others, publish lists that rank hospitals on various quality criteria, bringing healthcare decision-making into the public's consciousness. Consumers, commercial insurance providers, self-insured companies, and hospitals may use these quality measures to make better cost and quality decisions, assess performance, set benchmarks, and drive quality improvement initiatives. Centers for Medicare and Medicaid Services (CMS) rewards and penalties, as well as pay-for-performance bundle payment models, whether governmental or commercial, provide significant motivation for hospitals to assess their performance and focus on quality improvements.

One of the metrics that receives considerable attention is mortality. It is measured as hospital mortality and 30-day mortality, meaning mortality including the hospital admission and the 30-day period after discharge.

Key Concept
Mortality is used by almost all public rating agencies as a component of the metrics used to benchmark hospitals on quality performance.

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Even Agency for Healthcare Quality and Research (AHRQ) Patient Safety Indicators attempt to use mortality as an indicator of a hospital's ability to prevent mortality in surgical patients and those who are expected to have a very low risk of dying (see Chap. 26). The Risk-Adjusted Mortality Index (RAMI) is a method for comparing hospital death rates using administrative or billing data. It is generally defined as the ratio of observed to expected mortality. It drives a significant component of external rating agencies' scores used to publish or dashboard hospitals' performance. For example, Leapfrog uses AHRQ PSI-4, and CMS and USNews use 30-day mortality; hospital risk-adjusted mortality (RAMI) is employed by Vizient and Healthgrades.

25.1 Do Rankings Reflect Better Care?

High-quality care has been defined as safe, effective, patient-centered, timely, efficient, and equitable. The degree to which safety, effectiveness, and timeliness of care can be optimized during hospitalization will likely be reflected in a hospital's mortality rate, defined as the proportion of patients who die during or shortly after admission to the hospital.

If variation in hospital mortality is due to care differences, such as the treatments provided, service organization, workforce, or human resource management, higher mortality rates will reflect poor quality of care. However, mortality rates are also determined by the baseline health status with which the patient is admitted. Hospital case-mix attempts to provide an estimate of illness severity; high case-mix index and high mortality rates may reflect a sicker patient population. Case-mix index is a crude proxy for mortality risk of the hospitalized patient since it is based on the value of the DRG. Statistical methods can be used to produce risk-adjusted mortality estimates that take case mix into account, but they may be subject to limitations that may render them inadequate or inaccurate [1].

Variations in documentation accuracy among hospitals may also contribute to fluctuating expected rates of mortality because risk adjustment models depend on accurate representation of diagnoses documented to represent health status at the time of admission. Variability in the calculation of mortality risk among hospitals may result from the difficulty of assessing the severity of the principal or presenting diagnosis because administrative data lack clinical detail.

Low Hanging Fruit

A consistent observation from our practice is the inability to accurately reflect disease severity in the patient who expires shortly after hospital admission. They pass without the benefit of a full work-up and the attention of medical staff whose careful documentation is hampered by the rapid turn of events and incompletely available diagnostic data. Efforts to document as accurately as possible are well spent to capture diagnoses based on the suspicions and clinical judgment of the medical staff despite the unavailability of definitive diagnostic information.

Comorbid diagnoses are derived from documentation in the medical record, and their assigned weights determine the expected risk of death in most risk adjustment methodologies. Observed mortality is also influenced by demographic and psychosocial factors, such as social determinants of health, access to care, and treatment setting. Like disease severity, the effect of these factors is not well captured by administrative data and are only now beginning to make their way into risk adjustment models.

Therefore, even RAMI estimates could lead to misleading conclusions being drawn about the quality of care provided at an institution.

25.2 History of the Risk-Adjusted Mortality Index (RAMI)

The Commission on Professional and Hospital Activities (CPHA) developed the Risk-Adjusted Mortality Index. It was meant to provide a comprehensive method for comparing hospital death rates of all cases except neonates using existing abstracted or billing data from all payers. RAMI was designed using an extensive national database to differentiate among admissions based on patient characteristics that increase or reduce the risk of dying in the hospital. At the time of design, the model proved effective at predicting risk-adjusted outcomes, with a correlation of 0.98 between actual and predicted deaths [2, 3].

Most methods for risk adjustment include the relationship between observed or actual events and the events predicted based on certain characteristics of the patient and his or her disease. The treatment rendered can also enter the risk adjustment equation. The simplest way to explain risk adjustment is to revert to the formula

$$\text{RAMI} = O / E$$

where RAMI is the RAMI index, O is the frequency of observed or actual events, and E is the frequency of events of this type that are expected based on risk adjustment for patient and treatment characteristics.

Given accurate documentation and absence of acuity concentration (see below), RAMI appears to be a powerful tool for using already existing administrative data to monitor changes over time in hospital death rates.

Observed Deaths Observed deaths, the numerator of the RAMI, are often the unavoidable result of end-stage illness or sudden overwhelming disease. These observed deaths, and not the relatively few cases for which quality of care issues are determinative, make up most of the numerator events in the observed/expected mortality ratio [1]. Marginally preventable deaths in the hospital are relatively uncommon. Our own mortality review experience identifies only 15–20% of reviewed mortalities as potentially preventable or preventable. Attribution of preventability of death is higher for surgical cases; Shannon et al. used phase of care mortality analysis to report a 41% rate of "potentially avoidable" surgical mortality [4].

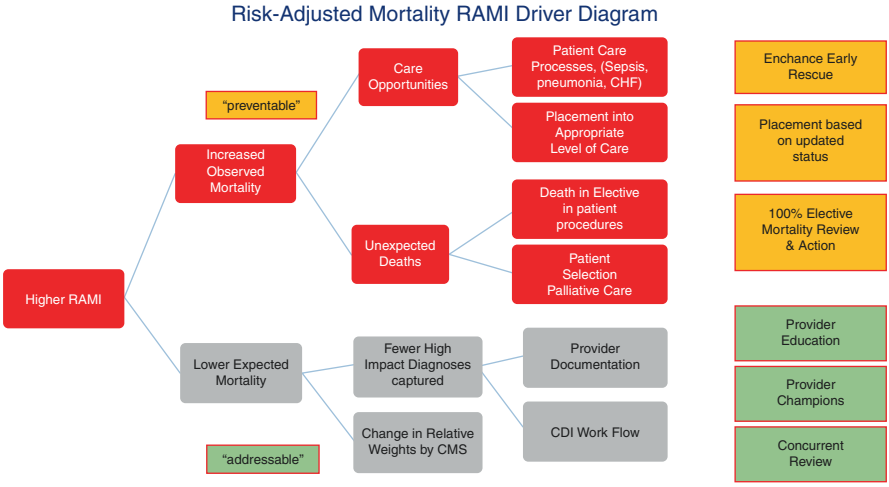

Fig. 25.1 Driver diagram for risk-adjusted hospital mortality (RAMI). CDI clinical documentation improvement, CHF congestive heart failure, CMS centers for medicare and medicaid services. (© Ochsner Health)

Therefore, numerator variations in the *O*/*E* ratio may be more responsive to the acuity (severity of illness on admission) and case-mix index of a general hospital's patients than represent the quality of its care. The effect of acuity on RAMI cannot be understated. Every inpatient mortality increases the numerator considerably more than the denominator because expected mortality for each individual patient is rarely 100%. Therefore, the inevitable effect of increasing acuity is an undesirable but unavoidable increase in the observed/expected ratio [1].

Optimizing care delivery is an organization's first priority as it is that of the hospital's medical staff. Hospitals must identify the segment of the hospital's admitted patients whose survival is challenged but within the reach or modifiability. Unfortunately, this segment represents a small number of cases. Tactics to identify them can be very different based on the populations predominantly served by the hospital (see also Fig. 25.1 below). In our hospital, we have recently chosen to focus on elective mortality and mortality associated with a diagnosis of sepsis. After improving palliative care and on review of our current mortality data it seemed that these two populations presented the greatest opportunities for modifications in clinical care, as evidenced by the experience of appropriately selected peer hospitals.

25.3 Concentration of Patient Acuity

Surviving low-acuity patients increase the denominator more than the numerator of RAMI, because the expected rate of mortality is rarely zero. The end effect is a decrease in the observed/expected ratio [1]. A hospital that avoids admitting very ill patients or transfers them before they die could favorably affect its RAMI, assuming

it has at least average quality of care processes that keep most lower-risk patients from deteriorating. In addition to reducing RAMI, lowering a hospital's acuity through avoidance of very ill patients also decreases the number of long-stay patients. The singular use of RAMI as a quality marker and a reimbursement multiplier may, therefore, threaten to limit access to care for the extremely ill.

Moreover, comparing hospitals' RAMI within a health system or among hospitals that differ in their role in sending or accepting transfer patients is likely to bring frustration to care teams in hospitals where a sizable proportion of admissions result from hospital transfers. Such patients are frequently in a very late stage of their serious and often unmodifiable illness; they are therefore poorly amenable to the successful application of even the most advanced care interventions. It is thus reasonable to benchmark RAMI performance among like hospitals in the transfer spectrum, such utilizing comparisons among different groupings of hospitals, such as comprehensive academic medical centers(CAMCs), offered by the Vizient methodology.

25.4 A Framework for Addressing RAMI in Our Organization

Despite the fact that RAMI reduction could be accomplished by avoiding very ill patients, most regional referral hospitals do not have exquisite control over which patients they accept in transfer and offer inpatient admission. Enhancing the quality of care is, of course, a better overall strategy. We can improve our observed/expected mortality by decreasing the "observed" numerator selectively among those whose survival is challenging but within reach. As mentioned, these are a small minority of observed deaths; knowing where to find them requires an organized approach. Identifying this subset of patients is a complex medical delivery problem for the hospital to solve, making it an excellent opportunity to use driver diagrams to improve Risk-Adjusted Mortality (Fig. 25.1).

Improvement science considers driver diagrams helpful tools. When performance improvement teams set out to optimize the accuracy and performance of any quality metric, they use driver diagrams to identify the main factors that should be considered for intervention. Therefore, we recommend developing a driver diagram approach for risk-adjusted hospital mortality. The use of a driver diagram allows appropriate focus on areas of improvement identified by data and difficulty level. Generally, it is possible to identify 3–5 main drivers, each of which may have secondary drivers. The last tier in a driver diagram represents the actions taken to improve drivers or secondary drivers.

Figure 25.1 represents a driver diagram that illustrates the relationship between first and second-level drivers and actions to reduce risk-adjusted mortality. In our institution, we chose the following primary buckets for our significant drivers, those that decrease observed moralities and those that increase the expected mortality. The major drivers we identified for decreasing observed mortality include (1) failure to rescue from recognized and unrecognized clinical deterioration, (2) sepsis – which in our experience is often the final common pathway for many critically ill

patients, (3) advanced care planning with the intent of exploring and honoring patients' wishes and goals of care, and (4) deaths after elective patient procedures with the goal to optimize safe surgery procedures to prevent mortalities.

Key Concept
Risk-adjusted mortality can improve by focusing on the small minority of patients whose survival is challenging but within reach. Knowing where to find them requires an organized approach, making it an excellent opportunity to use driver diagrams. Consider this approach to identify the subset of patients for which to improve complex advanced delivery of hospital care.

The driver diagram approach to RAMI has helped our hospitals' executive teams focus on the two or three care system priorities they can influence. They included documentation improvement and deepening resources for palliative care. At the health system level, documentation improvement efforts are directed to identify diagnostic buckets that may be under-represented in our practice compared to Vizient peer CAMCs. Recognizing the need for greater emphasis on palliative care, our executive board authorized resources to build a strong palliative care team. Palliative care capability was enhanced significantly in both the hospital and outpatient settings. Process metrics pertinent to effective palliative care have improved, such as the fraction of hospitalized patients receiving palliative care consultation (see Fig. 25.2) and the documentation of advanced care directives documented on admission.

Individual hospital leadership teams have also contributed by establishing a pathway for rapid evaluation of patients at risk for application of nonbeneficial care

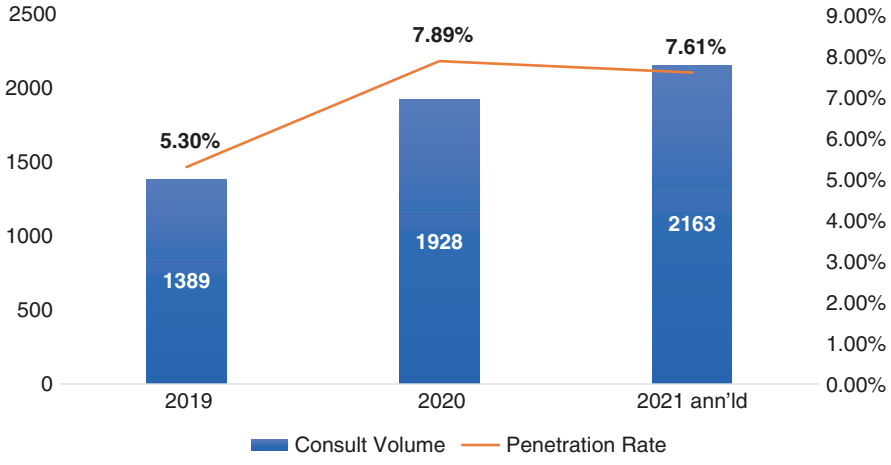

Fig. 25.2 Increasing palliative care effectiveness at Ochsner Medical Center New Orleans. (© Ochsner Health)

(see Chap. 28), improvement in sepsis care, earlier recognition and intervention for clinical deterioration, and efficacy of resuscitation. Supported by health system quality resources, our hospitals have stood up sepsis work groups and collaboratives whose focus is on changing to a culture of preoccupation with sepsis, early recognition, and in-depth data review to inform improvement actions.

At the authors' CAMC, a sepsis collaborative encompasses a group of highly engaged emergency department, hospital medicine, surgical and critical care providers, nurses, performance improvement, and support personnel. Resources have been allocated to include a dedicated medical director of sepsis, a hospital sepsis program director, a performance improvement coordinator, and analytics resources.

The driver diagram approach has also allowed us to strengthen our capabilities for resuscitation from clinical deterioration and management of cardiopulmonary arrest. Review of elective surgical mortalities suggested that early recognition and intervention in response to potentially serious surgical complications was an opportunity, as has been reported previously [5]. A dedicated team of rapid response nurses now proactively rounds and responds to urgent needs on our hospital floors 24 hours a day, 7 days a week. As has been reported previously [6], real-time sampling of electronic medical records can be used to identify hospitalized patients at risk of dying. To assist with prioritization for proactive rounding, we have developed an alert system based on machine learning to help identify patients at risk for clinical deterioration. Increasing the hospital's rescue capabilities has resulted in a substantive decrease in hospital floor codes and the ratio of rapid response calls to proactive interventions (see Chap. 43). In summary, RAMI is a complex medical delivery problem for the hospital to solve, making it an excellent opportunity to spearhead meaningful efforts to improve care delivery.

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Mortality AHRQ Patient Safety Indicators 4 (Failure to Rescue) and 2 (Death in Low Mortality DRGs)

26

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26.1 Agency for Healthcare Quality and Research (AHRQ) Patient Safety Indicator-2 (Death in Patients with Low Mortality Conditions)

This Patient Safety Indicator (PSI) will apply to in-hospital deaths in patients coded for low mortality Diagnosis-Related Groups (DRGs). Low mortality in this context is defined as <0.5%. If an MS-DRG is divided into triplet DRGs (such as without/with major) complications and comorbidities), all component DRGs with complications and comorbidities of the triplet must have mortality rates below 0.5% in the reference population to qualify for inclusion. The population of patients that are considered for this PSI are inpatients aged 18 years and older or obstetric patients. Quality review for mortality in these situations is generally conducted by performance improvement personnel and the peer review process in hospitals. Review for accuracy of reported diagnoses primarily revolves around assuring the correct DRG has been chosen.

Assuring Accuracy of the Principal Diagnosis We recently encountered a group of patients for whom an obstetric principle diagnosis had been chosen which

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committed them to a low mortality DRG. On further review, it was clear that these patients had presented to our hospital several weeks, in some cases months after delivery, for medical diagnoses unrelated to the puerperium. Some of these diagnoses included stroke unrelated to obstetrical diagnoses, respiratory failure, and fracture. Reviewers should ascertain that the correct principal diagnoses are reflected in the coding profile despite the notion that the puerperium extends to 6 weeks after delivery, and coding guidelines may be perceived to indicate that all diagnoses during this period should be considered as peripartum.

Looking for Exclusionary Conditions Excluded from this PSI are cases with trauma (identified in AHRQ appendix G), cancer (identified in AHRQ appendix H), and immunocompromised states or procedures relating thereto (identified in AHRQ Appendix I), and transfers to an acute care facility.

26.2 AHRQ Patient Safety Indicator (PSI)-4

PSI-4 is also referred to as an indicator of failure to rescue. It is one of the data points used in the Leapfrog Hospital Safety Grade. It is also a component of the Centers for Medicare & Medicaid Services (CMS) hospital star ratings [1]. Specifically included in the denominator population are patients ages 18–89 years who underwent a surgical or interventional procedure within the first 2 days of inpatient admission. The metric attempts to measure how well hospitals do in preventing mortality from severe medical conditions in such patients. These severe medical conditions, also referred to as strata, are pneumonia, sepsis, pulmonary embolism (PE), deep vein thrombosis (DVT), gastrointestinal (GI) hemorrhage, shock, and cardiac arrest. Coding and medical record documentation practices can produce bias in reporting PSI-4 [2, 3]. Because of this and other difficulties with this metric [4], the National Quality Forum has removed its endorsement of this measure [2]. The general approach to assuring accuracy with this PSI is to determine if the stratum that might trigger PSI-4 is correctly represented. This means assuring that the diagnosis was actually ruled in and satisfied MEAT (*m*onitoring, *e*valuation, *a*ssessment, and *t*reatment) criteria. In addition, other more technical considerations relate to the specific nature of PSI-4. There are other aspects of review such as the accuracy of procedural timing.

Timing Accuracy It is important to understand that timing plays a key role in triggering a PSI-4.While this PSI is meant to measure failure to rescue surgical patients from severe but treatable conditions, it also applies to patients who were admitted for nonsurgical care and who required a triggering procedure within the first 2 days of admission. It is therefore extremely important to correctly establish the time and date of both the inpatient admission and the procedure. A special situation may develop when a patient was originally admitted in observation status and then upgraded to inpatient status, introducing an opportunity for error. In any case, if the procedure was done more than 2 days after inpatient admission, PSI-4 designation does not apply.

Medical vs. Surgical Diagnosis Related Group Only surgical discharges will trigger a PSI-4 designation. Surgical discharges are defined by specific Medicare Severity Diagnosis Related Group (MS-DRG) codes and ICD-10-Procedure Coding System (PCS) codes indicating major operating room procedures. It is therefore important to assure that the correct DRG is represented. One obvious reason for this is so as not to spend unnecessary resources on reviewing medical patients' records for PSI-4. There may also be opportunities to more correctly represent a patient's hospitalization when the surgical DRG hinges on a procedure that has not been described accurately. If it is not on the list of procedure codes that CMS uses to trigger this PSI [5], a PSI-4 should not be reported. One example is a medical patient who undergoes a minor diagnostic procedure (e.g., a bedside nasopharyngoscopy or bronchoscopy) that may be incorrectly represented as a major operating room procedure with the procedure code of excision of lung tissue, potentially placing it into the bucket of DRGs that would trigger PSI-4.

Understanding the Five Strata of PSI-4 One of the first steps a quality reviewer should undertake is to determine which of the PSI-4 strata are relevant in a particular case. Not infrequently, there will be more than one potentially triggering diagnosis or stratum. In this case, it is important to understand the outcomes hierarchy of strata spelled out in the Agency for Healthcare Research and Quality (AHRQ) definitions [6]. The mortality outcomes risk hierarchy is (1) shock/cardiac arrest, (2) sepsis, (3) pneumonia, (4) gastrointestinal (GI) hemorrhage, and (5) deep vein thrombosis/pulmonary embolism (DVT/PE). If the coding profile indicates the presence of several strata, only one candidate stratum is applied. The stratum that is applied has the highest risk of the mortality outcome and therefore highest in the above hierarchy. For example, if both shock and sepsis are coded, shock will be the triggering diagnosis stratum for PSI-4.

Low-Hanging Fruit
For efficiency of review, it is helpful to be able to identify the triggering stratum diagnosis.

Once this is accomplished, consider which diagnosis will trigger. Then deal with this diagnosis to understand whether it was accurately captured. If it was, there is no need to consider the other strata if any apply.

Addressing Each Stratum If the stratum diagnosis was truly ruled in, reviewers should evaluate the following:

1. Was the stratum diagnosis clinically insignificant? If not clinically significant (such as not satisfying MEAT criteria), PSI-4 designation might be avoided if the triggering diagnosis is removed. Such removal, however, may still trigger PSI-4 in cases where multiple strata are coded.

2. Look for coded conditions that are suspected to be the cause of death (e.g., GI bleed during final code blue). If not evaluated or treated (MEAT criteria), they should not be coded routinely without a physician query.
3. Could the stratum diagnosis be the principal diagnosis? This may offer the opportunity to avoid triggering a PSI-4. In some strata, if the triggering diagnosis is also the principal diagnosis, PSI-4 designation may be avoided as the principal diagnosis serves as an exclusion. In some situations, PSI-4 designation may be avoided for two strata, such as pneumonia and sepsis, because one is an exclusion for the other.
4. What is the DRG and corresponding major diagnostic category (MDC) number? Some strata (such as pneumonia) exclude from an MDC. An example is MDC-4, diseases/disorders of the respiratory system, which excludes from the pneumonia stratum.

It is therefore imperative to assure during concurrent review that procedure timing, principal diagnosis, and DRG/MDC are correct, as inaccuracies in these parameters could lead to incorrectly triggering an unwarranted PSI-4 occurrence.

1. *Stratum Shock or Cardiac Arrest:* Surgical discharges whose medical record documents cardiac arrest or various types of shock as secondary diagnoses will trigger this stratum. Even if the medical record does not specify shock, PSI-4 will still trigger from any listed ICD-10-PCS codes for shock or cardiac arrest (resuscitation) [7]. The important exclusions are (1) age >89 years, (2) a principal ICD-10-CM diagnosis code for shock or cardiac arrest, (3) a principal ICD-10-CM diagnosis code for trauma [8], (4) a principal ICD-10-CM diagnosis code for hemorrhage or GI hemorrhage, (5) a principal ICD-10-CM diagnosis code for abortion-related shock, (6) an MDC 4 or 5 (diseases/disorders of the respiratory or circulatory system), and (7) discharge disposition to an acute care facility or admitted from hospice.

First and foremost, reviewers should assure that the correct principal diagnosis is represented. If the patient came to the hospital primarily because of a respiratory, circulatory, or hemorrhagic diagnosis or for trauma care, this should be reflected in the principal diagnosis and therefore represents an important opportunity for exclusion from PSI-4. While assuring the capture of the correct principal diagnosis is certainly a good overall goal, there may be difficulties when reviewers try to reconcile this with coding guidelines. At our organization, coding professionals almost never code a principal diagnosis of shock because they feel that coding guidelines force them to consider shock a symptom. Per coding guidelines, the condition underlying the symptom should be coded when supported by the medical record.

This limitation is difficult to understand from the clinician's point of view because the patient who presents in shock will have a substantial array of resources dedicated to treatment and evaluation of shock, with the treatment of the underlying condition often having already been initiated or completed. For these reasons, we have focused on the principal diagnosis other than shock. This approach seeks to

ascertain if the patient had a condition that required hospitalization that would allow the DRG to fall into one of the exclusionary MDC or trauma buckets. We bear in mind that admission for trauma conditions such as hip fracture or dislocation or injuries from falls, including subdural hemorrhage, present these exclusionary opportunities. We have also found it helpful to review the following set of circumstances. A patient may have had a do-not-resuscitate order or comfort care plan in place but may appear from the medical record to have been resuscitated or to have had a cardiac arrest. In this situation, it is important to assure that such patients are correctly represented in the coding profile as having passed without cardiopulmonary resuscitation or arrest, thus potentially obviating the PSI-4 trigger.

2. *Stratum Sepsis:* If a diagnosis of sepsis or septic shock is present, the sepsis stratum of PSI-4 will be triggered. The only exceptions (exclusionary conditions) are (1) a principal diagnosis of sepsis, (2) age >89 years, (3) discharge disposition to an acute care facility or admitted from hospice, and (4) the presence of an infectious condition as a principal diagnosis. These exclusionary diagnoses are listed in AHRQ Appendix F [9].

While Appendix F is a long list of diagnosis codes, it is worthwhile for the reviewer to remember a few common diagnostic groupings from the list. These themes will guide the search for clinical indicators to support diagnoses as possible exclusions for PSI-4, stratum sepsis:

- Any pressure ulcer
- Any bacterial or fungal infection, abscess, furuncle, carbuncle
- Eye or ear infections
- Periodontitis
- Pneumonia (bacterial, fungal, viral)
- Bronchitis or chronic obstructive pulmonary disease with acute infection
- Methicillin-resistant *Staphylococcus aureus* or methicillin-susceptible *S. aureus* infections
- Gangrene
- Osteomyelitis or septic arthritis
- Cellulitis
- Meningitis
- Endocarditis
- Enteritis or enterocolitis
- Cholecystitis or cholangitis
- Appendicitis, diverticulitis, or peritonitis
- Foodborne infections
- Ulcerative colitis or Crohn's disease with abscess
- Pelvic inflammatory disease or other genitourinary infections
- Pyelonephritis, urinary tract infection, or cystitis
- Infection postprocedure, infected hardware, implant, or vascular device
- Sepsis or septic shock

When looking for exclusionary diagnoses, reviewers should keep in mind that these diagnoses also require the presence of sufficient data in the medical record to meet clinical significance criteria (i.e., MEAT criteria).

Case Illustration: Unwarranted Complication Avoided by Clarifying the Diagnosis of Sepsis

Reason for Concurrent Chart Review: This patient's chart was reviewed for PSI 4-44 (stratum sepsis). The event was identified by 3 M (Death Rate among Surgical Inpatients with Serious Treatable Complications stratum PSI 4- 44 stratum Sepsis). The triggers for PSI 4-44 were diagnosis codes A419 (sepsis, unspecified organism) and R6521 (severe sepsis with septic shock).

Review Summary: A middle-aged male underwent elective coronary artery bypass graft x3 with a mitral valve replacement. His postoperative course included cardiogenic shock. He required an intra-aortic balloon pump which was eventually removed and replaced with a right and left Tandem-heart ventricular assist device. Anticoagulation was started and a sudden neurologic change was noted. A computed tomogram of the head showed a large cerebral hemorrhage with midline shift. The injury was deemed non-survivable and the family decided to pursue comfort care measures only. The patient expired shortly after terminal extubation.

Proposed Coding (Pre-billing): A419 sepsis, unspecified organism, and R6521 severe sepsis with septic shock.

Quality Review Reasoning and Request: The chart was reviewed for PSI 4-44 Stratum Sepsis. Physician documentation was found to indicate the presence of postoperative cardiogenic shock and renal failure. No mention of sepsis or septic shock was noted. In addition, no documentation for sepsis or septic shock was noted in the discharge summary. All blood cultures were negative. No elevations in lactic acid occurred and the routine course of perioperative antibiotics was completed.

Referral for Physician (VPMA) Review: The case was referred for VPMA review. It was agreed that the case should undergo senior coding review. A request was made for a query to rule in or out both sepsis and septic shock.

Coding Outcome: The account was reviewed by a senior coder, at the request of the quality department. The determination was that a query was justified to rule in or out both sepsis and septic shock. The query was answered ruling out both A419 (sepsis unspecified) and R6521 (severe sepsis with septic shock). The removal of both triggering codes A419 and R6521 avoided the reporting of this case as a PSI 4 event. Although the patient had cardiogenic shock, the latter does not trigger PSI-4 because of the MDC of 5.

3. *Stratum* P*neumonia:* If a diagnosis of pneumonia is present, the pneumonia stratum of PSI-4 will be triggered. The only exceptions (exclusionary conditions) are (1) a principal diagnosis of pneumonia, (2) a principal diagnosis of

respiratory complications (such as chemical aspiration pneumonitis or ventilator-associated pneumonia), (3) age >89 years, (4) discharge disposition to an acute care facility or admitted from hospice, and, importantly, (5) many diagnosis codes for viral pneumonia or influenza, including SARS-CoV-2, (6) many procedure codes for lung cancer (endoscopic and open), and (7) DRG classification into MDC 4 (diseases/disorders of the respiratory system).

This list shows that many more exclusionary conditions can apply for stratum pneumonia than for sepsis. Because the source of sepsis can be pneumonia, it is important to sort this relationship out. Evidence for a causal relationship between pneumonia and sepsis should be specifically sought so that it can be reflected in the coding profile and/or be queried. The result of correctly representing this relationship could be avoidance of both the triggers for stratum pneumonia and sepsis. An example of such a case might be a patient who was admitted for sepsis but also had pneumonia that became evident after fluid resuscitation. The patient underwent a pulmonary procedure such as bronchoalveolar lavage which is on the PSI-4 procedure inclusion list. If sepsis is coded as the principal diagnosis, PSI-4 is unavoidable, as pneumonia would only exclude the sepsis stratum if it is the principal diagnosis. If pneumonia is coded as the principal diagnosis, the pneumonia stratum is avoided for this reason (principal diagnosis). The sepsis stratum excludes as well because pneumonia as a principal diagnosis is an exclusionary condition for sepsis.

Key Concept
Getting the principal diagnosis correctly identified can result in the avoidance of PSI-4. If pneumonia is identified as the principal diagnosis, both potential PSI-4 trigger strata, sepsis and pneumonia, are avoided.

4. *Stratum Gastrointestinal* H*emorrhage:* Surgical patients with diagnoses of GI bleeding or a bleeding acute GI lesion will trigger a PSI-4. The intervention to treat GI bleeding can place such patients into a surgical DRG. GI bleed diagnoses include such conditions as melena, hematemesis, bleeding associated with gastric or duodenal ulcers or perforation, diverticular bleeding, and more. Exclusions are (1) age > 89 years, (2) a principal diagnosis of GI hemorrhage, acute peptic/gastric ulcer, trauma, alcoholism, or anemia, and (3) discharge disposition to an acute care facility or patient admitted from hospice. The reviewer's approach for this stratum focuses on establishing whether a principal diagnosis of GI bleeding or ulcer is warranted. In rare cases, alcohol use disorder or anemia could be the principal diagnosis. An interesting situation seen in our practice has been determining which condition is primary when a GI bleed is associated with cardiac ischemia and perhaps even infarction. In this situation, a similar or greater amount of resources may be devoted to the treatment of the cardiac condition as it is to manage GI care. Careful review and appropriate documentation should establish whether GI hemorrhage should be considered the principal diagnosis. For GI bleeding that occurs during the hospital course,

reviewers also need to evaluate whether the bleeding condition was clinically significant or not (i.e. failed to influence treatment or diagnostic regimens).

5. *Stratum Deep Vein Thrombosis or Pulmonary Embolism:* If a diagnosis of DVT or PE is present, this stratum will be triggered. The few exclusions are (1) a principal diagnosis of DVT or PE, (2) age > 89 years, (3) a principal diagnosis of abortion-related or postpartum obstetric PE, or (4) discharge disposition to an acute care facility or admitted from hospice.

In the authors' practice environment, review for this stratum is frustrating as DVT is usually clinically significant (with evidence of diagnostic evaluation and/or pharmacological treatment). In some cases, it may be feasible to make the argument that the DVT was not clinically significant if no changes in therapy were made (e.g., the patient was already anticoagulated). Another review approach is to look for information indicating that DVT may have been present prior to admission such as at a recent clinic visit or hospitalization. Such prior information may be used to generate a query. Some organizations rely more heavily on screening for DVT on admission, which is not our practice nor supported by evidence.

Case Illustration: Unwarranted PSI-4 Avoided Because Cardiac Arrest Does Not "MEAT" Criteria

Reason for Concurrent Chart Review: This patient's chart was reviewed for PSI-4, identified by 3 M (Death Rate among Surgical Inpatients with Serious Treatable Conditions; PSI 45, Stratum SHOCK: Shock/Cardiac Arrest). The triggers for PSI-4 were the fact that the patient had a surgical procedure within the first 2 days of hospital admission and a code of cardiac arrest (I46.9).

Review Summary: A middle-aged male was originally admitted to another hospital after an accidental overdose. Evaluation revealed brain stem strokes and edema with resultant obstructive hydrocephalus. He required tracheal intubation, sedation, treatment with hypertonic saline, and nicardipine infusion for blood pressure control. He was then transferred to our medical center where the neurosurgical evaluation of this deeply comatose patient (Glasgow Coma Scale score 3) was performed, resulting in emergent frontal ventriculostomy and external ventricular drain placement. The patient was admitted to intensive care for intracranial pressure monitoring. The patient failed to improve, resulting in the care team and family opting for palliative withdrawal of care and compassionate extubation. Do-not-resuscitate orders were entered accordingly. The patient passed shortly thereafter.

Proposed Coding (Pre-billing): The physician's discharge summary indicated that "family opted for withdrawal of care and comfort measures. The patient was extubated, shortly followed by respiratory arrest and cardiac arrest." The text recognition software identified the mention of respiratory and cardiac arrest in a physician's note, prompting inclusion of the I46.9 code in the patient's pre-bill coding profile.

Quality Review Reasoning and Request: The quality reviewer requested the removal of diagnosis code I46.9 (cardiac arrest). The reason was that the patient was not monitored, evaluated, or treated (absence of MEAT criteria to justify coding) for cardiac arrest, in accordance with the documented plan for withdrawal of care. Death occurred naturally following terminal extubation per the family's wishes. There was no documentation of shock or cardiac arrest other than in the discharge summary.

Referral for Senior Physician Review: The case was escalated for senior physician review because of the documentation of "respiratory and cardiac arrest" after compassionate extubation in the discharge summary. The senior physician's review indicated that death occurred naturally and by intention of the treating team, without any intended therapy for cardiac arrest or further monitoring and evaluation.

Coding Outcome: The account was reviewed by a senior coder at the request of the quality department. The determination was that coding changes were needed to (1) add a physician-documented central line placement code missed on original coding profile, (2) re-sequence the principal diagnosis to become obstructive hydrocephalus (this was the reason for transfer, focus of treatment, and procedure (ventriculostomy)), and (3) delete code I46.9 as there were no MEAT criteria for I46.9. The cardiac arrest is an expected result of palliative withdrawal of care. This case illustrates also the potential beneficiary effects on coding accuracy incident to concurrent quality review.

26.3 Medical Staff Education

It is very difficult to educate surgical, medical, and supporting staff around this highly complex metric. Our approach has been to focus on a few key points: the accurate documentation of pneumonia, traumatic injury, and GI bleeding on admission. In addition, we emphasize documenting the results of the workup for triggering diagnoses, such as sepsis, so that the coding profile represents an accurate picture. In some cases, while a triggering diagnosis is initially suspected, a PSI-4 can be avoided if the workup demonstrates that the originally suspected diagnosis was eventually ruled out.

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Concurrent Review for Risk-Adjusted Mortality: Documentation and Coding Care Process Considerations

27

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Mortality is an outcome that demands universal attention. The practice of mortality review is time-honored and nearly universal. Mortality review has educational benefits and spurs improvement when preventable mortality is identified. Mortality is measured as raw or risk-adjusted mortality, most frequently reported as occurring either during hospitalization or within 30 days of hospital discharge. In publicly reported quality metrics, mortality features prominently. More than 30% of the U. S. News hospital and specialty quality score is derived from 30-day mortality performance. Risk-adjusted mortality is an important component of the Vizient "Q & A" hospital ranking and features prominently in Healthgrades metrics. Vizient risk adjusts based on logistic regression (taking into account age, gender, race, admission source, and comorbidities) that determines expected rates of mortality based on the diagnosis-related group (DRG).

Healthcare organizations desire to optimize their performance in risk-adjusted mortality. A useful way to think about this is by constructing a driver diagram for hospital-associated mortality (see Chaps. 4, 25 "The Power of the Driver Diagram" and "Risk-Adjusted Mortality"). Inpatient drivers of lower patient mortality may include early recognition of sepsis, avoidance of codes on hospital floors, placement of patients in the correct level of acuity, prehospital management of severe illness,

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elective mortality, and effective palliative care. Quality improvement efforts related to these drivers have been reported extensively.

In addition to such efforts, hospital performance improvement teams also recognize that accurately submitted data can influence publicly reported mortality statistics. In this chapter, we discuss opportunities in concurrent mortality review that relate to the accuracy of documentation and coding; we also share insights gained through this process that led to changes in care coordination.

27.1 Service Line Mortality

When mortality is reported by service line, the usual method of attribution is the DRG. Therefore, it is imperative that the coding profile accurately reflects the patient's disease and reason for hospitalization so that the accurate DRG can be assigned. Other data elements that can influence inclusion or exclusion from publicly reported mortality statistics are admission and discharge dates, age, admission source, and disposition. For example, U. S. News 30-day specialty mortality is defined by a bucket of DRGs for each specialty. In some cases, a DRG may trigger a U. S. News mortality for more than one specialty (such as for cancer and urology). Paradoxically, a patient may count more than once as a mortality, if the final two hospitalizations were within a 30-day period. To account for the expected higher mortality of patients transferred to regional referral centers, U. S. News mortality excludes patients transferred from another acute care hospital.

Vizient data have been used to elucidate factors associated with service line mortality. Hammers et al. (2010) combined traditional concurrent mortality review with an analysis of Vizient (at the time still University HealthSystem Consortium [UHC]) [1]. They found that the neurosurgical mortality rate differed substantially among patients with different presentations and pathology. For example, elective case mortality was six times lower than nonelective mortality. Vizient/UHC data supported the notion of higher risk-adjusted mortality in patients who are trauma victims, are transfers, are admitted via the emergency department (ED), and have Medicaid insurance.

27.2 Approach to Concurrent Mortality Quality Review

Concurrent mortality quality review at our organization includes several perspectives, the most important of which is potential avoidability. Our performance improvement department reviews cases identified from our incident reporting system, elective surgical deaths, deaths identified as unexpected based on clinical screening criteria, and deaths falling into the US News and World Report DRG triggers. Medical and surgical departments hold educational multidisciplinary case conferences, often prompted by mortality review outcomes conducted by the performance improvement department. Another approach identifies mortalities for

review if their expected mortality falls below a certain value. The Vizient mortality calculator provides tools to facilitate the identification of such patients.

Concurrent mortality review in our organization denotes the process of reviewing cases of mortality as soon as they are identified. The process starts with identifying the case, and a performance improvement coordinator conducts a preliminary review to identify opportunities in practice and documentation. This review is shared with the designated departmental physician quality champions. A short cross-disciplinary summary meeting brings together points of view from physicians, documentation experts, performance improvement, and hospital leadership.

Key Concept
Concurrent quality review for mortalities, when conducted in the context of public quality reporting, can be particularly effective in engaging physicians. Cross-disciplinary review promotes a comprehensive understanding of the drivers of mortality metrics, including clinical documentation, care coordination, application of practice guidelines, and palliative care.

Considering the Numerator Reviewers want to be certain that patient demographics are represented accurately. In addition, it is imperative to assure that inpatient admission time and date are correct. In U. S. News methodology, patients are excluded from mortality counts if they are admitted and discharged from an acute care hospital on the same calendar day. Because of transfer delays and late-night interhospital transfers, patients may be included in mortality counts who otherwise qualify for the U. S. News transfer exclusion.

DRG assignment is driven by the principal diagnosis and the primary procedure performed. The principal diagnosis is chosen by clinical documentation improvement (CDI) and coding professionals, often without clinical input beyond what appears in the medical record. Concurrent clinical review attempts to validate the principal diagnosis based on the comprehensive clinical picture provided by the patient's presentation on admission and completed as the diagnosis is solidified and confirmed within the first 24–48 hours after admission. An example of such an opportunity is a DRG assignment to the specialty of otorhinolaryngology (ENT), identified in a recent review from our practice. The patient had been admitted from a nursing home with the diagnosis of dysphagia and aspiration. Dysphagia led to the assignment of an ENT U. S. News DRG. The patient ultimately succumbed to sepsis from overwhelming pulmonary aspiration suffered prior to admission. No intervention from an ENT specialist was either necessary or requested. On further review of the medical record, it became clear that the DRG assignment was incorrect.

Considering the Denominator As most risk-adjustment methodologies use expected rates, risk-adjusted mortality is also influenced by the denominator in the observed to expected ratio. Risk-adjustment generally uses the severity and totality of prehospital conditions, with little or no dependence on diagnoses that are added

later in the patient's hospital course, as these are considered hospital-acquired. It is therefore critical to be able to accurately document and capture all relevant diagnoses that were present on hospital admission. Systematic efforts to review and capture the medical complexity of patients who die in hospitals have been reported. For example, Horwood et al. used a cross-disciplinary approach to concurrent review including coders, CDI specialists, quality improvement personnel, and service line physicians. These investigators report opportunities to improve coding accuracy in 18–56% of cases reviewed [2]. The most frequent codes captured were related to coagulopathy, malnutrition, fluids and electrolytes, shock, renal failure, sepsis, hypotension, and mechanical ventilation on the day of admission. Opportunity service lines were identified based on the frequency of opportunity codes identified. As a result of this activity, documentation and expected rates improved, with observed to expected mortality ratios decreasing 38–45% in their acute care surgery and neurosurgery service lines. Concurrent physician review for this purpose has also been described elsewhere. Such review of acute care surgical and trauma surgical patients by a physician panel increased the reported severity of illness and risk of mortality [3].

Low-Hanging Fruit: Clinical documentation can substantially influence the expected rate of mortality while also helping to avoid inappropriate DRG assignment for service-line mortality indicators.

We have also seen improvements using a cross-disciplinary approach to concurrent chart reviews and the use of the Vizient mortality calculator. Potential opportunities found by quality improvement personnel are communicated to our coding/CDI department for documentation review and appropriate coding for the condition. If a query is needed, they compliantly query the appropriate provider for clarification of the documentation and apply the appropriate coding assignments based on the response to the query. In the year 2020, we reviewed 199 medical records in this way. Approximately 15% (31 charts) were identified with potential opportunities to improve accuracy. Collaboration between coding, a CDI specialist, and quality improvement personnel resulted in improved accuracy for 6 cases. Improvements included more accurate principal diagnosis and DRG assignment and point of origin accuracy. In addition, review of 10 cases resulted in improved expected mortality based on the Vizient mortality calculator. Concurrent review and collaboration provide the platform to improve accuracy in the reported data for the care the patient received.

Mortality review has also helped identify opportunities at the patient population or service line level. By summarizing data from our concurrent case reviews, we found that many mortalities in neurological DRGs had short lengths of stay. On further examination, a pattern emerged. During a recent 18-month period we found at least 12 mortalities in certain neurology and neurosurgery DRG cohorts who were admitted with severe life-limiting comorbidities. Approximately 50% of

patients over the age of 65 years, who were admitted for severe intracranial bleeding, arrived at our facility unresponsive, with a heavy burden of comorbidities, and a with high mortality risk. Moreover, DRG 100 (seizures) was also identified as a population of interest (see below). As a result of this review experience and a concomitant Vizient mortality data analysis, a multidisciplinary work group was formed to identify potential solutions that include leaders for our neurology, neurosurgery, palliative care, and emergency departments. As described elsewhere (see Chap. 28), actions that were vetted and implemented included an ED admission protocol for unresponsive patients with a Glasgow Coma Scale rating of 3 or 4, establishment of inpatient hospice beds, training updates for ED teams, and the creation of a clinical evaluation unit to serve as a transition point for such patients.

27.3 Physician and Provider Engagement

An important educational message for providers is the high importance of their accurate and complete documentation of all conditions that are present on admission. When this practice is followed rigorously, expected rates of mortality rise and risk-adjusted mortality falls even in the absence of observed mortality changes. Clarifying the principal diagnosis is paramount, as this will result in the attribution of the mortality to a particular specialty. Physicians can assist by reevaluating the state of documentation at intervals after admission and, at the latest, on discharge. Providers should be able to quickly and reliably enter the principal diagnosis and supporting evidence. A last resort is to answer a medical record query about an otherwise unclear principal diagnosis.

An example of excellent physician engagement from our practice relates to the assignment of DRG 100 (Seizures with MCC). Our hospital has patients transferred to us for post-cardiac arrest management. In some cases, the only reason identified for the transfer is "for treatment of seizures." Coding guidelines force such documentation to identify the patient as DRG 100 because the reason for hospital admission is thus documented to be for evaluation of seizures. What can result is a very high risk-adjusted mortality for this DRG because the expected risk of patients electively admitted for seizure control is relatively low. The challenge for physician leaders and physician documentation champions is to engage members of the medical staff to describe the patient's status on admission and the totality of care requirements necessitated by the transfer. If the great majority of treatment effort was directed toward control of seizures, DRG 100 would seem appropriate. If, on the other hand, provider notes illustrate that managing cardiovascular and respiratory diagnoses accounted for the majority of medical decision making and intervention, assignment of DRG 100 would be much more difficult to justify. Our group of neurointensivists now participate in concurrent reviews of patients assigned DRG 100 to share documentation opportunities and improve accuracy.

Sophisticated analysis of existing national databases can help make educational interventions with the medical staff more efficient. For example, utilizing the Vizient mortality calculator, certain DRGs and diagnoses can be identified for targeted

medical staff feedback education efforts. This has been used in our organization by establishing physician documentation champions within service lines. Data were gathered and shared during education sessions that highlighted potential opportunities for improvement in documentation. This helped shed light on the importance of complete documentation of the patient's acuity on presentation. An approach similar to this was recently reported in the literature. Kessler et al. (2020) used the calculator to identify coding opportunities in risk-adjusted mortality for the service lines of neurology and neurosurgery [4]. MS-DRGs with the greatest opportunities were identified, as were the most common diagnosis that could have been added to the coding profile, based on information present in the medical record. Trained coding and documentation specialists were then assigned to review these cases concurrently. Vizient mortality index performance improved 11% after 6 months and continued to improve by another 10% thereafter. At the authors' hospital, a similar effort identified coding opportunities that primarily involved more accurate documentation and coding for brain edema, thus appropriately describing the patient's condition. Like Kessler et al. we identified opportunities in coding comorbidities for very acutely ill patients who die shortly after admission.

Electronic medical record templates and smart-logic technology can assist providers in this effort. As providers document, real-time suggestions for possible diagnostic choices can be offered. At discharge, a pause and review of the patient's principal diagnosis and reason for admission can be encouraged. Compliance department consultation should be obtained to assure that such smart logic is based on appropriate clinical indicators.

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Avoiding Nonbeneficial Care in the Acute Care Hospital

28

A. Shreves, I. Innocent-Ituah, and S. Nelson

Avoiding inpatient admission for patients unlikely to benefit from hospitalization is an important component of an overarching mortality reduction strategy [1]. As described below, the primary reason to avoid unnecessary hospitalization of patients at the end of life is to avoid the burdens it entails – burdens that are part of a system designed to keep patients alive. In addition, in various rating and pay-for-performance methodologies (Vizient, *U.S. News* survival score, Leapfrog, and Centers for Medicare & Medicaid Services Value-Based Purchasing Program among them) inpatient mortality is used as one indicator of quality. A patient is considered an inpatient if they are admitted to the hospital – regardless of do-not-resuscitate status, even if the patient is receiving comfort measures only. A patient evaluated in the emergency department (ED), admitted for observation, or admitted into hospice (either inpatient or home hospice) is not considered an inpatient and does not impact these quality metrics. In this chapter, we provide a perspective on inpatient hospital admission at the end of life and explore the relationship with certain acute care hospital quality indicators.

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Key Concept
Acute care hospitalization at the end of life may well benefit many patients. When hospitalization is nonbeneficial, it may adversely affect hospital mortality metrics.

28.1 Downsides to Acute Care Hospital Admission at the End of Life

While there are obvious benefits to hospitalization for many patients with serious illnesses, the challenges inherent to an acute care admission are significant. Patients forgo their independence; the comfort and security of their home environment; and unrestricted access to family, friends, and the outdoors. At the same time, they accept discomforts and indignities that accompany inpatient hospital stays such as frequent vital sign checks, painful procedures like venipuncture, disrupted sleep, tethers to monitors, and hospital meals. For some patients, the burdens of hospitalization are outweighed by the potential for clinical improvement. Patients are typically willing to undergo a significant amount of suffering if there is a reasonable expectation for improvement to a quality of life consistent with their values and goals. For patients with an advanced illness, however, particularly those near the end of life, the ability of the hospital to help them achieve those goals diminishes. Not surprisingly, earlier hospice enrollment, avoidance of intensive care unit (ICU) admissions within 30 days of death, and death occurring outside the hospital were associated with perceptions of better end-of-life care by family members of Medicare recipients who died of lung or colon cancer [2]. In addition, the National Quality Forum has endorsed measuring ICU admissions in the last 30 days of life and hospice enrollment for cancer patients as quality metrics.

Hospice care is a type of palliative care available to patients with a terminal disease and an expected prognosis of 6 months or less. Hospice care includes a set of services provided in the home, free-standing inpatient facility, hospital, or nursing home. Election of hospice care is not synonymous with "do not treat," although the focus is generally on maximizing comfort and/or quality of life with some acceptance that the patient is dying. The benefits of hospice care to both patient and family are enormous and include improved symptom management, spiritual support, and caregiver support. There has been a small but steady increase in patients accessing hospice use at the end of life, with half of Medicare decedents accessing hospice in 2018 [3], and over the past 20 years, Medicare data suggest fewer people are dying in the hospital setting [4]. Enrollment in hospice is associated with significantly lower rates of hospital use and in-hospital death in Medicare decedents [5].

Key Concept
Where appropriate, hospice care may provide substantial benefits to patients and families. When chosen as an alternative to acute care hospital admission, a hospice disposition generally does not adversely affect hospital quality metrics.

As a health care institution, Ochsner has been at the forefront of providing patient-centered care. For patients with an incurable illness and a very limited prognosis, ideal patient-centered care may involve forgoing an admission and instead quickly transitioning the patient out of the hospital setting and into a more appropriate and comfortable environment that can provide the best end-of-life care. Ample resources should be available to assist patients and families in making this time-sensitive transition.

28.2 Identifying the Opportunities: Systemwide Approach/ Advance Care Planning

Advance care planning (ACP) is a process that supports patients at any age or stage of health in understanding and sharing their personal values, life goals, wishes, and preferences regarding their future medical care. In a broader context, ACP also improves communication among patients, surrogates, and clinicians and assists patients in clarifying the choice of surrogate. It provides a framework for informed decision-making through disease education and trajectory to help decrease family and surrogate burden.

Approximately 70% of older Americans complete ACP prior to their death. Unfortunately, documentation of these discussions doesn't always find its way into the medical record, and the Ochsner system is no exception. Ochsner Health has documentation of ACP for only approximately 11% of its adult population, highlighting a significant area of opportunity. The ACP process can occur through multiple clinic and hospital visits with providers who coordinate the patient's care. It should be proactive and integrated into routine care, such as annual visits and routine procedures, as well as during chronic and terminal illness follow-up visits. Content of conversations should be documented and accessible as patients travel across health care settings.

ACP often includes the documentation of preferences in the form of advance directives to ensure that treatment preferences can be communicated in times of crisis. Examples of advance directives commonly used in the Ochsner Health system are the following:

1. The living will documents the patient's preferences for life-sustaining treatments and resuscitation in the setting of a terminal illness.
2. The health care power of attorney (HCPOA) or health care proxy documents the choice of a surrogate decision-maker for when the patient no longer has capacity.

3. The physician orders for life-sustaining therapy (POLST; in Louisiana called a LaPOST – Louisiana Physician Orders for Scope of Treatment) documents preferences for specific treatments/interventions (CPR, intubation, artificial nutrition, or hydration) that are frequently considered at the end of life and are actual medical orders signed by a physician. The POLST document is a set of portable medical orders that can operationalize the preferences for life-sustaining treatments (contained in the living will) in the setting of a life-limiting illness or may be used as a standalone set of orders.

Relevant to the issue of avoiding nonbeneficial admissions, successful ACP programs can be measured by a higher rate of completion of advance directives, less intensive treatments and hospitalization at the end of life, a decrease of in-hospital deaths, and an increased likelihood of patients dying in their preferred place. Studies have also suggested that ACP increases the utilization of hospice services and reduces moral distress among health care providers [6].

Our organization has created an easily accessible ACP section in the Epic electronic medical record (EMR). Providers are trained on how to navigate the information contained in the ACP section to ensure they can rapidly access and interpret advance directives the patient may have completed. In addition, providers are educated about documentation tools that ensure goals of care discussions are populated to this tab. Access to the LaPOST Registry (statewide POLST program) is available through the Ochsner EPIC ACP module with one click.

28.3 Identifying the Opportunities: Emergency Department

Traditionally, most patients presenting to our organization's ED who had critical or life-threatening illnesses were reflexively treated with all available tools to prolong their lives. The common practice was to admit them to the hospital, including to a critical care setting (ICU). This model of care has shifted in recent years as emergency providers have become more engaged in end-of-life discussions and decision-making. Palliative care screening and consultation have been shown to be feasible in the ED setting and are associated with benefits such as more direct hospice referrals, improved patient and family satisfaction, reduced duration of hospitalization, and lower utilization of intensive care [7, 8]. Empowering emergency providers to engage in this process can be bolstered by the following initiatives:

1. *Accessibility of advance directives in the EMR*. Patients in the Ochsner Health system are increasingly completing advance directives such as the living will, HCPOA, and LaPOST. These documents are intended to guide medical decision-making in an emergency when the patient is unable to speak for him or herself. It is critical that emergency providers know where to access these documents and how to apply them at the bedside.
2. *Hospice education*. Emergency providers need to be educated about the value of hospice care, patients who are eligible, and the specific hospice resources in their community. Information about inpatient hospice resources is particularly

important, as the majority of critically ill end-of-life patients in the ED forgoing admission will meet the criteria for an inpatient hospice admission.

3. *Communication skills training.* Navigating end-of-life (also referred to as "goals-of-care") discussions can be overwhelming and complex. Communication skills training improves provider knowledge and confidence in approaching these discussions. All emergency department providers at the authors' hospital completed the VITAL Talk communication skills course in September 2019 [9]. The Respecting Choices platform also offers courses and online resources to educate providers on communication skills necessary in end-of-life discussions [10].
4. *ED social worker facilitation of hospice enrollment and transfer.* Critically ill patients at the end of life require significant amounts of care and support, even when the focus is comfort. Nearly all should be enrolled in hospice, in situations where admission is to be avoided. Successfully enrolling a patient in hospice care from the ED requires multiple steps (selecting a hospice, determining the level of care, sending documentation to the hospice), all of which can be greatly facilitated by the presence of an ED social worker.
5. *Palliative care availability for complex cases.* Palliative care is discussed in detail below.

All that being said, prognostication is an imperfect science and a tricky and humbling endeavor. It is not always possible in the first minutes to hours of a patient's ED stay to predict whether that person would benefit from a traditional hospitalization or whether mechanical ventilation, pressors, and other interventions will merely prolong the patient's dying process. Life-prolongation is understandably prioritized in the ED in many situations until more and better information becomes available.

Case Study: Alternative Care Pathway for Devastating Intracranial Hemorrhage (Transfer Evaluation Unit)

The Ochsner Health Main Campus, a 500+ bed tertiary/quaternary academic medical center, serves as a tertiary referral center for a large part of Louisiana and southern Mississippi. Accordingly, large numbers of patients with devastating intracranial hemorrhages are transferred to the site for formal neurosurgical consultation. While many patients have benefited from this transfer and subsequent rapid surgical intervention, a subset of these transferred patients have suffered intracranial bleeding so devastating that clinical recovery is impossible, regardless of the intervention delivered.

An interdisciplinary group of thoughtful ED, neurosurgery, neurology, palliative care, and neuro-critical care physicians came together to develop an alternative care pathway for patients with devastating intracranial hemorrhage. A care algorithm was proposed that allowed patients with very poor prognoses to receive high-quality end-of-life care and avoid an ICU stay that would not benefit them.

A new workflow has been created for these patients with suspected poor prognoses (Fig. 28.1). At the outside facility (at the point of the transfer

Fig. 28.1 Workflow for transfer evaluation unit. (© Ochsner Health)

request), neurosurgery reviews the clinical details and imaging studies and suggests that appropriate patients be designated as a TEU (transfer evaluation unit) patient. The neuro-ICU and ED teams are then notified about the incoming transfer. The patient's family is informed at the outside facility that the

prognosis is likely poor and that surgery is unlikely. The neurosurgical team examines the patient immediately after arrival to the ED and then formulates a plan and recommendation based on the patient's neurologic examination and imaging studies. If it is determined that the patient is not a surgical candidate and that overall recovery is very unlikely, the family is engaged in a goals-of-care discussion. Hospice care is offered. For families who accept hospice care, arrangements are made to transfer the patient to one of the three inpatient hospice units in the area. Nearly all of these patients are intubated. While some families are ready to move forward with a terminal extubation in the ED—and this is certainly available to those who want it—many need more time to gather family and friends to say goodbye. One hospice agency has agreed to accept the TEU patients while still on mechanical ventilation, as long as there are concrete plans for extubation within the next several days. This accommodation has allowed a large portion of TEU patients to benefit from hospice care and avoid a highly medicalized death in the ICU setting. When families are not ready to transition to comfort-focused treatment, the neurosurgical ICU admits the patients, and palliative care is consulted to assist with further discussions.

28.4 Palliative Care Consultation

Palliative medicine and supportive care at Ochsner are provided by a multidisciplinary team of health care professionals in the inpatient and outpatient settings. The teams offer pain and symptom management; navigate the complex health care system, including coordinating care between teams; and assist with the development of ACP documents. When entered in the EMR, these documents detail the patient's desired treatment goals so that the care proposed matches these goals. Palliative care is offered any time during a patient's illness regardless of curative intent and is often confused with hospice care which is palliative care at the end of life. Palliative medicine consultations should be considered at the request of the patient, family, or other health care team members. Consultation should be considered for a broad range of diagnoses and clinical circumstances (see Table 28.1).

28.5 Hospice Collaborations

Palliative care teams work collaboratively with hospice teams to provide the whole-person care necessary for a patient nearing the end of life. Hospice is both a plan of care and an insurance benefit provided for patients who seek aggressive symptom management when the disease is no longer curable. Patients are expected to have a 6-month lifespan if the disease follows the normal disease trajectory. Hospice is a Medicare benefit offered under Part A [12]. Other insurances model their benefit after Medicare. Unfunded patients are usually offered the same benefit provided

Table 28.1 Diagnoses and clinical conditions appropriate for palliative care consultation [8]

General medical diagnoses and conditions	New diagnosis of life-limiting illness needing symptom management and patient/family support Progressive metastatic cancer Declining ability to perform activities of daily living Difficult to control symptoms Family conflict regarding goals of care or appropriateness of treatment options Discussions about placement of feeding tube or long-term ventilation Two admissions within the last 3 months or admission from a long-term care facility
Specific referral recommended for cancer patients with	Stage 3 or 4 disease with progression despite treatment Decline in functional status Brain or spinal cord metastasis Hypercalcemia Progressive pleural/peritoneal or pericardial effusions
Specific referral recommended for patients with neurologic diseases/ disorders with	Moderate to severe cognitive impairment Consideration of feeding tube placement Status epilepticus longer than 24 hours Amyotrophic lateral sclerosis or other neuromuscular diseases for which mechanical ventilation is considered Any recurrent brain neoplasm Parkinson's disease with poor functional status or dementia Advanced dementia with dependence in all activities of daily living [11]

through philanthropy. Hospice provides a generous menu of benefits that is required of all hospice agencies licensed by the Centers for Medicare & Medicaid Services and each state: home care, respite care, continuous care, and inpatient care, with established criteria for the provision of each. The required elements of the hospice plan of care include the services of physicians, nurses, home health aides, social workers, chaplains, bereavement coordinators, and volunteers. Durable medical equipment and medications related to the patient's illness are also covered.

Ochsner Health works in collaboration with many hospice agencies in the community, several of whom run inpatient hospice facilities and are able to accept patients directly from the ED [13]. As has been reported elsewhere [5], avoidance of unwarranted inpatient admission can reduce observed inpatient mortality in this population, which in turn can favorably affect the risk-adjusted mortality index. It can also influence the mortality Patient Safety Indicator-4, failure to rescue, as many patients at the end of life would have diagnoses that trigger this metric.

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The Role of a Comprehensive Patient Flow Center in Optimizing Patient Outcomes

29

J. Kuo, A. Hebert, and S. Pepitone

As an ever-expanding, multifacility organization with a tertiary and quaternary care full-service hospital as the flagship, Ochsner Health has been on a patient flow quality improvement journey for many years. The importance of timeliness as a critical component of health care quality is widely recognized. However, transfer centers across the country have struggled to connect the dots on the impact of the transfer process on quality outcomes [1]. Over a decade-long period, Ochsner Health developed a state-of-the-art patient transfer center whose mission is to provide optimal access to health system resources. The impact of patient transfer operations on quality has been the driving motivation behind improving operational processes, streamlining clinical decision-making, and most importantly, the creation of the Ochsner Patient Flow Center (PFC).

Key Concept
The speed with which patients can be offered access to advanced health care resources is known to influence health outcomes. The development and operation of a state-of-the-art transfer center brings the opportunity to improve outcomes such as hospital mortality.

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29.1 Our Journey

Ochsner Health established the Regional Referral Center (RRC) in 2007 as a way for the health system's community hospitals to transfer patients to Ochsner – Jefferson Highway, the "Main Campus." These transfers were necessary due to the limited services available at many community hospitals. Staffed by two registered nurses (RN) around the clock, the RRC facilitated approximately 500 patient transfers that first year and grew to 1000 the following year. The next evolution was expanding the transfer process to all non-Ochsner hospitals in the region. This ignited the regional growth strategy and transfer volume soared to 8718 in 2015. As our number of facilities and, subsequently, transfers increased, it became evident that the standard approach to all facets of patient flow was antiquated.

29.2 Igniting Change

Two distinct catalysts prompted us to forge ahead on our journey towards the development of a comprehensive command center for patient flow. The first occurred in late 2017 when the RRC, in collaboration with Ochsner Health's Medical Informatics Department, sought to study the quality of care that transferred patients were receiving. The study was completed using the ratio of observed deaths to expected deaths [O/E ratio] or risk-adjusted mortality index (RAMI), a validated method to compare hospital death rates using billing data to account for differences in patient risk factors.

The original Ochsner Health analysis found the RAMI of 8000 transfer patients into the system to be 0.99, signifying that overall patient mortality outcome was comparable to national performance with actual mortality approximating expected mortality. However, when the data were segmented by the duration from transfer request to transfer arrival, the outcomes were quite concerning (see Fig. 29.1) and were consistent with findings reported by others [2]. Specifically, intensive care unit

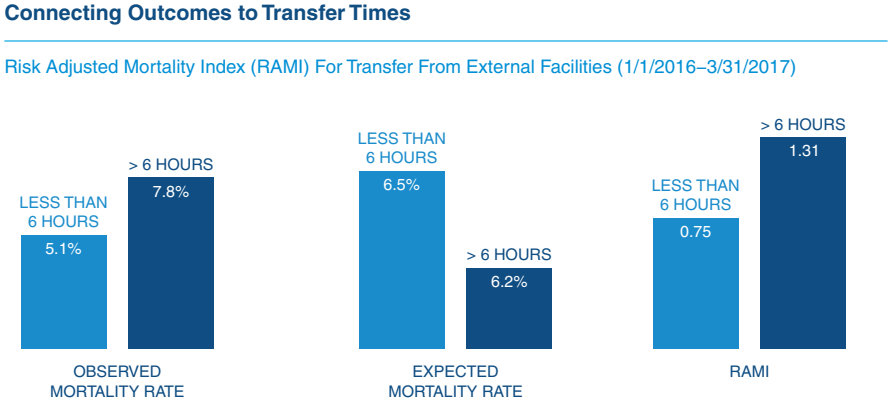

Fig. 29.1 Relationship between mortality and transfer efficiency. (© Ochsner Health)

(ICU) mortality and in-hospital mortality were found to increase for patients that encountered emergency department (ED) to ICU admission delays of more than 6 hours. For the patients arriving within 6 hours of the transfer request, the RAMI was 0.75. For the patients that exceeded 6 hours to arrive, the RAMI increased to 1.31. Simply put, the longer it took to transfer a patient from Point A to Point B, the higher the RAMI.

As transfer volume continued to increase, so did the complexity of the transfer process. These were some of the dimensions of this complexity. Which campus has the necessary services? Which campus has the bed availability? Which patient takes priority for available beds? The number of variables to solve for in the transfer process equation would occupy a mathematician for quite some time. It was difficult to imagine a nurse attempting to do so using pagers, phones, and faxes. The results of the RAMI analysis led to a significant philosophical shift from transferring patients and meeting higher level of care requirements to getting these patients to the appropriate level and location of care as soon as possible.

Shortly after this change in focus, our health system grappled with the greatest flu season since the 2009 H1N1 pandemic. The Centers for Disease Control estimated the 2017–2018 flu season caused 810,000 hospitalizations across the country [3]. The New Orleans region was greatly impacted by this, along with the bed capacity at all hospitals within Ochsner Health. On January 10th, 2018, the organization and all of its facilities reached maximum capacity and all patient movement came to a halt. There were 57 admitted patients holding and awaiting hospital admission in emergency departments across our health system. On that day Ochsner had committed to accepting 21 additional transfer patients but did not have the capacity to admit them. There were another 40 patients in outside facilities that required transfer for a higher level of care that could not be accommodated. This forced a deeper dive analysis which resulted in an important and concerning discovery. There was an obvious imbalance across the healthcare system. Several community hospitals never held patients in their emergency rooms overnight, hospitals were transferring patients out due to capacity concerns, hospital diversion requirements varied substantially from campus to campus, and many "unstaffed" beds were available without anyone having knowledge. The problems were obvious, yet the solutions were very complex. After a decade of operating as a health system and a transfer center, the RRC had to go back to the drawing board.

29.3 Solving the Problems

Improving transfer time was the driving factor to begin building the framework for Ochsner's Patient Flow Center. From here, our journey led us to visit other organizations across the country that were considered leaders in patient throughput and capacity management. With each healthcare system we visited, we identified aspects of patient flow that we felt represented best practice [4]. This concept has previously been reported. Using these insights, RRC leadership proposed a bold, comprehensive

Table 29.1 Critical success factors for an Ochsner Health Patient Flow Center

Investment in system infrastructure: Centralized bed management, high tech patient flow center (PFC), and an in house physician staffing model
Rebuild all internal processes: Standardization across all Ochsner campuses, develop operational standards, and develop cross system communication including the PFC
Driving the culture shift: Lead the project as executives, remove all internal barriers, and drive the buy in and engagement.

solution to the executive and physician leadership group in February 2018 using a multifaceted approach (see Table 29.1).

All of the tasks were immediately approved with a target go-live date of November 1st, 2018, before the upcoming flu season. It is nearly impossible to recount all the work that transpired over the next 8 months here. Therefore, we will focus on the high points.

PILOT The first initiative was to transform the physician acceptance process, which was a major cause of transfer delays. The Patient Flow Center (PFC) hired and trained hospital medicine physicians to be the facilitator of all internal medicine and internal medicine subspecialty transfers as the Physician in Lead of Transfers (PILOT). The PILOT's primary objective is to facilitate the acceptance of patient transfers while positively impacting the quality of care these patients receive preceding the transfer, during transport, and even after the transfer is complete. The PILOT has the authority to accept all medicine transfers (including critical care) to any Ochsner Health hospital in the system. Prior to the transfer, the PILOT has adequate time to review the medical record and to have a detailed conversation with the sending physician, in order to have a comprehensive understanding of the patient's condition. With this information, the PILOT can provide consultative medical management advice as well as designate a patient acuity level. Frequently, this consultative advice leads to medical treatment that conforms to the standard of care prior to and during the transport. The PILOT's acuity level designation assists the Patient Flow Center in stratifying which patients must arrive at the accepting facility within a pre-determined time. The PILOT also documents a detailed transfer acceptance note into our electronic medical record (EMR) and engages in a thorough conversation with our admitting physician, leading to a decrease in patient handoff errors.

Centralization Three major areas were centralized during the project: bed control, patient transportation, and psychiatric patient placement. To completely streamline all patient movement, especially transfers, it was imperative to shift to a centralized bed management solution in the PFC. The decentralized, siloed model saw each campus with its own bed assignment processes, many of which used manual phone calls and several hand-offs. The PFC designed an automated approach leveraging our EMR. Having dedicated bed planners and streamlined workflows led to immediate results in bed assignment time. This resulted in reductions in ED admit length of stay, postanesthetic care unit length of stay, and speed of transfer placement.

A major issue causing ED backlog was psychiatric patient holds. Traditionally, the ED staff at each facility worked independently to place their psychiatric patients in behavioral health facilities across the region. Not only did this take valuable time away from front-line clinical duties, but it delayed the process during busy times in the ED. The project work groups decided that the solution to this was creating a Behavioral Health Transfer Center (BHTC) team dedicated to completing this function for all Ochsner Health hospitals.

Lastly, another challenge to efficient patient movement was transportation delays. All transportation had previously been arranged locally by case managers or unit secretaries. With the system scheduling over one hundred patient transports a day, there was an obvious burden on patient facing staff and vendors coordinating this via phone calls. In mapping out the ideal state of this process, the PFC project team developed quite possibly their most innovative solution yet. Any Ochsner team member could request a ride for their patient simply by entering an order in the EMR. This order triggers an alert to the transportation dispatcher in the PFC, who then uploads the ride request into an online portal where transportation vendors can accept the request.

SPACE Since time was so valuable in effecting optimal patient outcome, we realized we needed to create an environment and a team that could work more efficiently. Many considerations entered into creating the physical space for our PFC. The location was carved into a pre-existing Ochsner building about a mile away from our main campus. This was a purposeful design to minimize unnecessary distractions. Badge swipes were installed so that only the necessary personnel could enter. A circular floor plan was chosen to promote constant communication with accessible collaboration surrounding each individual. This design, along with strategic seating assignments, placed every team member in the middle of the action and provided appropriately distributed situational awareness. An open ceiling along with carpeted floors helped with sound absorption. Workstations were equipped with height adjustability allowing for ergonomic benefits and dashboard visibility.

TEAM Building the right team for these responsibilities would shape the future of patient movement for our entire healthcare system. Historically, most of the work was done by registered nurses (RN). To ensure a budget-conscious staffing model, we incorporated others into the mix. With thousands of telephone calls each month, it wasn't necessary for a nurse to be on every call. We blended in licensed practical nurses amidst the RNs on the transfer team. We hired recent college graduates with strong analytical minds to handle bed planning for all the community hospitals. Lastly, we hired coordinators (people in college or nursing school) to staff the BHTC team. One site we visited (Johns Hopkins) took a similar approach to staffing its command center to improve patient flow. They utilized a unique combination of skill sets to hire employees for bed management, access line, and admitting [5].

29.4 Results of the System Patient Flow Center (Fig. 29.2)

With several of the workflows already live, the Patient Flow Center opened its doors in the fall of 2018. Over the ensuing weeks, the remaining processes were rolled out across the Ochsner Health system. The improvements far exceeded expectations. From a bed planning perspective, we saw emergency department admit length of stay reduced by an average of 47 minutes systemwide, with one larger campus seeing a nearly two-hour improvement (see Fig. 29.3). The shortest reduction in psychiatric patient holds was 40 minutes at Main Campus, with two other campuses seeing over a 90-minute reduction. All the streamlined workflows on the transfer process resulted in a 37% reduction in incoming call volume despite increasing transfer volume.

Fig. 29.2 Ochsner Health Patient Flow Center showing cross-disciplinary staff working together in a common, intentionally designed space (depicted here are physician, nursing, case management, and administrative staff). (© Ochsner Health)

Emergency Department Admit Length of Stay:

	Admit LOS		
	Pre	Post	VAR
Baptist	360	303	-57
Baton Rouge	563	440	-123
Kenner	494	429	-65
OMC	478	473	-5
OMC-NS	289	290	1
Westbank	411	347	-54

Emergency Department Psych Patient Average Length of Stay:

	PEC ALOS		
	Pre	Post	VAR
Baptist	298	256	-42
Baton Rouge	280	236	-44
Kenner	323	225	-98
OMC	395	355	-40
OMC-NS	250	191	-59
Westbank	344	254	-90

Fig. 29.3 Improvement in emergency department length of stay for patients awaiting in-patient psychiatric admission and/or transfer. LOS Length of Stay, OMC Ochsner Medical Center ("Main Campus"), OMC-NS Ochsner Medical Center Northshore (Community Hospital), VAR Change from Pre-PFC operation, Pre Pre-PFC operation, Post Operation after establishment of PFC, PEC Physician emergency commitment (psychiatric patients). (© Ochsner Health)

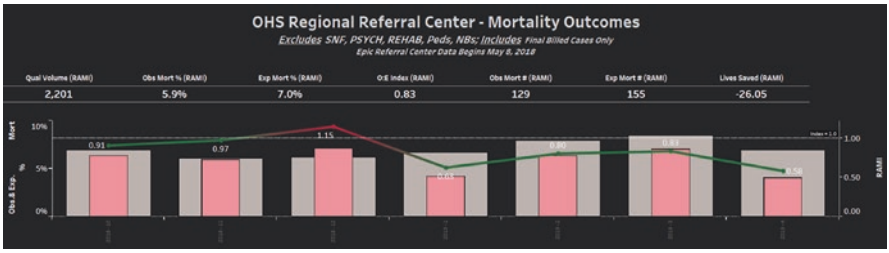

Fig. 29.4 Improvement in risk-adjusted mortality for transfer patients. (© Ochsner Health)

From a quality perspective, we believe that improved efficiency and resource utilization in conjunction with the contributions from the PILOT positively impacted the quality of care that transfer patients receive. More specifically, we observed decreases in the RAMI of our transfer population (see Fig. 29.4). Our preliminary data has been extremely promising. Since our comprehensive Ochsner Patient Flow Center go live and the initiation of the PILOT program, nearly all of our facilities within the Ochsner Health system have seen a transfer patient RAMI improvement. Overall, there has been a 7% decrease in RAMI of our transfer patients across the system. At our flagship facility, patients admitted via a PFC-facilitated transfer have experienced a notable 19% improvement in RAMI, which translates into many actual lives saved.

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Part IV

Specialty Populations

Mitigating the Impact of COVID-19 on Quality and Value

30

A. Schubert, K. Gilkey LeBlanc, and S. Warren

The impact of the COVID-19 pandemic on hospital care quality operations and reporting is substantial. It can be understood in several interlacing contexts. The authors experienced them as members of the care and leadership teams directly managing large "surges" of COVID-19 patients in one of the United States' early COVID "hotspots," the Greater New Orleans area. These contexts are operational, regulatory, documentation and coding, as well as cultural.

30.1 Leadership Impact

The overarching principles our facility and medical staff leaders communicated and followed was to "protect our team members, our patients and our community." We placed an early high emphasis on protecting care team members because we knew that, without them, we would be able to protect neither our patients nor our community. From these principles flowed our actions that resulted in changes in how our teams needed to work, how we adjusted the structure for our care, and how we interacted with our community.

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30.2 Structural and Operational Impact

During the height of the early 2020 COVID pandemic affecting the New Orleans area, Ochsner Medical Center became the area's largest recipient of COVID hospitalizations. At the busiest time, over 90% of staffed hospital beds were devoted to the care of COVID patients. ICU capacity had to be doubled in a matter of 2–3 weeks. Large-scale redeployment of medical and non-medical personnel needed to be managed to bring resources to COVID inpatient care and post-acute care from elective procedural and outpatient clinical areas.

Initially, quality department personnel were also redeployed to clinical areas. Infection preventionists were working exclusively to support the day-to-day needs of clinical areas with respect to COVID isolation and personal protective equipment (PPE). Reporting and analysis of hospital-acquired infection events, as well as other events such as hospital-acquired pressure injury, declined dramatically. Still, health system resources were able to summarize information received via our incident reporting systems although the number of total self-reported events declined to about 50% of pre-COVID volume. For several months our senior leader unit safety rounding program (about 15–20 such roundings monthly) was suspended. Also put on hold were twice monthly unit quality leadership meetings where we review performance improvement data and projects. These temporary suspensions occurred because of our leaders' singular focus on managing the pandemic in the hospital.

To protect our care team members, we quickly moved to reconfigure existing spaces into closed units for the care of COVID patients. For the same reason care interactions were bundled which reduced the frequency of patient touches for our nursing, respiratory and physical therapy personnel while still ensuring basic care necessities. Practices such as "hourly rounding," "q 2-hour turns," and q 4-hour changes in endotracheal tube position were affected. Similar practices have been reported by other organizations [1]. Specialty processes of care have also been reported to have been severely impacted during March of 2020, for example with regard to best practice for hip fracture, with worse 30-day mortality [2]. Hospital and ICU mortality outcomes for non-COVID patients were observed to worsen in a retrospective cohort study [3].

30.3 Community Impact

As mentioned, we approached every decision through the lens of protecting our caregivers, our patients, and our community. State-mandated pandemic lockdowns, facility visitation restrictions and the general reluctance to visit in person lead us to expand telemedicine video visits >400-fold to be able to continue to connect to our patients. Recognizing that our patients and families were so deeply affected by limited or no visitation, we developed Video Family Connect (providing secure tablets to patients to connect with families). Patient experience

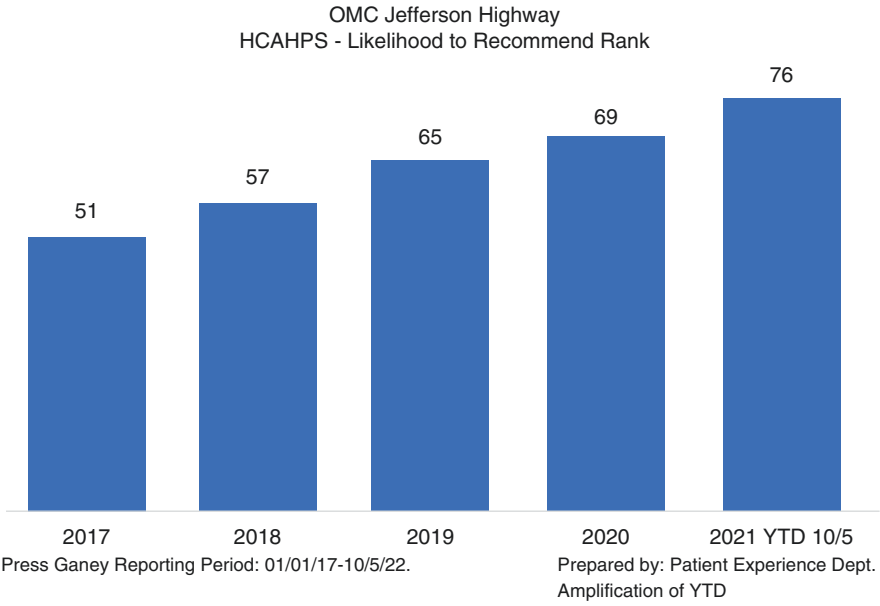

Fig. 30.1 Our hospital's patient experience metrics through the pandemic. HCAHPS Hospital Consumer Assessment of Healthcare Providers and Systems. YTD Year to date. (© Ochsner Health)

continued to improve during the pandemic (see Fig. 30.1) and we now routinely provide tablets for family members unable to be physically present to support a hospitalized patient; telemedicine visits continue to represent 10% of total visit volume.

To serve community members who deferred health-altering care during lockdowns and who sought routine care, we quickly designed and executed a campus-wide "Safe to Return" program. We knew from patients and families that they wanted to return if their safety was assured. Working with our patient and family advisory board, medical staff, clinic, and hospital leaders, we instituted cleaning, decluttering, and refurbishing actions. This included the redesign of waiting areas for social distancing, mobile check-in, parking-lot waiting, low/no-touch technology (e.g., for door opening), expanded temperature check-in stations, a communication campaign including visible social distancing reminders, and PPE provision (we partnered with local suppliers – a commitment that continues even now).

To protect our patients and community we carefully considered the need for our hospital and clinic staff to be vaccinated against COVID. Based on input from patients, families, community, state health department, and our employees, we proceeded to require vaccination because of the benefits to patients and families that would result from reducing asymptomatic transmission. Additional benefit accrued form an all-vaccinated staff that was more available for patient care and from enhancing peace of mind for individual care team members, patients, and family.

30.4 Countermeasures: Complications and Clinical Acuity Monitoring

It is fair to say that, during the 3 months of COVID "hotspot" activity (March–May 2020), the hospital's performance improvement capabilities had been impacted severely. Given the challenges faced by our teams, we instituted several countermeasures including the following:

- Daily reinforcement of safety protocols.
- Deployment of visual aids and succinct safety protocol manuals at the bedside.
- Intensified communication and increased awareness of medical staff.
- Deployment of a medical staff skin integrity team.
- Adoption of special technology for continuous patient monitoring and skin protection.
- Adoption of "safety stand-down" methodology to counter safety threats quickly, such as CLABSI and *C. difficile* infections.
- Requirement of COVID vaccination for hospital staff.

Despite the challenges of reduced nursing interactions with patients and patient mobilization our medical staff volunteered to counteract some of the effects through special redeployment. Two plastic surgeons and a nurse practitioner working with them were integrated into a "Medical Staff Skin Integrity" team led by our medical director of wound care. This group of volunteer redeployed clinicians rounded twice weekly on all floors of the hospital, inspected patients at risk for hospital-acquired pressure injury (HAPI), communicated with the charge nurse, and directed skin care interventions as needed.

As has been reported in other hospitals, more device-related skin pressure lesions were being noted early during the high COVID activity. Formal analysis could not be undertaken until redeployment had largely ceased. However, it became clear from the ensuing analysis of all PSI-3 events that, even after the early high-COVID months, a greater proportion of coded PSI-3 events were related to COVID-related therapy and positioning. In particular, we identified increasing and prolonged use of continuous positive airway pressure (CPAP), bilevel positive airway pressure (BIPAP), and proning therapies as contributing factors, similar to what has been reported elsewhere [4].

Our analysis showed that the observed increase in device-related skin injuries was largely related to the extensive use of CPAP and BIPAP in COVID patients, as well as to the practice of proning patients for up to 18 hours to improve oxygenation. We encountered skin lesions in areas previously rarely seen, such as the bridge of the nose, the cheeks, the pinna of the ear, chest, and knees. Countermeasures employed by our teams included the application of a protective film under face masks, use of occlusive face masks covering a larger part of the face (vs. just mouth and nose), and improved prone positioning devices. In addition, we returned to the standard schedule for changing the position of endotracheal tubes. An all-out effort was also made to alternate high flow oxygen therapy with BIPAP whenever

clinically tolerated. The need for such measures is echoed by the nursing quality team from Rush Medical Center [1], who innovated with a new COVID-19 CLABSI (central line-associated bloodstream infection) tip sheet and a prone positioning kit for HAPI prevention. Following these care innovations, this team saw improvement in hospital-acquired infections and a return to the pre-COVID activity of care.

Key Concept
During the time of the first COVID surge quality personnel were re-deployed and care activities changed substantially. Surveillance of quality indicators based on administrative data, such as PSI-3, provided an early glimpse of the challenges associated with the care of COVID patients.

Other common hospital-acquired infections have been associated with COVID-19. More than 50% of patients with severe or critical COVID infections requiring hospital care developed secondary infections of the bloodstream, respiratory or urinary systems [5]. A number of reports highlight that COVID patients are at higher risk of developing *C. difficile* infections. This was attributed to the widespread use of empiric broad-spectrum antibiotics [6] for bilateral pulmonary infiltrates, at least early on during the pandemic [7, 8]. In addition, patients who survived hospitalization for COVID may be at risk for late *C. difficile* colitis [9]. Similarly, outbreaks of multidrug-resistant organisms have been reported during high COVID activity in US hospitals, such as Acinetobacter [10], which was attributed to changes in infection control practices due to PPE shortages.

To ensure enhanced monitoring for clinical deterioration, we rapidly expanded continuous vital signs monitoring in the hospital to 5 additional hospital units. Deployment and implementation activities of the ViSi® Mobile system were handled remotely except for physical equipment installation and training clinical teams. In this rapid implementation our Innovation, Information Systems, Operations, Supply Chain, and Facilities teams collaborated to complete equipment installation, staff training, and technology deployment for 174 additional beds over 5 weeks, a task that normally would take months. Clinical care teams viewed the new system favorably with quick adoption. We believe the expansion of continuous vital signs monitoring to be one of the reasons why hospital mortality declined rapidly during successive COVID surges.

30.5 Understanding COVID-19 Related Documentation and Coding Changes

As mentioned, our hospital began to see an exponentially increasing number of COVID-19 patients beginning in early March 2020. By the end of March 2020, the majority of our 500+ hospital beds were occupied by patients with this new disease. The first challenge that our CDI and coding teams faced was the absence of an

appropriate ICD-10 code for the disease. The new COVID-19 codes were not released by CMS until April 1, 2020. Preoccupied with creating new COVID isolation units and creating nearly 100 additional ICU beds to accommodate the most critically ill COVID patients, our quality and documentation excellence teams began to assess the impact of this wholesale change in our hospital's inpatient population.

As of April 1, 2020, two main codes were used for patients admitted for COVID-19 disease. They are U071 for reasonably well confirmed COVID-19 disease and Z20828, denoting contact with and (suspected) exposure to other viral communicable diseases. Learning to implement accurate assignment of the patient's principal diagnosis became a priority as allocation of resources might be impacted. A patient identified in the medical record as having only exposure to the virus would be assigned a substantially different level of resources and payment compared to a patient who had COVID-19 disease. Yet, early on, many patients had documentation that, because of testing availability and accuracy gaps, was not definitive with regard to the COVID diagnosis. Therefore they frequently carried the Z code despite a clinically fully developed picture of COVID-19 disease. We also knew that uninsured patients might receive payment through the Health Resources and Services Administration (HRSA) Uninsured Testing and Treatment Fund, which requires a correctly assigned diagnosis.

Risk adjustment for COVID-19 was not available in the IBM Watson outcomes reporting model we were using at the time. Instead, as the year progressed, we began relying on the Vizient risk adjustment model which started to incorporate COVID disease during this time, eventually allowing us to compare risk-adjusted outcomes. It was known that the code U071 would impact expected mortality significantly, while the history code Z20828 would likely not.

One of the first clinical documentation insights came with the realization that, in the early weeks, testing for the COVID-19 virus was not reliably available (tests had to be sent to the Centers for Disease Control and other remote laboratories) and was severely delayed in many cases. Provider documentation frequently indicated the absence of a definitive diagnosis. Another insight was the frequent observation of what clinicians deemed falsely negative COVID test results.

It therefore became clear that accurate documentation would be critical for many reasons. Despite many distractions during the first wave of COVID in New Orleans, by May 2020 our team had developed a program for training and compliantly querying our medical staff for greater documentation accuracy for COVID patients (see Fig. 30.2). This included tip sheets for the medical staff as well as briefings with departmental documentation champions and a specially designed medical record query (Fig. 30.3).

The existence of a previously established well-functioning collaboration between clinicians, performance improvement, CDI, and coding professionals was key to developing timely awareness of the issues presented by the rapid replacement of our traditional inpatient population with COVID-19. Despite huge challenges, the team was able to mount an effective response, develop compliant guidelines and queries, and achieve more accurate documentation over a short timeline.

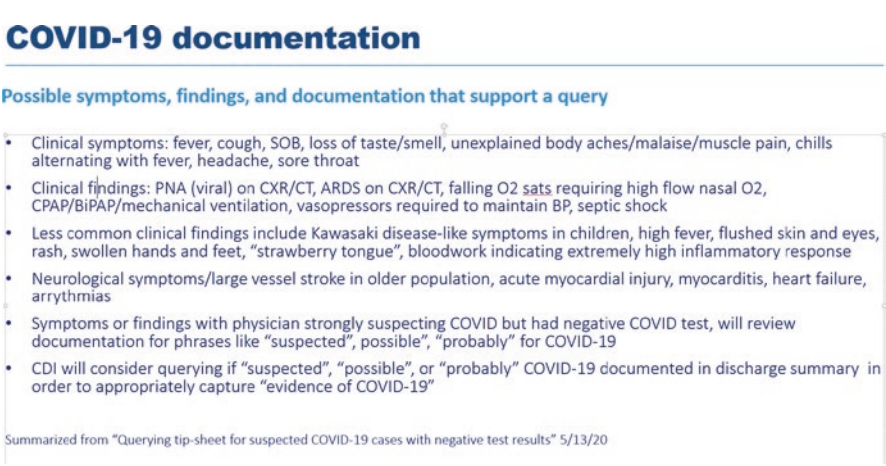

Fig. 30.2 Collaborative team COVID-19 pandemicdocumentation and coding changesconsensus developed to identify conditions whose presence in the medical record would justify a physician query. SOB Shortness of breath, PNA Pneumonia, CXR Chest X-ray, CT Computed tomography, O2 Oxygen, BP Blood pressure, CDI Clinical documentation improvement team. (© Ochsner Health)

Provider, please clarify the diagnosis:

[ ] Evidence of Covid-19 infection despite negative nasal swab, patient treated and managed per COVID protocol

[ ] Most likely not COVID-19, but cannot rule it out, therfore patient was treated and managed to cover the less likely possibility of COVID

[ ] Other (Specify): _____

[ ] Clinically undetermined

Fig. 30.3 Example of a physician query to clarify the medical record when clinical indicators of COVID-19 exist in the presence of a negative COVID-19 test. (© Ochsner Health)

30.6 Regulatory Mitigation

CMS extended waivers for health care organizations during the height of the COVID crisis. These waivers were covered under the COVID-19 Emergency Declaration Blanket Waivers for Health Care Providers (2020) and were aimed at loosening regulatory requirements to facilitate patient care during the pandemic. These waivers covered nearly every aspect of patient care and included flexibility for Telehealth services, EMTALA (Emergency Medical Treatment & Labor Act) obligations, verbal order acceptance, discharge planning, medical staff credentialing and privileging, and modifying the physical environment to meet patient needs without additional approvals [11].

Our organization participated in applicable CMS waivers while also adhering to guidance from our state health department; nursing units were converted to negative pressure to facilitate care of the COVID patient, additional units were built out within 4 weeks. Innovative staffing models were utilized to ensure patient care was optimized during the crisis and visitation policies were adjusted to assure safety.

Similarly, state agencies such as the Louisiana Department of Health reduced their survey burden to ensure safety of their survey teams as well as the organization. Patient complaints were handled through an administrative process, allowing the organization to respond in writing rather than undergo an on-site survey.

30.7 Impact on Patient Care Team Culture: Resetting Leadership Priorities and Competencies

During the height of the COVID crisis, several changes in care delivery were necessary, as outlined above. We found that these had become part of our caregiver culture despite the fact that we now have only a small fraction of our hospital beds occupied with COVID patients. These changes were made with the best intention to protect both patients and personnel. When escalating PPE usage rates became a factor of concern, our facility began to cohort patients on closed units who cared exclusively for COVID patients. This allowed a notable improvement in the availability of PPE, and the ability to continue to follow isolation practices for other infections.

With fewer patients and more plentiful PPE, it is now possible to return to the customary practices in place prior to the COVID surge. Across our 500+ bed hospital, we have initiated a "Reset" program that is intended to secure commitments from nursing units and provider groups caring for inpatients to "reset" their knowledge, skills, and competencies to prevent hospital-acquired conditions. This recommitment was driven by patient-facing personnel who were reviewing the quality performance metrics on their own units. Each unit chose one or two areas (such as CLABSI prevention, skin injury prevention, or prevention of clinical deterioration) to improve on. The unit-based CUSP (Comprehensive Unit-based Safety Program) or unit-based council teams chose the specific skills and competencies to refresh. Medical and surgical departments shared a common set of informational slides and clinical scenarios among their provider staff. Each scenario was designed to maximize learning engagement. Questions were made available through e-mail and organizational social media. They have generated substantial interest with responses from hundreds of team members. Early indications are that this "resetting" is in fact having a beneficial impact. Resetting activities for the prevention of central line infections were among the first to take hold. In each of the months following the beginning of the "Reset" we have seen fewer CLABSI events and are much closer to zero now for the entire hospital. Likewise, floor codes have decreased in a unit where nurses re-committed to their skills to recognize early clinical deterioration from respiratory, infectious, and cardiac causes.

During the recovery phase from the initial COVID surge, our leadership's approach reflected the themes in a recently published consensus statement [12]. We prioritized acknowledging staff for their extraordinary contributions, celebrating successes, and supporting their well-being. We studied, in real time, emerging facts from credible sources to understand the pandemic locally and globally; we developed a prediction model allowing us to make informed projections regarding resource needs. We established protocols and contingency plans to prepare for

future surges. We communicated our priorities, stating our commitments to caregivers, patients, and our community. This included dealing with pent-up demand for paused services while continuing our focus on regular communication to provide safety information and recommendations to our patients, families, and care teams.

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Opportunities Offered by the American College of Surgeons National Surgical Quality Improvement Program (NSQIP)

31

C. B. Whitlow, R. Brown, A. Teagle, S. R. Hart, S. R. Money, and S. F. Bardot

The American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP®) is a nationally validated, risk-adjusted, clinical outcomes-based program [1]. It aims to measure and improve the quality of surgical care by helping hospitals to improve surgical care through the use of risk-adjusted clinical data. NSQIP envisions that engaged program participation will assist hospitals' lead in providing high-quality, effective surgical care. NSQIP collects data from participant hospitals, risk-adjusts the outcomes data, and provides benchmarking reports every quarter, though the reporting lag can be 6–9 months. NSQIP cases are selected using a systematic sampling process from several subspecialties, including colorectal surgery (CRS), neurosurgery, ear nose and throat (ENT) surgery, thoracic surgery, vascular surgery, urology, orthopedics, plastic surgery and general surgery. Data inputs are not derived from billing data but are abstracted from the medical record by meticulously trained and ACS-certified personnel. NSQIP uses an extensive library of standard data definitions.

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31.1 Experiences and Opportunities with NSQIP-Inspired Quality Improvement

In 2013, Ochsner's main academic medical center began its participation in NSQIP, collecting approximately 3200 cases each year. Risk-adjusted outcomes reports are dispersed to chairs of appropriate surgical departments each quarter. Additionally, dashboards are created using non-risk-adjusted data and shared broadly. Section champions were identified within each surgical group to facilitate sharing their specific outcomes, often working directly with the NSQIP team to initiate surgical quality projects. The Surgical Quality and Safety Committee was created to provide an outlet for quality improvement discussions. Frequently, departments learn and adopt initiatives from other successful departments. This fosters a strong culture of organizational learning and patient safety at our medical center. In the following, we describe a number of experiences from our surgical groups that arose from review of NSQIP ISAR (Interim Semiannual Report) and SAR (Semi-Annual Report) reports.

Colorectal surgery and surgical site infections (SSI) When our first full-year NSQIP data became available, we saw opportunity for improvement in SSI for colon and rectal surgery. Our surgeons considered the NSQIP methodology to be a believable and high-quality source of clinically relevant data. This understanding then spurred a level of engagement that motivated the group to work together to find a solution for improvement. Prior to the availability of NSQIP data, it had been difficult to obtain reliable data and engage medical staff in a collaborative approach to reduce SSI. Like their peer groups, our six colorectal surgeons elected to develop a bundle based on best available evidence, realizing that data with the highest grade of evidence (prospective randomized controlled trials) would not be available for all bundle components.

Preoperative bundle components included allowing clear liquids up to 2 hours before surgery, using mechanical and antibiotic bowel prep, and creating standardized orders to facilitate implementation. We received input from our Infectious Disease Department to standardize intravenous antibiotics based on national guidelines and our hospital's antibiogram. These recommendations were included in our standardized preoperative order set. We further committed to an intraoperative bundle that includes the use of a wound protector for open colorectal cases and the use of a new set of clean instruments, gowns, and gloves for abdominal wound closure. Adherence to the bundle components was measured.

Adoption of and adherence to this care bundle resulted in a substantial and sustained decrease in SSI (Fig. 31.1).

At the same time, we experienced some predictable challenges. The Ochsner Department of Colon and Rectal Surgery performs the large majority of elective colon resections at our institution; cases done by surgeons outside of this department did not always follow the same process, accounting for residual variation in care. Tracking bundle compliance was a manual process and thus not sustainable.

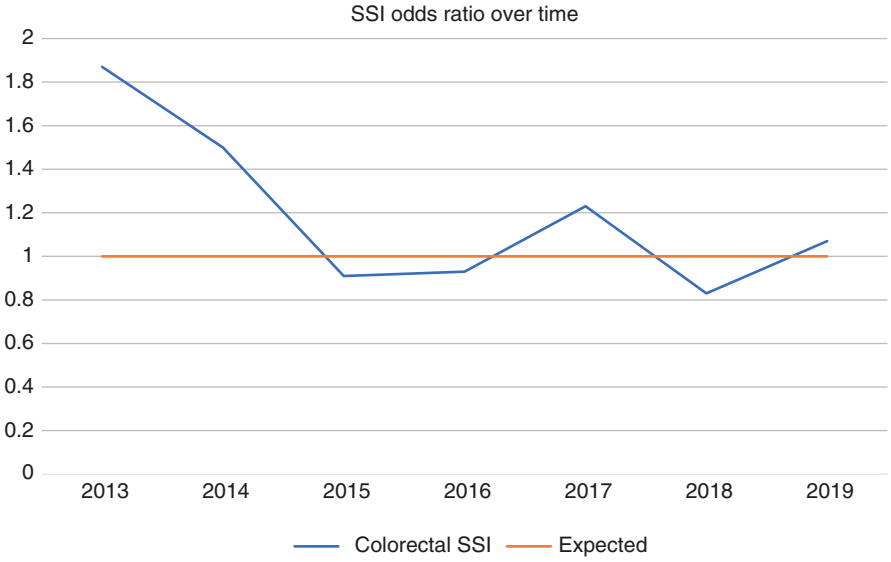


Fig. 31.1 SSI rate improvement with implementation of CRS bundles. (Based on SAR outcomes report provided by NSQIP). (© Ochsner Health)

The change from NPO (nothing by mouth) after midnight to allowing oral clear liquids up to 2 hours before surgery was especially difficult as patients sometimes received conflicting written and verbal instructions from multiple sources. We also realized that our bundle implementation process would need to allow for a review and updating, as new evidence emerges and recommendations for additional bundle components are made.

Urological surgery Standardizing the use of prophylactic antibiotics for prostatectomy reduced postoperative urinary tract infections (UTIs) (see Fig. 31.2). To improve recovery length of stay and respiratory complications, urologists also implemented opioid-limiting protocols for prostatectomy and nephrectomy cases in the 2015–2016 time frame.

General surgery Our Department of Surgery has embraced the use of NSQIP data fully. Quality data from this source is perceived as a well regulated and quality controlled. The understanding that the NSQIP program has been validated across many surgical specialties has helped with team engagement. Furthermore, NSQIP data have served as an internal check on administrative quality data reporting; this has frequently allowed for additional insights and is a sounder basis for quality improvement efforts.

Identification of NSQIP percentile outlier performance has sparked ideas for areas of improvement within the subspecialties in the Department of Surgery. NSQIP quality data reports allow for use as a regular "thermometer" for monitoring

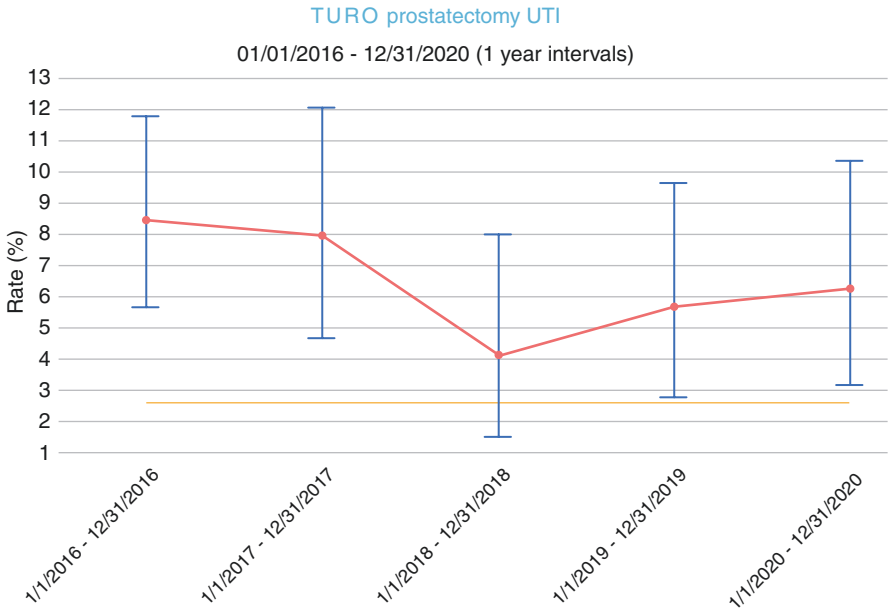


Fig. 31.2 Post-prostatectomy UTI improves after prophylactic antibiotic intervention. (Based on NSQIP on-demand risk-adjusted and smoothed rate report). (© Ochsner Health)

where the group's quality performance falls quarter over quarter. The data also allow comparisons with other hospitals and health systems in the NSQIP community both as a group (see Fig. 31.3) and for specific procedures (Fig. 31.4).

Other advantages perceived by this group include that NSQIP potentially allows for identification of problem areas earlier than may be possible by monitoring some publicly reported data sets using administrative data. In addition, NSQIP allows for participation in national clinical trials in efforts to improve patient care. Participation in the NSQIP community also affords opportunities for research using the larger data sets in the entire NSQIP registry encompassing data from many hundreds of hospitals.

To improve infectious complications after Whipple procedures, processes for intraoperative cultures and improved antibiotic selection were introduced. Following these interventions, SSI rates improved to the expected level (see Fig. 31.5).

Standardized management of urinary catheters Review of NSQIP data showed variation in urinary tract infection outcomes for surgical patients. We instituted a standardized nurse-driven protocol for urinary catheter management and removal in 2017 (Fig. 31.6). We agreed on exceptions to this protocol, such as those that are part of the colorectal surgical perioperative pathway for pelvic dissection cases. Catheter-associated urinary tract infections (CAUTI) and bundle compliance metrics are reported weekly for each nursing unit. CAUTI rates and events have been

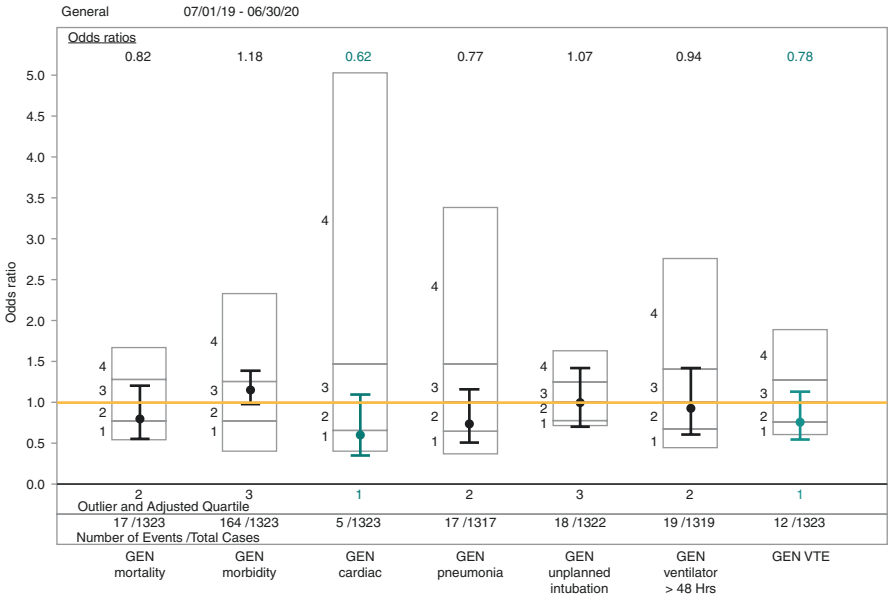
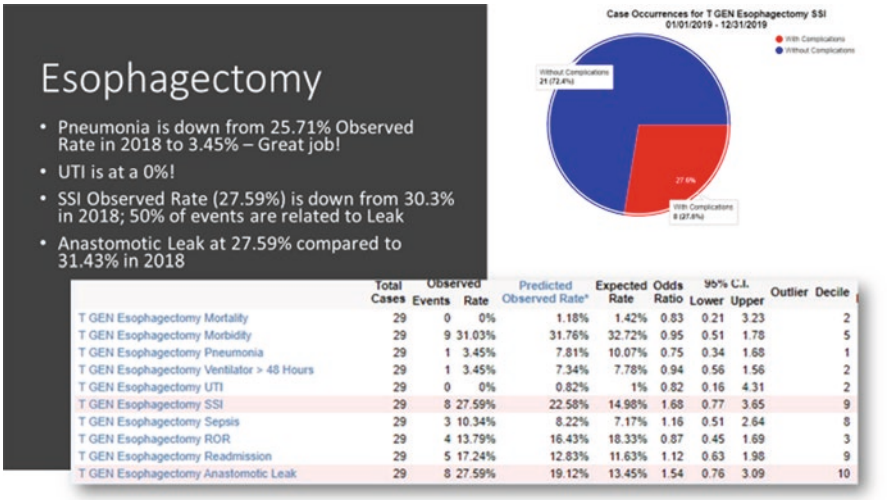


Fig. 31.3 Bar plot graph for general surgery outcomes (2020 NSQIP SAR). (© Ochsner Health)



	Total Cases	Observed Events	Observed Rate	Predicted Observed Rate*	Expected Rate	Odds Ratio	95% C.I. Lower	95% C.I. Upper	Outlier	Decile
T GEN Esophagectomy Mortality	29	0	0%	1.18%	1.42%	0.83	0.21	3.23		2
T GEN Esophagectomy Morbidity	29	9	31.03%	31.76%	32.72%	0.95	0.51	1.78		5
T GEN Esophagectomy Pneumonia	29	1	3.45%	7.81%	10.07%	0.75	0.34	1.68		1
T GEN Esophagectomy Ventilator > 48 Hours	29	1	3.45%	7.34%	7.78%	0.94	0.56	1.56		2
T GEN Esophagectomy UTI	29	0	0%	0.82%	1%	0.82	0.16	4.31		2
T GEN Esophagectomy SSI	29	8	27.59%	22.58%	14.98%	1.68	0.77	3.65		9
T GEN Esophagectomy Sepsis	29	3	10.34%	8.22%	7.17%	1.16	0.51	2.64		8
T GEN Esophagectomy ROR	29	4	13.79%	16.43%	18.33%	0.87	0.45	1.69		3
T GEN Esophagectomy Readmission	29	5	17.24%	12.83%	11.63%	1.12	0.63	1.98		9
T GEN Esophagectomy Anastomotic Leak	29	8	27.59%	19.12%	13.45%	1.54	0.76	3.09		10

Fig. 31.4 NSQIP feedback on esophagectomy performance. (© Ochsner Health)

reduced almost every year using this approach. The overall rate of postoperative UTIs has decreased since protocol implementation and is approaching benchmark (Fig. 31.7).

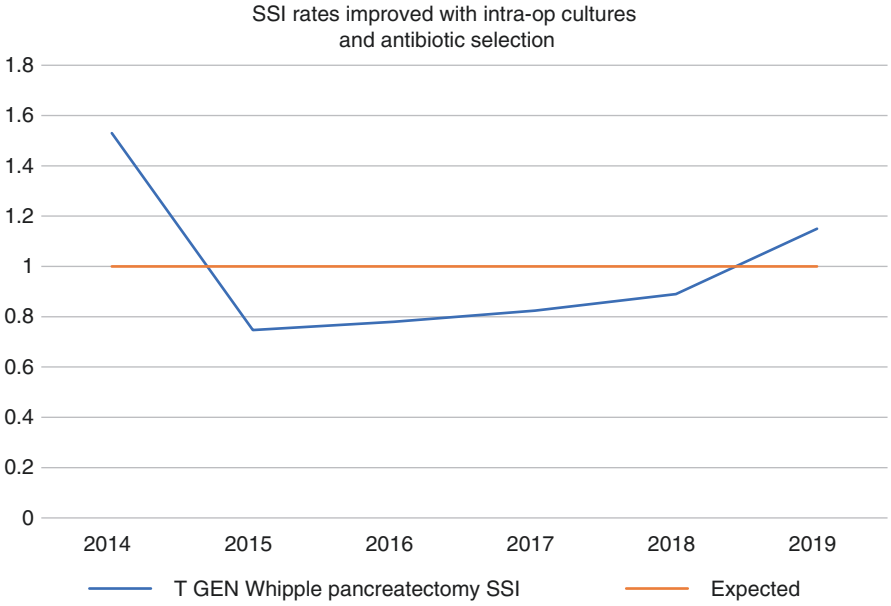


Fig. 31.5 SSI rate after Whipple procedure improves postintervention. (Based on SAR outcomes reports provided by NSQIP). (© Ochsner Health)

Postoperative cardiac complications Review of NSQIP data showed opportunity for improvement. Collaborative case review of approximately 25 records by cardiologists and anesthesiologists showed that most of these cardiac complication events carried the diagnosis of demand ischemia, with only few cases of coronary thrombosis. Almost all patients with perioperative cardiac events had undergone a complete preoperative risk assessment and optimization measures by a cardiologist. Based on this assessment, efforts were made to standardize blood pressure management postoperatively, with adoption of minimum blood pressure intervention orders and approach to the management of postoperative hypotension [2]. A favorable trend in postoperative cardiac events is now being observed (Fig. 31.8).

Pulmonary complications Review of NSQIP data indicated that respiratory complications such as postoperative pneumonia and reintubations offered opportunities for improvement. The ACS NSQIP ICOUGH program was reviewed and considered for implementation on our surgical floors. Evidence shows that ICOUGH implementation is associated with 30–38% reductions in pulmonary complications such as postoperative pneumonia and unplanned intubation [3]. ICOUGH intervention consists of **I**ncentive spirometry, **C**oughing and deep breathing, **O**ral care (brushing teeth and using mouthwash twice daily), **U**nderstanding (patient and family education), **G**etting out of bed frequently (at least three times daily), and **H**ead-of-bed elevation.

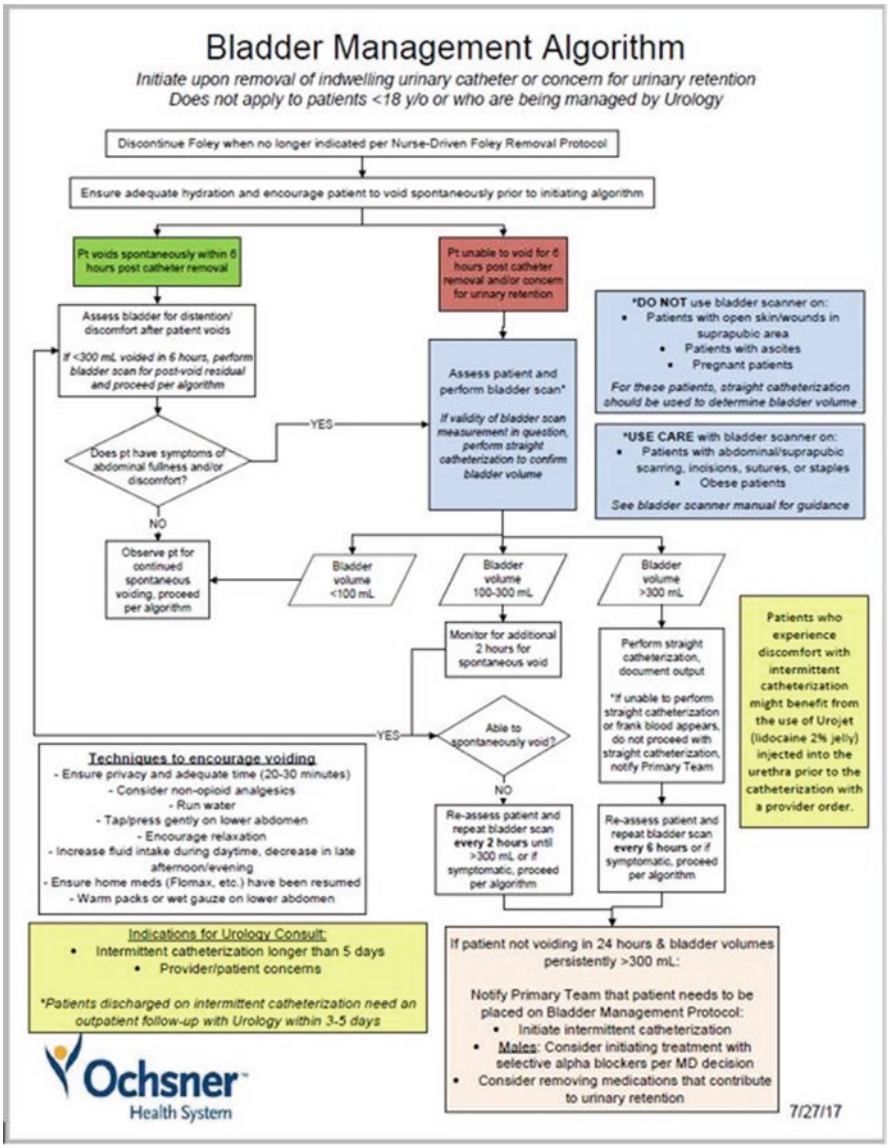


Fig. 31.6 Standardized bladder management algorithm. (© Ochsner Health)

Through a collaborative effort, the ICOUGH program was introduced shortly thereafter with guidance from the ACS ICOUGH coordinator. Cross-disciplinary collaboration and learning were emphasized; collaborating partners included our surgeons, surgical clinic, hospital floor nursing, respiratory therapy, and performance improvement personnel. Baseline data were collected and ICOUGH

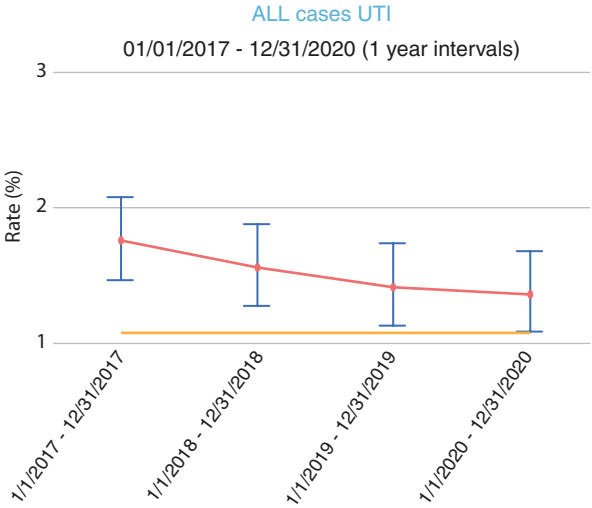


Fig. 31.7 Ochsner risk-adjusted NSQIP data show sustained decreases in urinary tract infections. (Based on NSQIP on-demand risk-adjusted and smoothed rate report). Yellow line NSQIP benchmark, UTI postoperative urinary tract infection. (© Ochsner Health)

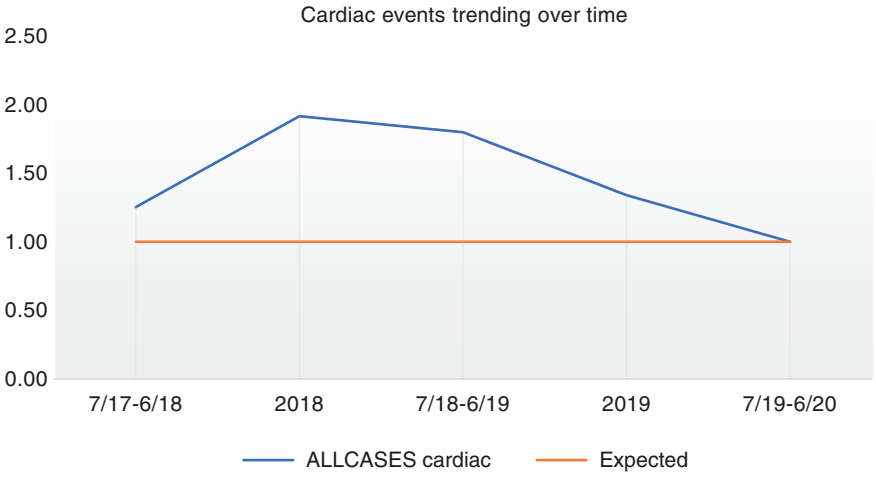


Fig. 31.8 All postoperative cardiac events based on NSQIP SAR outcomes trending odds ratio. (© Ochsner Health)

interventions implemented in late 2018. Process adherence was tracked with a dashboard that is available for review by the collaborative team (Table 31.1). Improvement of the ICOUGH process metrics is ongoing and part of the work of the hospital floor dyad leadership teams.

Our hospital has experienced a progressive decline in the AHRQ (Agency for Healthcare Research and Quality) postoperative respiratory failure patient safety

Table 31.1 ICOUGH interventions and dashboard metrics

ICOUGH data				
	Head of bed ≥30∞?	Ambulate/in chair/up in bed? (based on mobility)	IS within reach?	Oral care in room?
December 2019				
POSS	98%	90%	85%	90%
Surveys N Count=	265	265	267	266
GISSU	96%	90%	64%	89%
Surveys N Count=	327	321	352	327
POSS & GISSU Combined	97%	90%	73%	90%
Surveys N Count=	592	586	619	593
August 2020				
POSS	88%	64%	78%	87%
Surveys N Count=	365	363	361	365
GISSU	96%	79%	74%	84%
Surveys N Count=	544	548	534	551
POSS & GISSU Combined	93%	73%	76%	85%
Surveys N Count=	900	911	895	916
Trending				
POSS	–9.5%	–26.1%	–6.6%	–3.4%
Surveys N Count=	34.3%	37.0%	37.2%	37.2%
GISSU	0.0%	–11.4%	10.2%	–4.6%
Surveys N Count=	66.4%	70.7%	51.7%	68.5%
POSS & GISSU Combined	–4.0%	–17.2%	2.9%	–4.7%
Surveys N Count=	52.0%	55.5%	44.6%	54.5%
90–100%				
80–89%				
≤79%				

indicator 11 (PSI-11). Following ICOUGH implementation, NSQIP data showed a 20% reduction in postoperative pneumonia. The incidence of NSQIP unplanned intubations and postoperative pneumonia declined early on (Figs. 31.9 and 31.10). The effect on postoperative pneumonia was sustained (see Fig. 31.11). Vizient data corroborate a very sustained low incidence of the aspiration pneumonia complication for our hospital.

31.2 Engagement of the Surgical Staff

Review of quality outcomes data from the NSQIP is able to generate a remarkable level of engagement among surgical communities. Our experience has been that it promotes a supportive learning environment through credible, clinically well-understood data sources. In a short period of time, our surgical groups were able to make substantive improvements in perioperative patient outcomes.

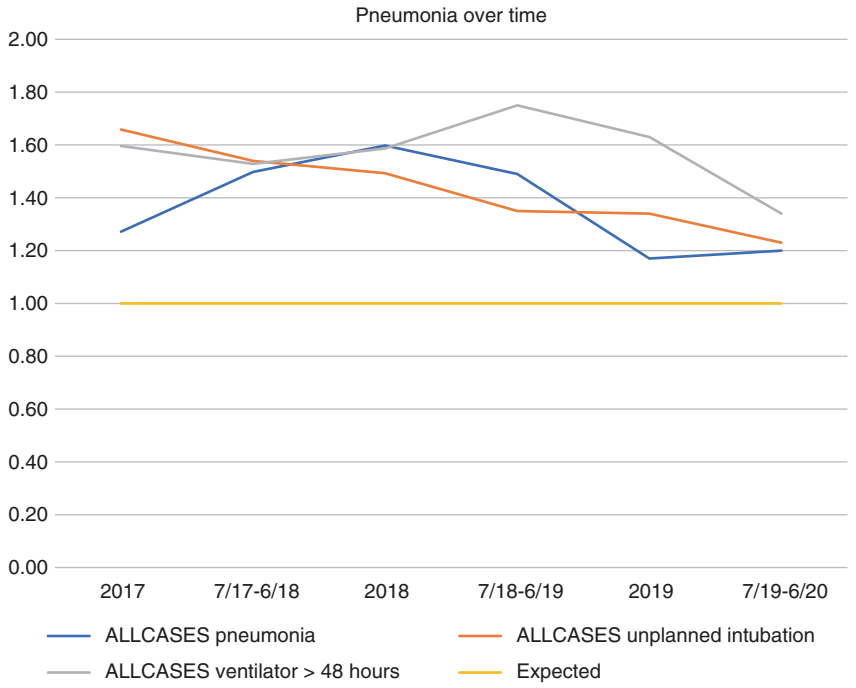


Fig. 31.9 Pneumonia, unplanned intubations, and prolonged mechanical ventilation decline after ICOUGH implementation. (Based on NSQIP SAR outcomes for all cases of pneumonia, trending odds ratio). (© Ochsner Health)

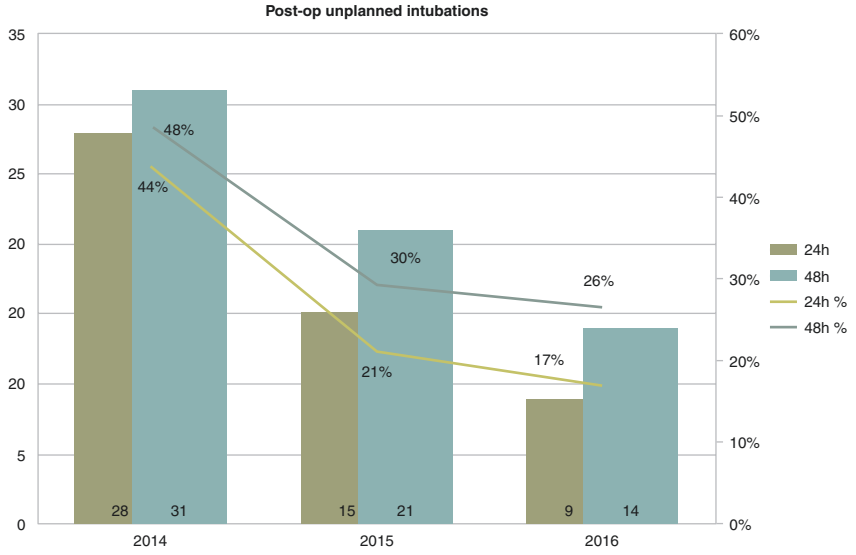


Fig. 31.10 Unplanned postoperative intubations decline after intervention requiring neuromuscular blockade monitoring after reversal (custom analysis from non-risk-adjusted data gleaned from the NSQIP data registry). (© Ochsner Health)

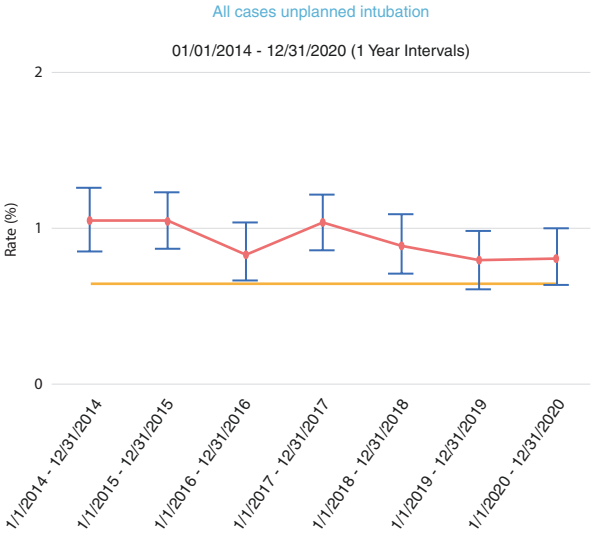


Fig. 31.11 Sustained decrease in NSQIP unplanned intubations. (© Ochsner Health)

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Oncology Hospital Quality Metrics

32

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The National Cancer Institute (NCI) defines quality cancer care as "the provision of evidence-based, patient-centered services throughout the continuum of care in a timely and technically competent manner, with good communication, shared decision making, and cultural sensitivity, with the aim of improving clinical outcomes, including patient survival and health-related quality of life" [1].

These components of cancer care encompass both desired outcomes and related processes of care provided using an appropriate structure.

Outcome is the ultimate effect of care on the patient's health status, commonly measured in oncology as overall survival (OS), disease-free survival, and quality of life. Using outcome measures to define quality appears logical. However, outcomes are heavily dependent on a variety of factors, like case mix and other patient factors. Examples of process measures of cancer care include the timeliness of care provided, infection avoidance, and palliative care reliability. Structural measures relate to credentials and adequacy of treating team resources. In the following, we discuss the AHRQ (Agency for Healthcare Research and Quality) quality metrics most applicable to cancer care in the inpatient setting.

32.1 Quality Metrics Relating to Inpatient Cancer Care

Of the 75 acute healthcare quality measures collected and reported, very few are directly related to inpatient cancer care. This reflects the fact that the majority of cancer care is delivered in the outpatient setting, more than 80% in many

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communities. For example, the acute cancer care quality measure captured by AHRQ includes the proportion of women with stage I or II receiving axillary lymph node dissection/sentinel lymph node biopsy at the time of surgery, women under 70 treated with breast-conserving surgery for breast cancer receiving radiation therapy within 1 year of diagnosis, and patients with colon cancer undergoing surgery who had at least 12 lymph nodes examined [AHRQ. https://nhqrnet.ahrq.gov/inhqrdr/National/benchmark/table/Diseases_and_Conditions/Cancer]. Given the preponderance of oncology care in the outpatient setting, much of inpatient cancer care is focused on surgical oncology, symptom management (pain, infections, intractable gastrointestinal side effects), or care of patients with hematologic malignancies and stem cell transplantation.

Key Concept
Inpatient quality metrics for cancer care focus on surgical oncology, symptom management (pain, infections, intractable gastrointestinal side effects), or care of patients with hematologic malignancies and stem cell transplantation.

The Prospective Payment System (PPS)-Exempt Cancer Hospital Quality Reporting (PCHQR) program was developed as mandated by Section 3005 of the Affordable Care Act. The PCHQR program is intended to equip consumers with quality-of-care information to make more informed decisions about healthcare options. It is also intended to encourage hospitals and clinicians to improve the quality of inpatient care that is provided to Medicare beneficiaries. A major part of the program supports improvement by ensuring that providers are aware of and reporting on best practices for their respective facilities and type of care. To meet the PCHQR program requirements, PPS-Exempt Cancer Hospitals (PCHs) are required to submit specific quality measures related to the PCHQR program to the Centers for Medicare & Medicaid Services (CMS). Mandated reporting began with the Fiscal Year (FY) 2014 payment determination year. These can be categorized under six broad headings (see Table 32.1).

Inpatient oncology quality measures can also be described in the traditional structure-process-outcome way:

- *Structure measures:* In the acute oncology setting, structure measures can include (1) the ratio of oncology-certified nurses to beds, (2) onco-pharmacists available for daily rounds (yes/no), (3) number of handwashing stations per team member, and (4) daytime, nighttime, and weekend nursing staffing pattern. While these measures have not been well validated in the inpatient oncology setting, there is enough evidence from other inpatient settings, like the ICU, where they have found to affect the outcomes [2, 3].
- *Process measures*: These include measures related to infection prevention and end-of-life care.

Table 32.1 Mandated quality measures under the PCHQR program

Safety and healthcare-associated infection (HAI) measures	Clinical process/ oncology care measure (OCM)	Intermediate clinical outcome measures	Patient engagement/ experience of care measure	Claims-based outcome measure
1. Centers for disease control (CDC) National Healthcare Safety Network (NHSN) catheter-associated urinary tract infections (CAUTI) (outcome measure) 2. CDC NHSN central line-associated bloodstream infection (CLABSI) (outcome measure) 3. Procedure-specific surgical site infection (SSI) (outcome measure) 4. CDC NHSN facility-wide inpatient hospital-onset methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia (outcome measure) 5. CDC NHSN facility-wide inpatient hospital-onset *Clostridium difficile* infection (CDI) (outcome measure)	1. Proportion of patients who died from cancer receiving chemotherapy in the last 14 days of life (process measure) 2. Proportion of patients who died of cancer not admitted to hospice (process measure)	1. Proportion of patients who died from cancer admitted to the intensive care unit (ICU) in the last 30 days of life (outcome measure)	1. Hospital consumer assessment of healthcare providers and systems (HCAHPS) survey (care measure)	1. Thirty-day unplanned readmissions for cancer patients (outcome measure) 2. Surgical treatment complications for localized prostate cancer (outcome measure) 3. Admissions and emergency department (ED) visits for patients receiving outpatient chemotherapy.

- *Handwashing:* Handwashing with soap and water will remove almost all transient Gram-negative rods. Especially important for the frequently immunosuppressed oncology inpatient, reliable hand hygiene is an effective way to prevent infections. Alcohol-based products have shown superior activity over water and regular soap, both before and after contacts with patients, except in the case of exposure to *C. difficile* or norovirus pathogens [4]. Hand hygiene performance itself is influenced by several factors, including structural aspects related to the quality and availability of alcohol-based sanitizers at the point of care. Reports on compliance with handwashing in inpatient oncology units are scarce, with self-reported rates between 80% and 90% in a pediatric oncology practice in Italy [5] and 90% at a hematology unit in Brazil [6]. Increasing handwashing compliance from 48% to 66% demonstrated a 40% overall decrease in the rate of nosocomial infections [7]. In our bone marrow transplant (BMT) unit, hand

hygiene compliance is monitored by trained "secret shoppers." The goal is 95% or higher. Regular education, frequent communication, displaying the measure in the form of dashboard on the oncology floor, and incorporating the measure as a value-based goal have all improved the adherence to hand hygiene and handwashing. On the inpatient oncology floor of our hospital, the unit's hand hygiene rate is displayed on a large highly visible computer monitoring screen and updated monthly. After multiple process improvement cycles that employed increasing the number of secret shoppers, recognizing them, improved geographic positioning of sanitizers, reliable filling of sanitizers, and incentives for coaching in the moment, hand hygiene adherence on our inpatient oncology unit has remained above 95%.

Prophylactic antibiotic use Prophylactic antimicrobials are routinely used in patients receiving myelosuppressive chemotherapy. A systematic review of prospective comparative studies showed that protective isolation, including air quality control, prophylactic antibiotics, and barrier isolation, brought about a significant reduction in all-cause mortality: risk ratio 0.60 (95% CI 0.50–0.72) at 30 days.

Inclusion of prophylactic antibiotics in the intervention was necessary to show mortality effect. The combined intervention reduced bacteremia and Gram-negative, Gram-positive, and *Candida* species infections. Mold infections were not significantly reduced [8]. Thus, prophylactic antimicrobial use in patients receiving myelosuppressive chemotherapy is a good example of process measure in the inpatient setting.

Percentage of patients who died from cancer receiving chemotherapy in the last 14 days of life The treatments given at the end of life have not been shown to improve outcomes in patients and can adversely affect patient and caregiver experience. Patients continue to receive chemotherapy treatments at the end of life even when it is futile. A study of older acute myeloid leukemia (AML) patients showed that as many as 84.5% of patients were hospitalized within 30 days of their death, with 61.0% dying in the hospital [9]. Resource utilization costs are significantly higher at the end-of-life period. Reducing unnecessary treatments at the end of life will decrease end-of-life resource utilization costs. ASCO (American Society of Clinical Oncology) advocates for early integration of palliative care/hospice services for patients with late-stage cancer to avoid aggressive measures at the end of life. There are cultural and other barriers that need to be overcome for this process to become routine [10].

Proportion of patients who died of cancer not admitted to hospice Many advanced cancer patients are enrolled in hospice less than 3 weeks before their death, which limits the benefit they may receive. Many of these deaths happen in the hospital. Early referral to palliative care can improve quality of life, cost of care, and even survival in patients with metastatic cancer. The rate of patients who do not have a hospice referral prior to death is as high as 30% and as few as 7% had a documented discussion on the option of palliative care [11].

Patients who were enrolled in hospice experienced increased survival times along with a reduction in resource use like aggressive end-of-life care and hospital admissions [12]. Medicaid patients were less likely to enroll in hospice in the last 30 days of life than Medicare patients with only 51% of Medicaid patients enrolled versus 64% of Medicare patients [13]. While there are demonstrated differences across race and ethnicity, as well as across geographic location, in palliative care and hospice use for patients near the end of life, these disparities are not explained by hospital-level practice variation [14]. Concerted effort is needed to start the palliative care discussion early in the cancer care, including patient and caregiver education to remove misgivings.

Review of these data at our organization showed opportunity for improvement. As a result, we have devised and implemented a process to assure that patients have advanced care directives on hospitalization. Likewise, we assure that palliative care support is made available for patients hospitalized for advanced cancer. Palliative care consultations for oncology patients prior to hospitalization have improved substantially during a recent time period (Fig. 32.1).

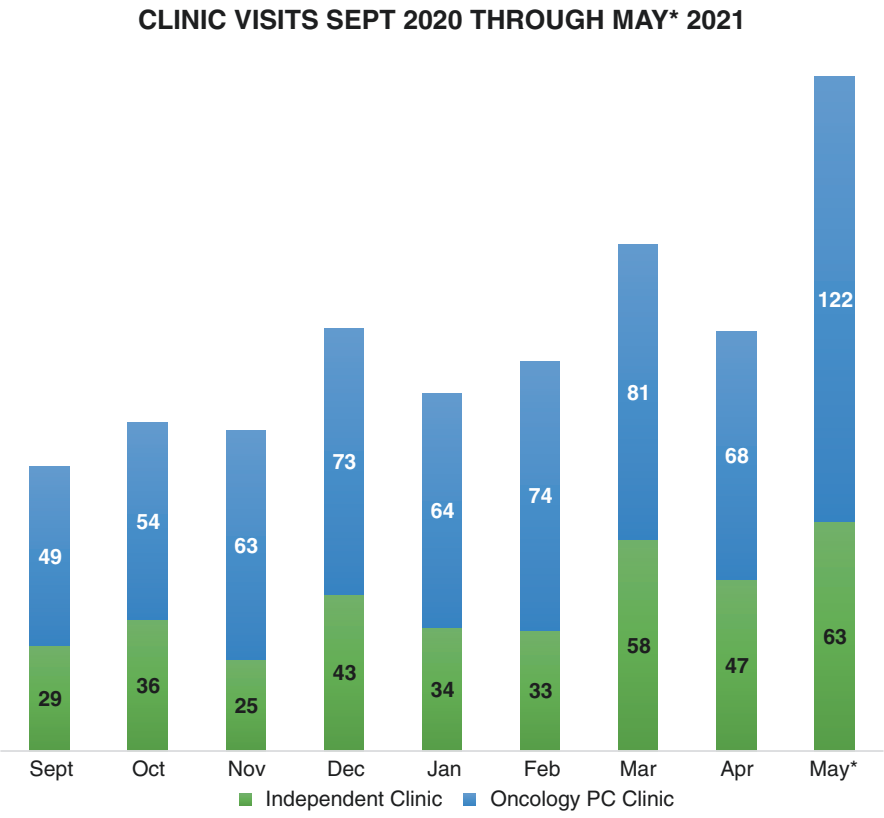

Fig. 32.1 Palliative care consultations for oncology patients prior to hospitalization

32.1.1 Outcome Measures, Safety and Healthcare-Associated Infection (HAI) Measures

CDC NHSN facility-wide inpatient hospital-onset Clostridium difficile infection (CDI) CDI incidence is higher in hematopoietic transplant recipients than for other hospitalized or surgical patients, especially in the patients with graft-versus-host disease, given the potential for damage to the mucosa of the gastrointestinal tract and the need for additional immunosuppression. Incidence has been estimated between 5% and 27%, with higher rates in patient after HCT (hematocrit) [4]. Environmental contamination by *C. difficile* spores plays a major role in horizontal transmission to patients and subsequent infections. Patients with *C. difficile* should be placed under contact precautions; all personnel should wear gowns and gloves, whether they anticipate touching the patient's environment. Handwashing with soap and water and thorough cleaning of all potentially contaminated surfaces with a 1:10 dilution of concentrated sodium hypochlorite are recommended to reduce the environmental burden of *C. difficile.* Significant increases in cost of inpatient care and post-hospitalization care have been seen in cases of CDI.

CDC NHSN central line-associated bloodstream infection (CLABSI) A non-tunneled, non-implanted catheter is considered temporary; a tunneled (including certain dialysis) catheter or implanted port is considered permanent. Of late, peripherally inserted central catheters (PICC) are used for chemotherapy in significant numbers. The incidence of PICC CLABSI in oncology patients is not insignificant. A study reported PICC CLABSI in 5.2% patients, with an infection rate of 2.31 per 1000 catheter days [15]

CDC NHSN facility-wide inpatient hospital-onset methicillin-resistant Staphylococcus aureus (MRSA) bacteremia A meta-analysis estimated the pooled prevalence of MRSA at 3% among all bloodstream infections and 44% among ***S. aureus*** bacteremia in cancer patients. A 60-day mortality in adult cancer patients with MRSA BSIs was reported to be as high as 12% [16]

CDC NHSN Catheter-Associated Urinary Tract Infections (CAUTI) This material is discussed in Chap. 10, CDC Hospital-acquired Infections.

Thirty-day readmission rate A 30-day unplanned readmission rate for cancer patients measure is a cancer-specific measure. CMS (Centers for Medicare & Medicaid Services) defines it as the rate at which all adult cancer patients covered as Fee-for-Service Medicare beneficiaries have an unplanned readmission within 30 days of discharge from an acute care hospital. The unplanned readmission is defined as a subsequent inpatient admission to a short-term acute care hospital, which occurs within 30 days of the discharge date of an eligible index admission and has an admission type of emergency or urgent.

Readmission following hospitalization may be preventable. In 2014, the Alliance of Dedicated Cancer Centers (ADCC) identified the 30-day unplanned

readmissions for cancer patients measure as a potential accountability measure for the PPS-Exempt Cancer Hospitals Quality Reporting (PCHQR) Program. This was initially developed by the Comprehensive Cancer Centers for Quality Improvement (C4QI), a group of 21 academic medical centers that collaborate to measure and improve the quality of cancer care in their institutions. C4QI's 21 members (11 ADCC hospitals/PCHs and 10 other academic medical centers or AMC) have utilized this claims-based, cancer-specific unplanned readmission measure since 2012.

This measure is designed to reflect the unique aspects of oncology and to provide a more comprehensive measurement of unplanned readmissions in cancer patients, when compared with existing measures. It considers patients with an admission type of emergency or urgent within 30 days of an index admission as an unplanned readmission. It excludes readmissions for patients readmitted for chemotherapy or radiation therapy treatment or with disease progression. The measure can better identify and address preventable readmissions for cancer patients. Studies examining readmission in cancer patients are mostly retrospective, and the reported 30-day readmission rates are as high as 25% [17, 18]. The main causes of unplanned readmissions were septicemia, complication of surgical procedures or medical care, congestive heart failure, pneumonia, and complication of device or graft. The multivariate predictors for higher 30-day unplanned readmissions were Charlson comorbidity index, hematologic cancers, chemotherapy, radiation, blood transfusion, discharge to other facility, and home healthcare [18]. A study including Medicare patients in the Surveillance, Epidemiology, and End Results Program with bladder, lung, pancreas, or esophagus cancer who were diagnosed between 2001 and 2007 and underwent extirpative surgery evaluated inpatient readmissions of these patients after the surgery [19]. Four thousand nine hundred forty cystectomies, 1573 esophagectomies, 20,362 lung resections, and 2844 pancreatectomies were included. Thirty- and 90-day readmission rates ranged from 13% to 29% and 23% to 43%, respectively, based on tumor type. Predictors of readmission were discharge to somewhere other than home, longer length of stay, comorbidities, higher stage at diagnosis, and longer travel distance. Patients who lived farther from the index hospital also had increased emergency room visits and were more likely to be readmitted to a hospital other than the index hospital. Of the readmitted patients, 31.9% were readmitted more than once. Long-term survival was worse and costs of care were higher for patients who were readmitted.

Thirty-day unplanned readmission rates and the associated factors have been studied across different cancers following inpatient treatment:

Gynecologic oncology A retrospective, concurrent cohort study of all surgical admissions to an academic, high-volume gynecologic oncology service during a 2-year period demonstrated a 30-day readmission rate of 11%. In a surgical subpopulation with more than one night stay, a readmission rate of 20.9% was observed. The mean interval to readmission was 11.8 days and mean length of readmission stay was 5.1 days. Factors associated with readmission included radical surgery for ovarian cancer (OR 2.87) or cervical cancer (OR 4.33), creation of an ostomy (OR 11.44), Charlson score of ≥5 (OR 2.15), language barrier (OR 3.36), median

household income in the lowest quartile (OR 6.49), and positive discharge screen (OR 2.85). The mean cost per readmission was $25,416, with the highest costs associated with gastrointestinal complications at $32,432. The total readmission-related costs during the 2-year study period were $4,523,959 [20].

Musculoskeletal oncology A retrospective study reviewed 30-day readmissions and a 90-day mortality in patients (n = 5293) following surgical resection of primary osteosarcoma in the National Cancer Database (2004–2015). Of 210 readmissions (3.97%), risk factors independently associated with unplanned 30-day readmission included comorbidity burden (odds ratio [OR] 2.4), Medicare insurance (OR 1.9), and axial skeleton location (OR 1.5). A total of 91 patients died within 90 days of their surgery (1.84%). Risk factors independently associated with mortality included age, increasing comorbidity burden, higher grade, increasing tumor size, metastatic disease at presentation, and amputation. Chemotherapy was associated with a decreased risk of short-term mortality [21].

Hematologic oncology A study investigated characteristics and predictors of 30-day hospital readmission in patients with AML after receiving induction chemotherapy. A total of 18,140 admissions were identified for induction chemotherapy. The all-cause 30-day readmission rates were 30.1%.

The inhospital and 30-day mortality rates were 3.9% and 4.8%, respectively. The inhospital mortality rate for readmitted patients was 3.8%. The top five causes for unplanned readmissions were neutropenia (7.2%), sepsis (6.1%), pneumonia (2.6%), acute kidney injury (2.5%), and neoplasm-related pain (2.3%). Mean total charges were higher during index admission than readmission ($118,449 vs. $49,087, $p = 0.000$). Independent predictors of readmission were younger age, low income, Medicaid, uninsured or private insurance, comorbidities, urban hospital, and length of stay during index hospitalization. The total hospital days associated with readmission were 102,924 days, with a total healthcare economic burden of $303 million [22].

The Re-Engineered Discharge (RED) model, consisting of 11 mutually reinforcing components that are delivered throughout the hospitalization and shortly after discharge, is effective at reducing readmissions and posthospital emergency department visits. The RED hospitals implementing this strategy have shown significant reductions in readmission rates [23]. A quality improvement initiative was successful in reducing the readmission rate of cancer patients with heart failure by 23.4% by adopting a patient-centric focus, using effective model of interprofessional collaboration, comprehensive discharge planning, and post-discharge support with follow-up phone calls to patients [24].

Colorectal cancer surgery In a retrospective analysis of the differences in predictors of readmission between colon and rectal cancer cohorts for 30-day readmission, the readmission rates significantly differed between rectal and colon cancer patients (7.1% colon and 10.7% rectal). Diabetes, age, and discharge to long -term care were significantly different among colon and rectal patients in the prediction of

readmission. Readmission for renal and stoma causes was more prominent in the rectal cohort. The adjusted cost difference for readmission did not significantly differ between rectal and colon cancers [25].

Genitourinary oncology Unplanned visits (UPV) – readmissions and emergency room (ER) visits – after radical prostatectomy (RP) for prostate cancer were analyzed. Sixty studies, with 406,107 RP patients, were eligible; 16,028 UPV events (~5%) were analyzed from 317,050 RP patients. UPV rates after RP varied between studies (ER visit range 6–24%; readmission range 0–56%). The 30-day and 90-day ER visit rates were 12% and 14%, respectively; the 30-day and 90-day readmission rates were 4% and 9%, respectively. A total of 55% of all readmissions after RP were directly due to postoperative genitourinary (GU)-related complications such as strictures, obstructions, fistula, bladder-related incontinence, urine leak, renal problems, and other unspecified urinary complications. Other common reasons were anastomosis-related, infection-related, cardiovascular/pulmonary events and wound-related issues. Nearly one-third ER visits after RP were directly due to urine-related issues such as retention, urinoma, obstruction, leak, and catheter problems. Other common ER visit reasons were abdominal/gastrointestinal issues, infection-related, venous thromboembolic events, and wound-related issues. Predictors for increased readmission included open RP, lymph node dissection, Charlson comorbidity index ≥2, low surgeon/hospital case volume, and socioeconomic determinants of health. Of the ten interventions evaluated, a 3.4% average reduction in UPV rate was observed. Meta-analysis demonstrated a significant benefit of interventions over controls with odds ratio 0.62.

Interventions focusing on multidisciplinary, nurse-centered programs, with patient self-care/empowerment, were more beneficial than algorithmic patient care pathways and preoperative patient education [26].

Head and neck cancer Please see discussion in Sect. 38.1 of Chap. 38, "Readmission Reduction."

Proportion of patients who died from cancer admitted to the ICU in the last 30 days of life A higher quality of life has been predicted in patients who avoid aggressive measures such as ICU stays in the last week of life. Coping with cancer (CwC1) was a US multisite, prospective, longitudinal cohort study of advanced cancer patients and their informal caregivers. Patients were followed from enrollment to death a median of 4.1 months later. The primary outcome was patient's quality of life (QOL) in the last week of life. ICU stays in the final week had the highest negative impact on the quality of life [27]. A longitudinal population-based study from Taiwan found that patients who enrolled in hospice (long- or short-term) versus those who did not receive hospice services had a reduced likelihood of being admitted to an ICU in the last 30 days of life by approximately 75% [28]

Cancer patients who died in an ICU or hospital report more physical and emotional distress and worse quality of life at the end of life, compared with patients who died at home with hospice. ICU deaths were associated with a heightened risk

for posttraumatic stress disorder, compared with home hospice deaths after adjustment for caregivers' preexisting psychiatric illnesses. Hospital deaths were associated with a heightened risk for prolonged grief disorder compared with home hospice deaths.

These data make strong case to decrease terminal hospitalizations or increase hospice utilization at the end of life [29]. Nearly 25% of Medicare expenditures are spent of intensive care in the final month of life with uncertain benefit. A reduction in healthcare expenditures can be achieved by reduced utilization of hospital services including ICU stays and a greater focus on palliative care and hospice services.

32.2 Inhospital Cancer-Specific Mortality Indicators

The Inpatient Quality Indicators (IQIs) are a set of measures used by the Agency for Healthcare Research and Quality (AHRQ) that provide a perspective on hospital quality of care using hospital administrative data. These indicators reflect quality of care inside hospitals and include inpatient mortality for certain procedures and medical conditions and utilization of procedures for which there are questions of overuse, underuse, and misuse. The IQIs help assess quality of care inside the hospital using administrative data found in the typical discharge record and include two primary types of indicators: (1) mortality indicators for conditions or procedures for which mortality can vary from hospital to hospital and (2) utilization indicators for procedures for which utilization varies across hospitals. The IQI module contains a total of 17 primary indicators and 2 composite indicators. Pancreatic resection mortality rate, measured at the hospital level, is the only cancer-specific, inpatient quality metric in the list. It is enumerated as the pancreatic resection mortality rate, stratified by the presence of pancreatic cancer, per 1000 admissions. It serves as a valuable comparator across hospitals for this treatment associated with suboptimal outcomes. Centralization of pancreatic surgeries is associated with significantly improved outcomes. The nonprofit Leapfrog Group has established new minimum annual hospital and surgeon volume standards and procedures for several procedures including pancreatic resection (hospital ≥ 20, surgeon ≥ 10) [30].

32.3 Quality Oncology Practice Initiative (QOPI)

The American Society of Clinical Oncology (ASCO) created the Quality Oncology Practice Initiative (QOPI). This quality program was developed with guidance of oncology experts and begun in 2006. QOPI gives oncology practices a process for standardized assessment of care to identify opportunities for improvement and focus improvement work. Participating practices report on their evidence-based quality metrics. The QOPI program furnishes individual practices with performance reports; benchmarked performance is also available for comparison to all participating practices [31].

QOPI assessment categories include core, disease-specific, and domain-specific measures. Examples of core measures address cancer staging and pain and pathology evaluation. Symptom management and care at the end of life fall into domain-specific measures. Disease-specific measures address breast, colorectal, and non-small cell lung cancer. ASCO also offers QOPI certification which requires adherence to stringent criteria. About 1000 oncology practices in the USA are registered in QOPI. The QOPI measures are focused on outpatient oncologic management. Adherence to some can be accomplished during inpatient episodes of care.

32.4 Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) Survey

The HCAHPS survey asks discharged patients 29 questions about their recent hospital stay. The survey contains 19 core questions about critical aspects of patients' hospital experiences (communication with nurses and doctors, the responsiveness of hospital staff, the cleanliness and quietness of the hospital environment, communication about medicines, discharge information, overall rating of hospital, and would they recommend the hospital). The survey also includes three items to direct patients to relevant questions, five items to adjust for the mix of patients across hospitals, and two items that support congressionally mandated reports. The HCAHPS survey is administered to a random sample of adult patients across medical conditions between 48 hours and 6 weeks after discharge. HCAHPS can be implemented in four different survey modes: mail, telephone, mail with telephone follow-up, and active interactive voice recognition (IVR). Hospitals can use the HCAHPS survey alone or include additional questions after the core HCAHPS items. Hospitals must survey patients throughout each month of the year. The survey is designed to empower patients. It aims to produce data about patients' perspectives of care that allow objective and meaningful comparisons of hospitals on topics that are important to consumers. The public reporting of the survey results aims to create new incentives for hospitals to improve quality of care. The public reporting also serves to enhance accountability in healthcare by increasing transparency of the quality of hospital care provided in return for the public investment.

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Publicly and Widely Reported Pediatric Hospital Quality Data

33

J. Varghese, T. Harris, A. Pirrone, D. Kosydar, O. Dalili, and W. Lennarz

Tools and networks driving pediatric care quality improvement have become increasingly available during the past decade. Several widely reported quality metrics are applicable in pediatric hospital practice. While there are others, we focus on metrics associated with the Children's Hospitals' Solutions for Patient Safety (SPS), the US News pediatric specialty rankings, and Vermont Oxford Network rating.

33.1 Children's Hospitals' Solutions for Patient Safety Network

In 2017, the Ochsner Hospital for Children partnered with the Children's Hospitals' Solutions for Patient Safety (Children's Hospitals Working Together to Eliminate Harm) to consolidate our journey toward zero harm for our pediatric patients. The Ochsner Hospital for Children is one of the three hospitals in Louisiana that

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participates in the SPS Network and Patient Safety Organization. The SPS Network aims to create a universally safe and healing environment for all children under the care of network members. SPS was created in partnership with the Cardinal Health Foundation, the Children's Hospital Association, and the federal Partnership for Patients initiative. SPS has developed clear numeric goals for its membership, such as 1.07 central line-associated bloodstream infections (CLABSIs) per 1000 central line days, 0.04 pressure injuries per 1000 patient days, and 0.95 unplanned extubations per 100 ventilator days, to reduce network's staff days away by 25% and to reduce the network's serious safety event rate by 75%. These goals were developed based on outcome data submitted by member hospitals.

Our pediatric leadership team is centrally involved in the direction and monitoring of the SPS partnership program. The members of the steering committee for the Ochsner SPS safety initiative are medical and nursing leaders of acute pediatric hospital units, labor and delivery units, and pediatric and neonatal intensive care units. Also included are the pediatric chief quality officer; leaders from the pediatric department; administration, quality, and performance improvement specialists; pharmacy medication safety officer; infection preventionists; and respiratory therapists.

33.1.1 Principles Underlying Survey Completion

The Ochsner Hospital for Children submits data for the SPS survey annually as part of our commitment to improve the care of pediatric patients in the state of Louisiana and actively promote zero harm as one of our strategic goals. We view the benefits of partnership with SPS as the (1) singular focus on zero harm which aligns with our overall strategy, (2) access to and sharing of benchmarking data in a privileged manner to gauge opportunities for improvement, (3) learning and teaching opportunities, (4) team recognition, and (5) care team member safety.

Focus on zero harm We are committed to the notion that this is an inspiring goal well worth striving for. We partner with other children's hospitals in this endeavor, all of which subscribe to the tenet that there is no competition on patient safety; the goal is simply to eliminate harm. To achieve this goal, the Ochsner Hospital for Children has implemented many of the SPS healthcare-acquired condition (HAC) prevention bundles. These evidence-based bundles have been devised, implemented, and tested throughout the network and have been shown to statistically reduce harm when fully operationalized.

Access to benchmarking data This has allowed us to gauge opportunities for improvement. Best practices are shared in a confidential manner between all children's hospitals belonging to the network utilizing the "All Teach, All Learn" methodology. This methodology provides a pathway for noncompetitive and honest collaboration among the network children's hospitals. Children's hospitals can compare policies and procedures with other hospitals that have a similar structure. Having access to comparable data can clarify and identify the strengths and weaknesses of each institution.

Learning and teaching opportunities
Learning opportunities offered throughout the year include the national learning sessions, aviator Wednesday webinars, culture wave training, board training, error prevention training, and hospital-acquired harm work groups. On a smaller scale, we partake in interdepartmental modules and in-services and have focus groups.

Team recognition We encourage rounding to influence in-the-moment, written recognition (referred to as the "spirit on the spot" program) and other special employee recognition to facilitate an environment of self-learning and engagement and to further facilitate a culture of safety. An example of special recognition is the monthly patient safety champion award given to team members who report good catches.

Care team member safety We promote our commitment to employee safety being as important as patient safety. Our health system Office of Professional Well-Being encourages a culture of wellness and tackles obstacles that get in the way of an enjoyable work environment. We attempt to accomplish this through mindfulness courses, Hatha-based yoga, and a focused care team program called COPE. COPE is dedicated to recognizing and validating the effect of safety events on our providers and care team members. We also conduct debriefings with our palliative care and psychology colleagues and offer a program called Tea for the Soul to further promote the importance of the mind, body, and soul.

33.1.2 Process of Data Collection and Submission

Data entry for SPS focuses on 12 HACs. Data entry encompasses outcome metrics and SPS care process bundle reliability metrics.

Data element domains Data categories include adverse drug events, events relating to antimicrobial stewardship, catheter-associated urinary tract infections (CAUTI), central line-associated bloodstream infections (CLABSIs), injuries from falls and immobility, nephrotoxic acute kidney injuries, pressure injuries, peripheral intravenous infiltrations or extravasations, surgical site infections, unplanned extubations, ventilator-associated events, and venous thromboembolism.

Data from occurrence reporting These reports are reviewed biweekly by a team of multidisciplinary staff members. During this meeting, each event is reviewed utilizing the SPS Healthcare Performance Improvement Safety Event Classification algorithm. According to the algorithm, if an occurrence is deemed a serious safety event (SSE), an escalated review is required. SSEs undergo a higher-level medical review with the medical director on the unit or the pediatric chief quality officer in concert with performance improvement partners.

Timeline and rhythm for SPS data submission Our standard is for SPS data submission to occur monthly. Before the 15th day of every month, the performance improvement coordinator is responsible for facilitating all data collection, validation, and submission for SPS. Once the reported event is medically reviewed, it is assigned an SPS level of harm and entered on the SPS data dashboard (Fig. 33.1). Data are entered into the SPS SharePoint site for the Ochsner Medical Center provider number that includes three hospitals.

33.1.3 Improvements Efforts Sparked by SPS Participation and Related Outcomes

Unplanned extubations Review of SPS data showed a trend of increasing unplanned extubation for the Ochsner Hospital for Children. In September 2020, we initiated an improvement project that focuses on adherence to the SPS Unplanned

Prediatric SPS Dashboard: Solutions for Patient Safety Hospital

Measure	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	2020
Serious Harm Events	2	2	2	2	0	2	1	0	0	0	0	0	9
Serious Safery Events													
SSE 1	0	0	0	1	0	1	1	0	0	0	0	0	3
SSE 2	0	0	0	0	0	0	0	0	0	0	0	0	0
SSE 3	0	0	0	0	0	0	0	0	0	0	0	0	2
SSE 4	1	0	0	0	0	0	0	0	0	0	0	0	1
SSE 5	1	1	0	0	0	1	0	0	0	0	0	0	3
HACs													
Adverse Drug events (ADE)	0	0	0	0	0	0	0	0	0	0	0	0	0
CAUTI	0	0	0	0	0	0	0	0	0	0	0	0	0
CLABSI	0	0	0	0	0	0	1	1	0	0	0	1	3
Falls	0	0	0	0	1	1	2	0	1	0	1	0	6
PIVIEs	6	5	1	0	0	1	0	1	2	0	5	2	21
Falls													
Total Falls	0	0	0	0	1	1	2	0	1	0	1	0	6
Total Fall Rate	0.00	0.00	0.00	0.00	2.25	2.13	3.75	0.00	3.20	0.00	2.07	0.00	13.38
Falls-Harm moderate+	0	0	0	0	0	0	0	0	0	0	0	0	0
Falls-Harm moderate+Rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Adverse Drug Events (ADE)													
ADE(Category E) ADE Rate (E)	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
ADE (Categories F-I)	0	0	0	0	0	0	0	0	0	0	0	0	0
ADE Rate (I--I))	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Infection Prevention													
CLABSI	0	0	0	0	0	0	1	1	0	0	0	0	2
CLABSI Rate	0.00	0.00	0.00	0.00	0.00	0.00	2.50	5.34	0.00	0.00	0.00	0.00	7.86
CAUTI CAUTI Rate	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
Catheter Utlization	0.128	0.165	0.195	0.289	0.118	0.163	0.386	0.321	0.254	0.26	0.267	0.226	2.772
PIVIE (Peripheral Intravenous Intiltration and Extravasations)													
Total PIVIE w/Hdram	6	5	1	0	0	1	0	1	2	0	3	2	21
Moderate Injury Rate	0.00	1.17	1.69	0.00	0.00	4.95	0.00	0.65	3.20	0.00	2.07	1.45	15.18
Severe Injury Rate	0.00	3.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.09
Serlous Harm Rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Extubations													
Unplanned Extubations	0	1	1	2	1	1	3	4	0	0	0	1	15
Unplanned Extubation Rate	0.00	0.63	0.69	1.31	1.02	1.03	1.56	2.69	0.00	0.00	0.00	0.60	9.53

SSE = serious safety events; E, F, I = safety event classifications

Fig. 33.1 Example of SPS pediatric quality dashboard . SSE serious safety events, E, F, I safety event classifications. (© Ochsner Health)

Extubation Bundle. An extremely dedicated multidisciplinary team identified opportunities and tools expected to result in better bundle adherence. After the team reviewed the relevant literature [1–8], evidence-based bundle components were refreshed and adherence was improved. The SPS Network goal is <0.95 unplanned extubations per 100 ventilator days. The project achieved a significant decrease in unplanned extubations per 100 ventilator days (Fig. 33.2); our recent performance continues to remain well below the SPS Network goal.

Total number of falls Review of weekly unit safety reports revealed that the Ochsner Hospital for Children experienced an increase in falls during the summer of 2019 (Fig. 33.3). Our nursing team made fall reduction a priority patient safety improvement project at the time. Improvement actions taken included an increased focus on parent and nursing education while reinforcing known fall safety measures. These interventions improved the total number of fall events and fall rate. To further hardwire safety practices and ensure low fall rates, we adopted the SPS Fall Prevention Bundle in 2021.

CLABSI Monthly data review indicated that the Ochsner Hospital for Children saw an increase in CLABSI rate. On further review, this was identified as primarily involving peripherally inserted central catheters. After reviewing the literature [9–14], the team initiated a work group with our infection control team and assigned multiple CLABSI champions from our pediatric floor and pediatric intensive care unit teams, who fortified existing bundle interventions with the SPS CLABSI Prevention Bundle. This multilevel and diverse improvement effort helped to decrease our CLABSI rates (Fig. 33.4).

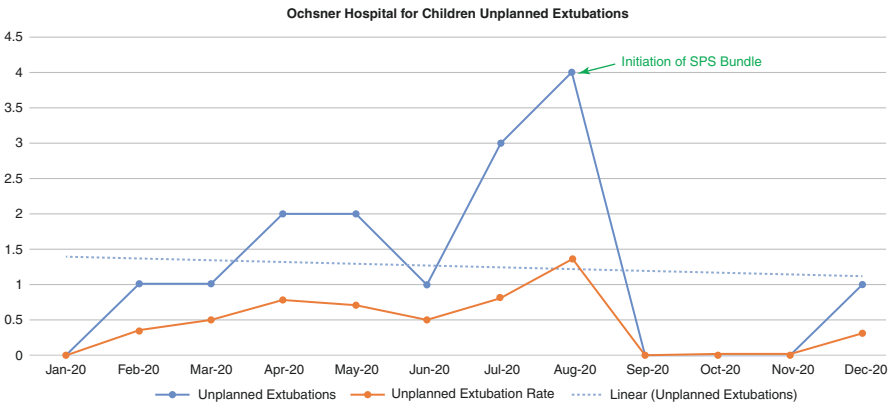

Fig. 33.2 Run chart related to improvement of unplanned extubations per 100 ventilator days with the initiation of the SPS bundle. (© Ochsner Health)

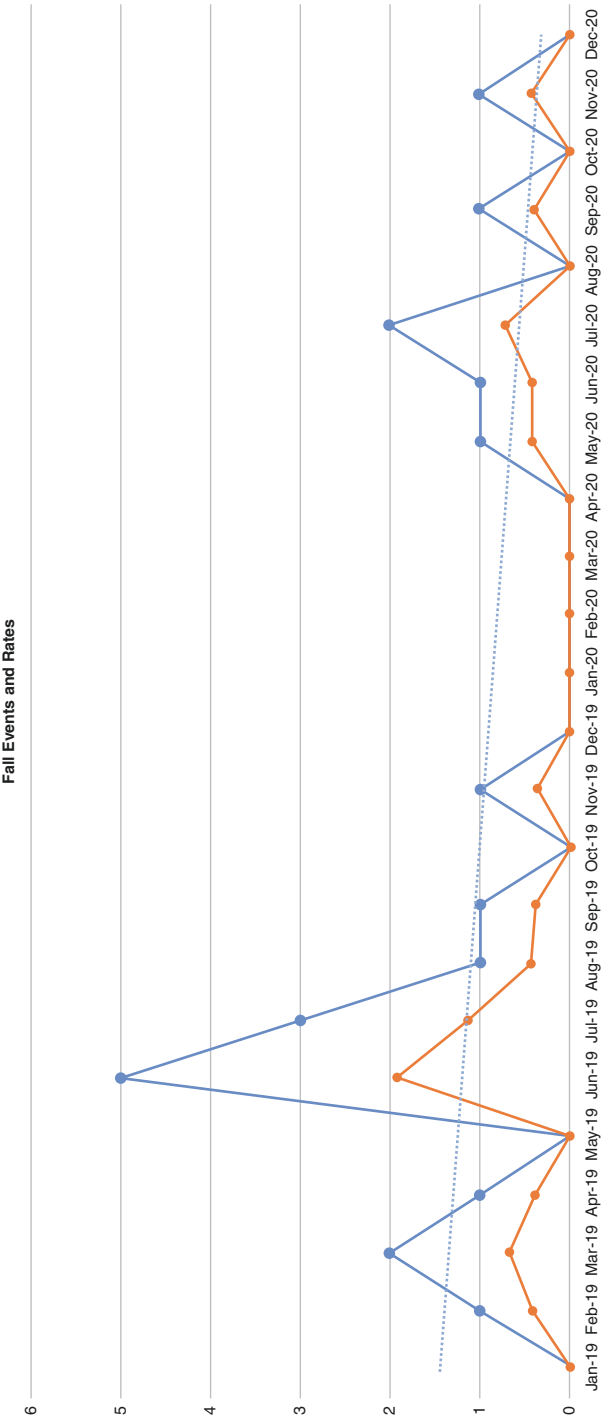

Fig. 33.3 Run chart for the Ochsner Hospital for Children fall performance. (© Ochsner Health)

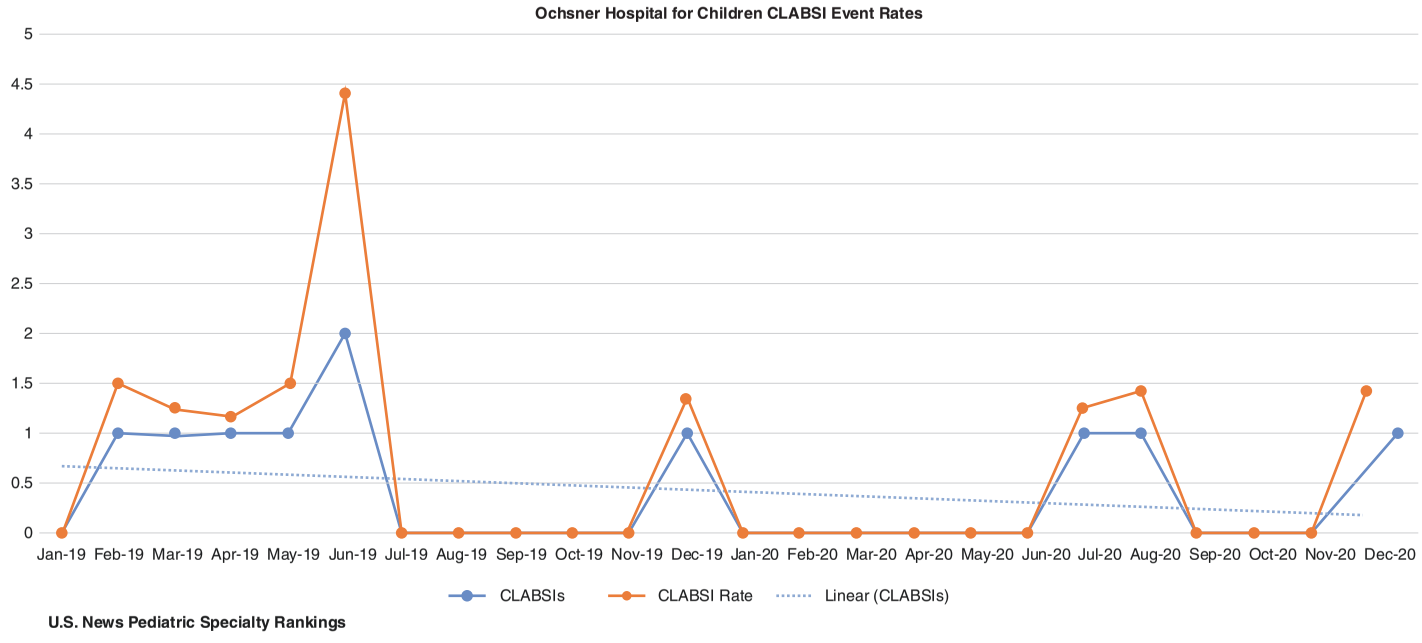

Fig. 33.4 Run chart of CLABSI events for the Ochsner Hospital for Children. (© Ochsner Health)

33.2 US News Pediatric Specialty Rankings

The US News pediatric specialty ranking methodology differs from that used for adult US News specialty and hospital rankings. It relies heavily on completion of a detailed survey that addresses both structural and process metrics.

Key Concept
The US News and World Report Rankings for pediatric subspecialties are determined based on the results of a survey. Survey completion required a detailed process that includes reporting of structural and programmatic components, as well as safety and quality outcomes. Sufficient time needs to be allotted to finding the data required for accurate completion. Software such as the Hospital Data Insights® assists in identifying opportunities for improvement.

33.2.1 The Process of Survey Completion

The Ochsner Hospital for Children submits nine of the ten specialty surveys, as well as Section A, the general section. Each specialty survey averages 40–65 questions. The data elements speak to processes of care, adverse event rates including mortality, safety protocols, availability of resources, and involvement of trainees in the care of children.

Submission team Our US News team includes professionals from the areas of finance (useful for volume and other data pulls), medical informatics (for data pulls, analysis, and co-leadership), pediatric department administration, pediatric physician leadership, quality and performance improvement, system physician leadership, pediatric section heads and clinic managers, and administrative fellows.

Data collection and submission process Our organization has developed a process for survey completion that follows a strict timeline and continuous annual rhythm (Table 33.1).

33.2.2 The Ochsner Pediatric Specialty Deep Dive Process

We use the annual US News Ranking process to effect continual programmatic and outcome improvement. The benefits of participating in the US News Specialty ranking program include (1) the recognition of distinctive quality, (2) identification of opportunities for improvement, (3) team recognition, (4) use in recruitment process, and (5) use in marketing.

Table 33.1 Milestones and timeline for submission of the US News Pediatric specialty survey

Timeline	Activity
December 1	Receive preliminary survey form
First 2 weeks in December	Pediatric and informatics leaders review survey components to determine data pull assignments
First week in January	Survey officially opens with release of final survey format
Mid-January	Pediatric and informatics leaders update and finalize data pull assignments
First week in February	Data pulls are complete
Second week in February	After we receive the requested data, we prep documents for section reviews
Second half in February	Conduct section reviews; we spend approximately 1.5 hours per specialty
Third week in February	Conduct US News and World Report submission committee review (informatics specialist, performance improvement leader, hospital quality officer, chief of pediatric medicine, chief pediatric administrative officer, chief quality officer)
Fourth week in February	After responses have been finalized by the submission committee, we block 3–4 days for data submission
Last day in February	Data submission deadline to the US News
Late May	Embargoed results are released in late May
June	Official results are released
August–September	Informatics specialist conducts the specialty ranking deep dive process
October–January and ongoing	Programmatic adjustments are made

Recognition of distinctive quality Recognition through the US News Rankings certainly inspires both care teams and patients. We take every opportunity to recognize our teams and communicate what this recognition means to patients and families.

Identification of opportunities for improvement We consider the results a barometer for improvement and an opportunity to improve future rankings. Pediatric physician and administrative leadership meet with each specialty's leader teams to review deep dives and develop a strategy for improvement. An example of this is our "Safety on Site" occurrence reporting program and pharmacy collaboration. A multidisciplinary collaborative was created among pediatric emergency, pediatric acute, and pediatric intensive care. This collaborative discusses recent medication error reports, categorizes incidents per the Healthcare Performance Improvement's Safety Event Classification algorithm, and develops action plans. This robust collaborative proved that real-time communication aided in the prevention of errors and strengthens a culture of safety.

Team recognition We initiated the Patient Safety Champion program to further engage our employees in our culture of safety. All good catches are reviewed

quarterly by leadership and voted on for the best catch. Good catch awards are presented to recipients with hospital leadership and team members present.

Use in recruitment process Having top pediatric specialty rankings has been useful to attract top talent. Prospective team members are inspired by our commitment to improve and to demonstrate performance within a benchmarked and refereed system of quality recognition.

Use in marketing The US News Rankings are useful for outreach efforts to referring physicians and facilities. The meaning of these rankings is also translated for patients and their families, including through social media channels. The use of the Hospital Data Insights application has been very helpful to mine the results of care outcomes and to identify opportunities for improvement [15]. This proprietary resource provides hospitals with an interactive dashboard to view rankings and data. It offers comparisons over time and benchmarking against other hospitals. It also allows for "what-if" analyses showing how different performance levels affect scores used in rankings. We have used information from this data platform to answer survey questions more accurately and to plan for additional capabilities to serve our pediatric patient population.

33.2.3 Outcomes Related to Improvements Sparked by the US News Ranking Information

Our deep dive process has been the driver behind continuous improvement in several specialty rankings year over year. Examples of improvements our pediatric specialty has made based on the US News data review include enhancements in both data accuracy and structure. We recognized the need to build a deeper provider bench in subspecialties such as pediatric hepatology, radiology, and palliative care. In addition to more accurately representing trainee's participation on pediatric clinical services, we enhanced consulting services and multidisciplinary clinics. This process has resulted in the Ochsner Hospital for Children becoming the only children's hospital in Louisiana and Mississippi to be nationally ranked by the US News & World Report, now for 5 years in a row. Most recently, two pediatric specialties ranked in the top 50, and other specialties came very close to ranking in the top 50.

33.3 Vermont Oxford Network Neonatal Quality Ratings

The Vermont Oxford Network (VON) consists of a group of more than 1300 hospitals and many individual practitioners committed to affecting the health outcomes of neonatal care through structured quality improvement efforts. VON quality improvement collaboratives use reports benchmarking their performance and share the evidence to affect care outcomes, family experience, and other quality goals. VON participation allows leaders and care teams to focus on practices and

processes related to teamwork, communication, family partnership, health equity, and performance improvement fundamentals to establish sustainable improvement in newborn care. An early example of such an improvement at our organization has been the development of reliable handoff processes and tools in our newborn nursery.

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Quality Excellence in the Neurosciences

34

R. M. Zweifler, C. J. Bui, B. Jennings, M. Ware, H. McGrade, and G. A. Vidal

The neuroscience service line at Ochsner includes the departments of neurosurgery, neurocritical care, neurology, and physical medicine/rehabilitation. Quality performance has been a focus since service line inception. The service line employs multiple initiatives to ensure success.

34.1 Stroke Center Quality

The most comprehensive quality initiatives relate to our vascular neuroscience program (Table 34.1). As a Joint Commission (JC) Certified Comprehensive Stroke Center, we collect and review data monthly per JC standards [1]. The quality metrics that are monitored for comprehensive stroke centers include data points relating to the care of the acute stroke patient, JC primary stroke measures, JC comprehensive stroke measures, and procedural complications. We also have quality initiatives in place to support performance in our Telestroke and Stroke Mobile programs

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A. Schubert, S. A. Kemmerly (eds.), *Optimizing Widely Reported Hospital Quality and Safety Grades*, https://doi.org/10.1007/978-3-031-04141-9_34

Table 34.1 Ochsner Medical Center monthly vascular neuroscience quality initiatives

Initiative
Multidisciplinary Stroke Committee
Stroke Peer Review Committee
Vascular Neurology M&M
Telestroke Committee
Mortality Review
Stroke Mobile Team meeting
SOS Review Committee
Vascular Neurology Provider meeting
Interventional Neuroradiology meeting

M&M morbidity and mortality improvement conference, SOS safety on site (local designation for safety reporting system)

Ochsner CareConnect 360

Telemedicine Report

Ochsner Comprehensive Stroke Program

Telemedicine News/Updates:

Growth:

Highlight:

TeleStroke

All Hospitals	Calendar Year 2020												CY2020 Grand Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ischemic Stroke	179	181	111	82	107	110	124	140	140	146	122	139	1,581
Hemorrhagic Stroke	9	3	4	3	9	5	5	5	4	6	3	4	60
TIA	41	37	37	25	39	27	32	33	49	45	41	38	444
Non-Stroke	129	103	91	92	147	142	150	162	137	150	154	157	1,614
Total Consults	358	324	243	202	302	284	311	340	330	347	320	338	3,699
# Times Door to Call w/in 15 minute	144	129	86	79	121	115	133	146	143	154	140	137	1,527
# Times Called [= Total Consults]	358	324	243	202	302	284	311	340	330	347	320	338	3,699
% of calls w/in 15 min	40%	40%	35%	39%	40%	40%	43%	43%	43%	44%	44%	41%	41%
Average of Door to Call (Min)	0:34	0:35	0:42	0:30	0:41	0:33	0:32	0:27	0:33	0:31	0:37	0:38	0:34
Door to Needle w/in 60 min	25	25	22	13	19	19	23	22	18	22	20	19	247
# Times TPA Given	40	40	33	20	33	36	34	43	32	40	32	32	415
% of doses given w/in 60 min	63%	63%	67%	65%	58%	53%	68%	51%	56%	55%	63%	59%	60%
Average of Door to Needle Time (Mi	1:03	1:02	1:12	1:05	0:55	1:06	0:55	1:09	0:59	1:04	1:04	1:05	1:03
# Patients Transfer requested	103	93	65	50	67	66	77	76	85	92	76	88	938
Retention Rate	71%	71%	73%	75%	78%	77%	75%	78%	74%	73%	76%	74%	75%

Fig. 34.1 Ochsner Telestroke program monthly dashboard. (© Ochsner Health)

(see below). The multidisciplinary vascular neuroscience team meets monthly to review all JC metrics. Unit-based reports follow a template and action plans are developed for items of concern. There is a monthly morbidity, mortality, and improvement conference, led by faculty and house staff.

The Ochsner's telestroke network includes one tertiary/quaternary hospital and over 55 spoke sites in the Gulf South. Performance data are reviewed monthly by the Telestroke leadership team. Data include volumes, diagnosis (vascular vs

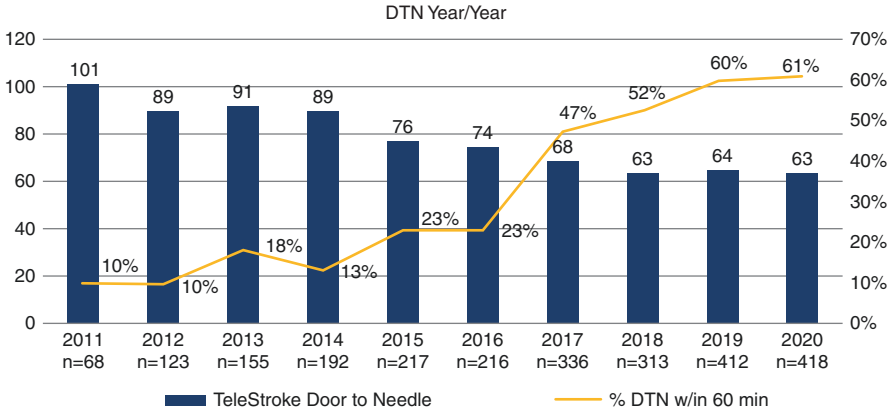

Fig. 34.2 Ochsner Telestroke program door-to-needle (DTN) times by year. (© Ochsner Health)

mimics), spoke site retention rate, and process metrics such as door to call, door to physician online, and door-to-needle times (Fig. 34.1). The program aims to keep care local whenever possible and consistently achieves a 75–80% spoke site retention rate. Individual providers' "door to physician online" data are provided and addressed for performance improvement. Optimal door-to-needle times for tissue plasminogen activator (tPA) administration are a focus of the program. Through data transparency and focused process improvement, we have achieved a steady improvement since program inception in 2011 (Fig. 34.2).

A unique component of the Ochsner Vascular Neuroscience Program is our Stroke Mobile Program. Designed to reduce readmissions and improve adherence to stroke prevention plans, the program emphasizes care navigation and in-home care. Teams consisting of a registered nurse and a lay patient educator travel to the home of patients discharged with stroke and/or transient ischemic attack (TIA). The program was initially funded through a Centers for Medicare and Medicaid Services (CMS) Innovations grant; initially in-home visits occurred monthly for 12 months with the initial visit occurring within 2 weeks of discharge. The program was modified in 2015 to allow for virtual or skipped visits beyond the first 3 months. Twelve-month follow-up data (e.g., blood pressure, modified Rankin Scale) are collected on all patients. The program has had impressive performance with respect to blood pressure control and 30-day readmissions (Figs. 34.3 and 34.4).

Key Concept
A regular rhythm of review of performance data within the structure of a Comprehensive Stroke Center can result in reliable improvement outcomes. Data transparency at both the individual provider level and the program level are key components of success.

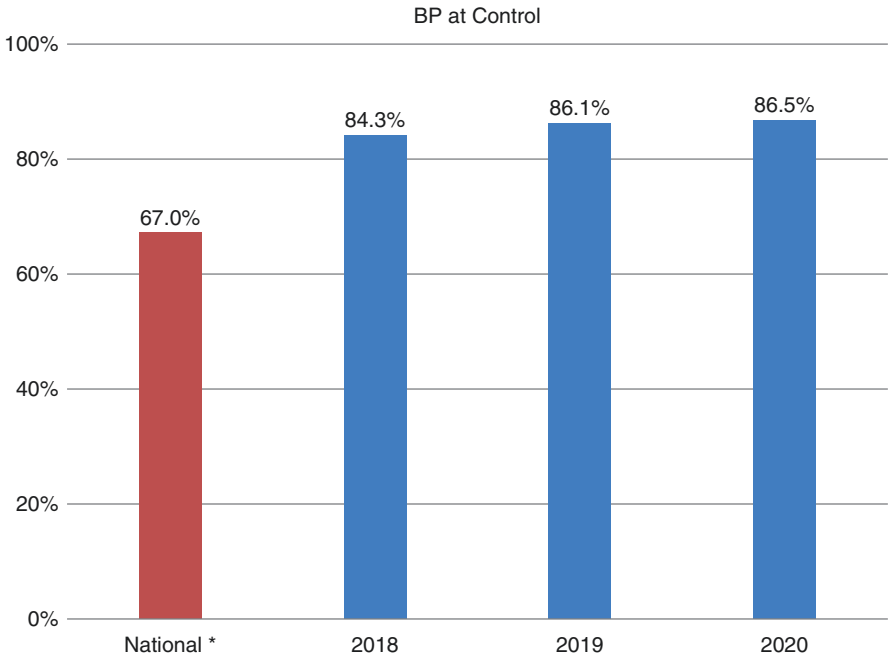

Fig. 34.3 Ochsner Stroke Mobile Program blood pressure (BP) control performance (showing percentage of patients with SBP <140 mm Hg) [2]. (© Ochsner Health)

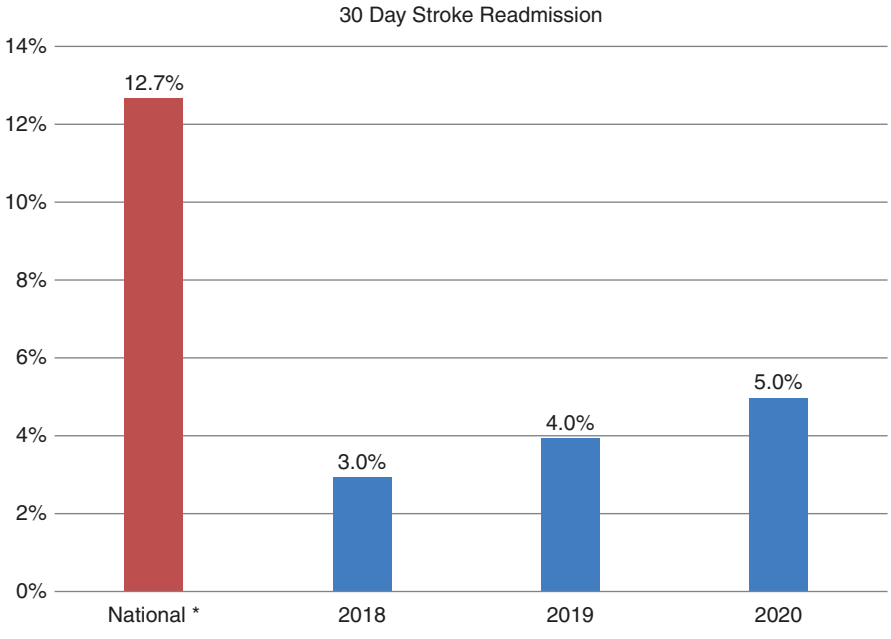

Fig. 34.4 National and Ochsner Stroke Mobile Program 30-day all-cause readmission rates [3]. (© Ochsner Health)

34.2 Neuroscience Safety Program

In 2016, the neuroscience service line initiated monthly safety data reviews. SOS (Safety on Site) is our organization's incident or occurrence reporting system. The Neuroscience SOS Committee has representation from hospital nursing, pharmacy, performance improvement, service line administration, and specialty providers. The majority of SOS reports are about occurrences relating to falls, skin integrity issues, lab specimen collection, and medication/intravenous fluid errors. Targeted performance improvement initiatives have been implemented and have shown sustainable results. Skin integrity is a current area of continuing focus for performance improvement on neuroscience floors and the entire facility. Another example is the improvement work these teams have undertaken to recognize changes in neurological status more timely and reliably, especially as they relate to the early postoperative period.

34.3 Neuroscience Mortality Review Program

In 2017, monthly mortality reviews were initiated with the leaders of neurosurgery, neurology, and neurocritical care. The reviews are conducted by the lead physician for hospital quality and are attended by representatives from the Performance Improvement Department. In 2020, palliative medicine leadership was added to the team. Each department has a designated quality representative who reviews relevant cases. The multidisciplinary input is discussed at these monthly meetings and action plans are developed as appropriate. The process has highlighted opportunities in both clinical care, documentation, and coding. The neuroscience risk-adjusted mortality index (RAMI) has consistently been below an O:E (observed to expected) of 1.0. Despite the challenges of the COVID-19 pandemic in 2020, we were able to achieve a Vizient RAMI of 0.88 for the Ochsner Neuroscience service line.

Our most recent quality initiative was the development of a transfer evaluation unit (TEU) (Fig. 34.5). Rather than representing a physical location, the TEU concept embodies a care pathway whose goals are to maximize alignment between patient and family wishes and clinical prognosis in patients with severe neurological injuries (see also Chap. 28). The pathway is designed to improve transfer efficiency and unnecessary exposure of patients to the discomfort of nonbeneficial acute hospital care. A potential secondary benefit is to avoid the inclusion of patients in the numerator of RAMI whose care would be nonbeneficial. The population this clinical pathway addresses are patients with large intracerebral hemorrhages and poor Glasgow Coma Scale on presentation. Our experience to date has been that approximately three patients a month are evaluated for this clinical care pathway, with beneficial effects on patient experience and hospital mortality.

In summary, we have seen the benefits of a regular rhythm of review of performance data within the structure of a Comprehensive Stroke Center. Over time, with multiple iterations of review and improvement cycles, reliable improvement outcomes follow. Data transparencies at both the individual provider level and the program level are key components of success.

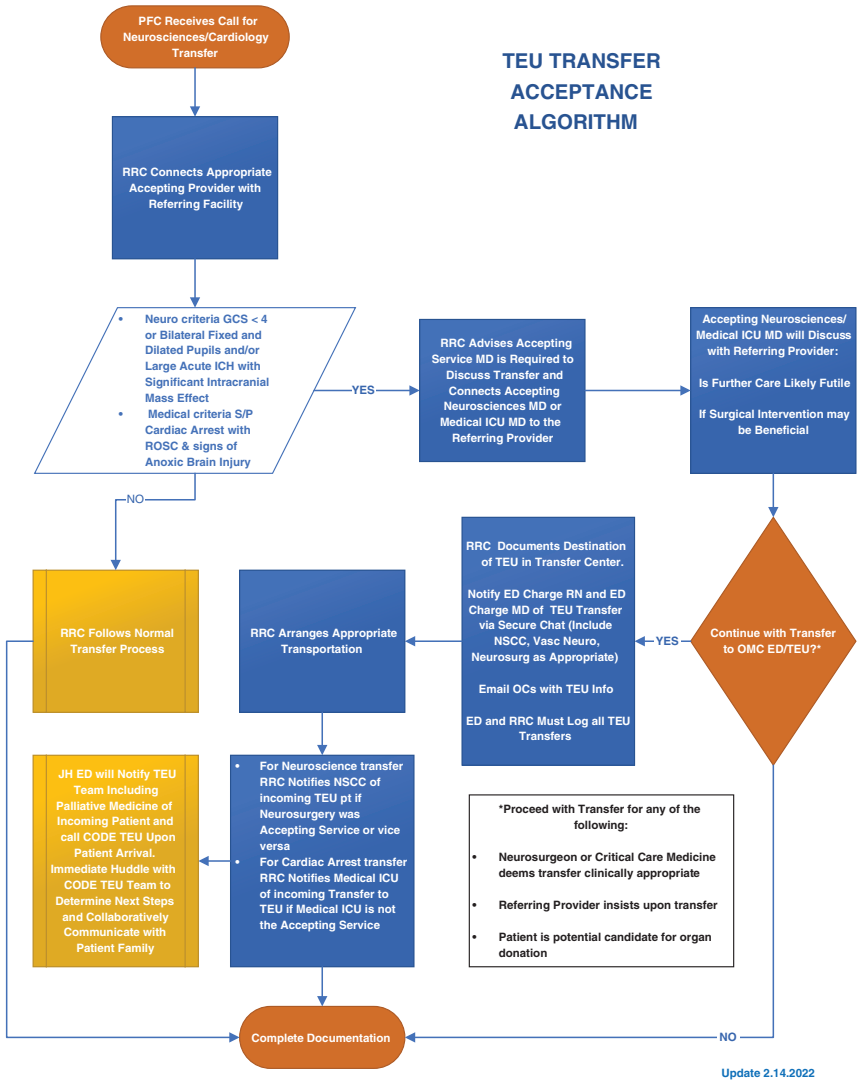

Fig. 34.5 Ochsner transfer evaluation unit (TEU) care pathway. ER emergency room, LOPA Louisiana Organ Procurement Agency, NSCC Neuroscience Critical Care, ICH intracranial hemorrhage. (© Ochsner Health)

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Use of Data Transparency and Process Change in Organ Transplantation

35

E. M. Bugeaud

The field of transplantation is perhaps one of the most rigorously regulated areas in health care today. Born out of an imperative to optimize utilization, access, and outcomes related to a limited resource, transplantation developed and evolved under a multifaceted framework of regulatory and reporting agencies. As such, regulatory reviews, compliance data, clinical practice, and outcomes data are readily available to institutions and the public, making transplantation also one of the most readily transparent areas of medicine. The consequences of such oversight and transparency are myriad as regulators, health-care organizations, insurers, transplant programs, referring providers, and patients make decisions on how to interpret and utilize these data.

35.1 Transplantation Regulatory Framework

Several agencies play a role in oversight of transplantation. These include the Organ Procurement and Transplantation Network (OPTN) and its current contractor the United Network for Organ Sharing (UNOS), the Centers for Medicare and Medicaid Services (CMS), the Department of Health and Human Services (DHHS), the End Stage Renal Disease (ESRD) Network, the State Department of Health and Human Services (SDHHS), the Joint Commission (TJC), and the Office of the Inspector General (OIG). Under the Code of Federal Regulations (CFR), the federal government began regulating kidney transplantation in 1976 with other organs to subsequently follow suit over time. In 2000, DHHS put forth the final rule, establishing a regulatory framework for the OPTN in an effort to address components of transplantation including organization membership, policies, listing requirements, organ procurement, identification of recipients, organ allocation, and programmatic and

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reporting requirements. In 2007, CMS published the final regulations for transplant programs in the Federal Register, which defined the *Medicare Conditions of Participation for transplant hospitals* (CoPs) 42 CFR Part 482 [1]. This document puts forth an extensive set of regulations to secure and maintain certification to provide transplant services for patients with Medicare funding. Since that time, together CMS and OPTN/UNOS have made a concerted effort to hold transplant programs accountable for meeting all the regulatory requirements of these agencies with the goal of improving safety, quality, and clinical outcomes in transplantation.

Key Concept
Organ transplantation is both one of the medicine's most highly regulated and transparent fields. As a result, transplant programs and their institutions have access to considerable data resources and reports to help dive process change and improvement.

CMS regulation encompasses two broad categories. It evaluates process requirements such as development and implementation of policies, consents, documentation of processes, and communication. In addition, it assesses clinical outcomes data for transplant candidates and recipients, data submissions, and volume metrics as provided by the OPTN. CMS surveys of transplant programs are conducted every 3 years or more often as needed if significant concerns or credible complaints are filed. These surveys include analysis of data provided by the OPTN in addition to on-sight reviews conducted by state agencies or federal contractors. These surveys are conducted without advanced notice, so programs must continuously operate in a survey-ready state. OPTN/UNOS is also an important regulatory body over transplant programs with regard to policies and bylaws established to ensure equity of organ distribution and to foster confidence in the national allocation system. Onsite surveys are conducted every 3 years in addition to periodic desk audits to follow up on any deficiencies identified.

Admittedly, there is overlap between the oversight goals and responsibilities between CMS and OPTN/UNOS (Table 35.1). However, these agencies continue to

Table 35.1 Transplant program items evaluated by agency surveys

CMS	OPTN/UNOS
List of transplant candidates, recipients, and living donors	Membership and personnel requirements
List of meeting schedules, scheduled follow-up visits, and current transplant inpatient census	Organ allocation, packaging, and acceptance
List of organ recover and organ offers	Living donation
Program administration	Data submission requirements
Personnel	Transmissible diseases
Clinical policies and procedures	Transplantation of nonresident aliens
Education information, policies, and procedures	
Quality assessment and performance improvement	

work together to identify requirements that overlap and develop strategies on how they can facilitate joint regulation of transplant programs and centers. Importantly, the goal of both agencies is to improve safety, quality, clinical outcomes, as well as availability and access to transplant. Failure to comply with any agency requirements will result in reported deficiencies, which may result in sanctions against a transplant program. Depending on the severity in nature or the extent of noncompliance, deficiencies can also result in more severe consequences.

35.2 Regulated Data Collection and Public Transparency

With the passage by congress of the National Organ Transplantation Act (NOTA) in 1984, the OPTN was established and a mandate issued for regulated transplant data collection [2]. The design of this was to use data to direct patient care, facilitate outcomes analysis, drive quality assessment and performance improvement, and assist in process analysis, contracting, and research initiatives. The goal was to use data to influence a spectrum of clinical and nonclinical activities. To this end, the Scientific Registry of Transplant Recipients (SRTR) was established in 1987 as a national computerized database to house and analyze data collected by the OPTN. The registry is responsible for comprehensive reporting of transplant data and analytics including information on transplant candidates, organ donors, and transplant recipients and their survival. This includes data pertaining to transplant candidate demographics and waitlist time, death on the waitlist, organ offer acceptance, and risk-adjusted posttransplant patient and graft survival reported by observed versus risk-adjusted expected outcome (O:E) statistics. The SRTR (Scientific Registry for Transplant Recipients) publishes its data biannually with program-specific reports [3] (Fig. 35.1).

Although these data generated by the SRTR are used by agencies like CMS and OPTN/UNOS in their oversight and regulation of transplant centers and programs as described above, the information is also made available publicly. As such, these data are freely available to private insurers, patients, and transplant centers and have become important tools informing practices relating to contracting and clinical decision-making on the part of patients and referring providers.

35.3 Process Change: Drivers and Tools for Quality Assessment and Performance Improvement

The strict regulation and transparency of data as described above are important tools for quality assessment and have definite impact on program development, change, and improvement. Despite the power of these tools, they do have limitations in that the data and survey cycles are relatively long intervals to be used in change cycles. For most effective change and performance improvement, programs need to have the ability to develop, test, and implement change at frequent and regular intervals. To this end, CMS has mandated the formal establishment of quality assessment and

SCIENTIFIC REGISTRY OF TRANSPLANT RECIPIENTS

Ochsner Foundation Hospital
Center Code: LAOF
Transplant Program (Organ): Liver
Release Date: January 5, 2021
Based on Data Available: October 31, 2020

SRTR Program-Specific Report
Feedback?: SRTR@SRTR.org
1.877.970.SRTR (7787)
http://www.srtr.org

A. Program Summary

Figure A1. Waiting list and transplant activity

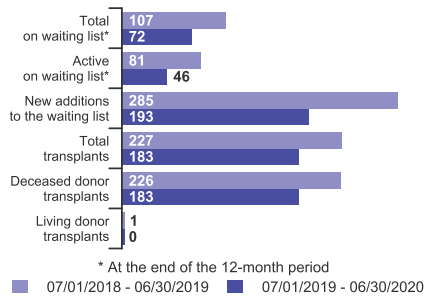


Table A1. Census of transplant recipients

Recipients	07/01/2018-06/30/2019	07/01/2019-06/30/2020
Transplanted at this center	227	183
Followed by this center*	1,422	1,464
...transplanted at this program	1,399	1,436
...transplanted elsewhere	23	28

* Recipients followed are transplant recipients for whom the center has submitted a post-transplant follow-up form for a transplant that took place before the 12-month interval for each column.

Figure A2. Transplant rates 07/01/2018 - 03/12/2020

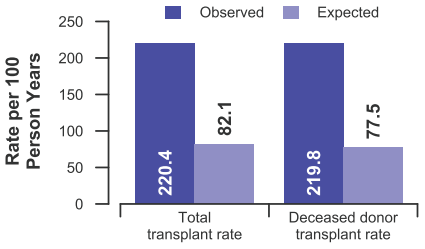


Figure A3. Waiting list mortality rates 07/01/2018 - 03/12/2020

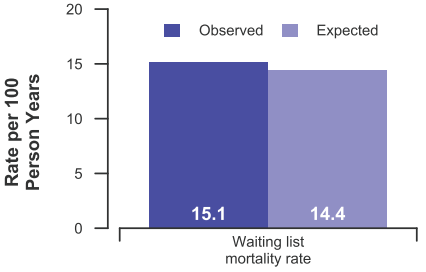


Figure A4. First-year adult graft and patient survival: 07/01/2017 - 12/31/2019

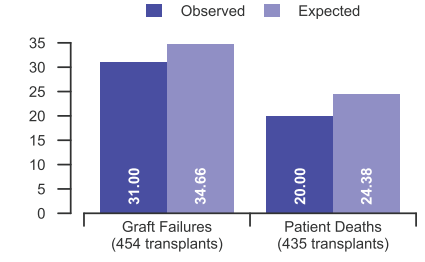
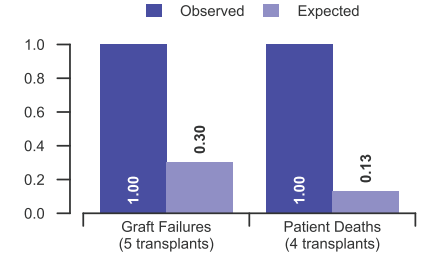


Figure A5. First-year pediatric graft and patient survival: 07/01/2017 - 12/31/2019



The data reported here were prepared by the Scientific Registry of Transplant Recipients (SRTR) under contract with the Health Resources and Services Administration (HRSA).
See User Guide for pandemic-related follow-up limits.

Fig. 35.1 An example of a program summary from the biannual SRTR report for Ochsner Foundation's liver transplant program. (© Ochsner Health)

performance improvement (QAPI) committee for all transplant programs, which is specifically evaluated as an element of its program surveys [4]. This committee should consist of transplant surgeons and physicians, administrators, coordinators, social workers, dietitians, pharmacists, living donor advocates, and bedside nurses. At a minimum, it is required that the QAPI committee meet quarterly and be incorporated into the hospital's quality committee.

The key principles that should be incorporated into the QAPI committee include development of standardized patient care protocols and regular initiatives to improve clinical care and establish a culture of safety. Specifically, QAPI committees are responsible for determining, prioritizing, and evaluating annual QAPI measures against benchmark standards. They must regularly review the status and assess progress and effectiveness of improvement projects. In doing so, they must identify areas where further actions or resources are needed. The committee is also responsible for reviewing all adverse events and conducting root cause analyses. All meetings must be documented for review.

Each program must define specific metrics to assess quality. Although programs have some flexibility in the metrics they choose to follow, they should be objective criteria that can be readily evaluated, measured, and compared to benchmark standards [5]. These quality metrics must include both transplant processes and patient outcomes across three phases of care: pretransplant, inpatient, and posttransplant for both donors and recipients. Typically, the data are collected and presented to the QAPI committee in the form of charts or dashboards (Fig. 35.2). The committee must then assess the validity of the data, evaluate for trends, and identify opportunities for performance improvement.

The design of the QAPI committee is to conduct a regular, data-driven quality assessment that can be used to identify opportunities for growth and improvement. The committee can then prioritize and execute performance improvement projects, continuously using new data cycles to evaluate the effectiveness in these initiatives. This should be done at regular intervals using process improvement methodologies such as the Institute for Healthcare Improvement Plan-Do-Study-Act principles.

A recent example of such a dashboard-driven process improvement change in our practice is related to pretransplant ABO verification. QAPI work indicated opportunity for improvement based on trends of the continually monitored pretransplant ABO verification before anastomosis for both heart and lung transplant procedures. Process changes were implemented to include a planned pause for surgeons to stop and document; in addition, educational and leadership engagement activities were instituted including both surgical and anesthesia team members. As a result, pretransplant ABO verification documentation adherence improved to 100%.

Together, public data collected by regulatory agencies as well as internally maintained quality metrics through QAPI programs are the key drivers for process change in transplantation and have been fundamental in improvements seen over the years in organ allocation, utilization, and patient and graft survival. As a community, the American Society of Transplant Surgeons began an initiative to further enhance the tools for quality improvement with the goal of reducing postoperative

Stage	LIVER TRANSPLANT QUALITY 2021 DASHBOARD		2021 Goal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	YTD 2021	Actual 2020	Actual 2019	Actual 2018
PRE	Median days from refferral to first PFC		1 day																
	Median days from PFC to financially cleared		1 day																
	Median days from start of evaluation to committee presentation		20 days																
	Median days from start of evaluation to listing		14 days 45 days																
LIST	1 year death rate on waitlist		15.40%																
	status 7 %																		
TRANSPLANT	% transplanted within 30 days of listing (excludes exception patients)	MELD 15-20	7.60%																
		MELD 21-30	26.30%																
	% transplanted within 1 year of listing (excludes exception patients)	MELD 15-20	39.80%																
		MELD 21-30	57.30%																
	LOS in days (liver only)	Median	8 days																
		Average																	
	LOS in days (liver/kidney , liver/heart)	Median	11 days																
		Average																	
	Median PRBC use during transplant (excludes multiple organs and re-transplants)		2																
POST-TRANSPLANT	Patient Survival (Initial txp only)	# Living																	
		Tx Vol																	
		%	100%																
	Patian Survival (Re-txp only)	# Living																	
		Tx Vol																	
		%	100%																
	Graft Survival	# Living																	
		Tx Vol																	
		%	100%																
	Return to OR within 30 days of transplant	# Living																	
		Tx Vol																	
		%	20%																
	Hospital readmission 0-2 days after post transplant discharge	# Living																	
		Tx Vol																	
		%	5%																
	Hospital readmission 0-30 days post transplant discharge	# Living																	
		Tx Vol																	
		%	38%																
	% rejection within 30 days of transplant		n/a																
	% rejection within 1 year of transplant		n/a																
	% with CMV within 1 year of transplant		n/a																
	% with hepatic artery stenosis within 1 year of transplant		n/a																
	# patients having ERCP within 1 year of transplant		n/a																
CGCAHPS	Liiklihood of recommending		65																
	Overall assessment		65																
	Access		65																
	Moving through your visit		65																
	Nurse/Assistant		65																
	Care provider		65																
	Personal issues		65																
	Staff worked together to care for you		65																
	Number of responses																		

	LIVER TRANSPLANT OPERATIONAL 2021 DASHBOARD		2021 Goal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	YTD 2021	Actual 2020	Actual 2019	Actual 2018
	Transplant monthly referrals		65																
	Hepatology monthly referrals		250																
	Montly recipient evaluations		33																
	Monthly donor evaluations		n/a																
	Total patients listed in a month		20																
	Montly transplant volume		17																
	#Organs refused and used elsewhere		n/a																
	#Organs refused by local centers and transplanted here		n/a																
	#Organs imported/total		n/a																
	%Organs from outside region		n/a																
	%Organs from DCD donors		n/a																
	Appointment no-show rate (liver medicine)		6.50%																
	Appointment no-show rate (transplant surgery)		6.50%																

Below Goal | Meets Goal | Above Goal

Fig. 35.2 Sample QAPI dashboard from the Ochsner liver transplant program. (© Ochsner Health)

morbidity and mortality. Following the success of the National Surgical Quality Improvement Program (NSQIP) in significant improvements in postoperative morbidity and mortality in other surgical disciplines, a new transplant-specific quality improvement program, coined TransQIP, is in development [6]. The goal is to use a standardized approach to quality improvement by developing a highly reliable

quality database that can be used to improve quality, develop risk adjustment models, identify best practices, and drive practice change for quality improvement. TransQIP has completed an alpha and beta phase of development, and the transplant community awaits official rollout of the production program to guide future quality assessment and performance improvement initiatives.

35.4 Impact of Regulation, Data Transparency, and Structured Quality Assessment and Performance Improvement

As in other areas of health care, rigorous quality assessment and continuous quality and process improvement are essential in transplant. It has driven many advances in clinical outcomes, immunosuppression, and organ utilization over the years that has advanced the field. In addition to striving to provide the highest quality of care to the greatest number of patients, maintenance of a structured quality assessment and performance improvement program is an absolute requirement that transplant programs must be compliant with. Failures in compliance with regulatory standards or suboptimal clinical outcomes will jeopardize a transplant program's existence. Additional negative consequences include loss of patient referrals or insurance contracts. For all these reasons, transplant programs necessarily have to invest significant resources into quality assessment and performance improvement programs. This comes in the form of personnel as well as infrastructure for data collection, maintenance, and analysis. All this takes considerable time and financial support; however, if done well, this process also contributes to improved cost-effectiveness.

For all the benefits we have seen stem from regulation, the emphasis on quality improvement, and the strive for clinical excellence, there is potential for unintended negative consequences that are counter to the goal of increasing utilization and access to care. With such public availability of data as well as high stakes for perceived outcomes, there is a potential that risk aversiveness actually limits delivery of care. Because of this concern, much effort is placed by regulatory bodies and transplant programs to critically balance the types of metrics and data by which programs are judged. Equal attention needs to be paid to access to care and listing behaviors, organ utilization practices, waitlist mortality, and posttransplant outcomes to ensure that programs are not restricting access and delivery of care to bolster outcomes in any one area.

Key Concept

Because of the concern over potentially unintended negative consequences of transplantation data transparency, much effort is placed by regulatory bodies and transplant programs to critically balance the types of metrics and data by which programs are judged. Equal attention needs to be paid to metrics relating to access to care, organ utilization practices, and posttransplant outcomes to ensure that programs are not restricting access and delivery of care to bolster outcomes.

In summary, the field of transplantation has a long history with data-driven quality assessment and performance improvement. Largely, this stems from a history of regulations and regulatory bodies that were developed to ensure appropriate utilization of limited resources and delivery of the highest quality of care to the greatest number of patients. Through the years, transplant programs have refined this process and can serve as an example to other areas of health care with regard to how to systematically and continuously drive equitable, high-quality, and cost-effective care.

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Managing Populations, Chronic Conditions, and Episodes of Care

36

P. Oravetz, J. Foley, K. Guichard, V. Kaplan, and A. Schubert

The fragmentation of healthcare into a cacophony of specific services and procedures, without effective care coordination and controls for efficiency, has led to high healthcare costs in the United States. A fragmented approach to care delivery also is not delivering the highest quality as measured by process and outcomes (Figs. 36.1 and 36.2).

The payment landscape has been changing for many healthcare organizations, including ours. The proportion of Ochsner Health payments at risk for quality performance is increasing (Fig. 36.3). In our organization, the number of patients who are in value-based arrangements, along with the revenue at risk, has increased by 50–70% annually. As a result, we are finding ourselves moving progressively up the steps along an evolution of value-based payments and quality incentives at the Ochsner Health (Fig. 36.4).

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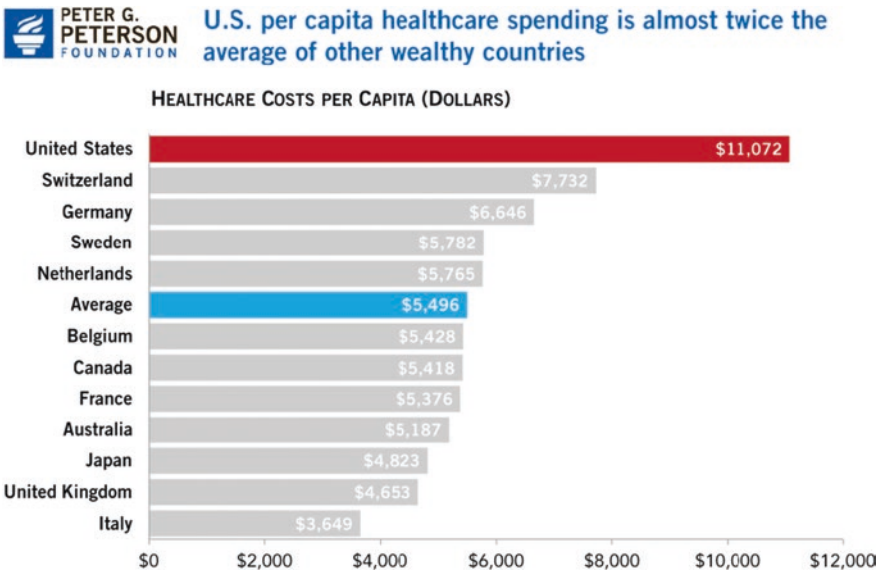


Fig. 36.1 US healthcare spending in relation to that of other nations (https://www.pgpf.org/blog/2020/07/how-does-the-us-healthcare-system-compare-to-other-countries). (Source: Organisation for Economic co-operation and Development, *OECD Health Statistics 2020*, July 2020. NOTES: The five countries with the largest economies and those with both an above median GDP and GDP per capita, relative to all OECD countries, were included. Average does not include the U.S. data are for 2019. Chart users purchasing power parities to convert data into U.S. dollars. ©2020 Peter G. Peterson Foundation)

36.1 Population Health Management

Population health management is the system of care that drives better health outcomes and patient experiences at a lower cost for populations for whom organizations have agreed to take responsibility. This is further exemplified by the Quadruple Aim identified by many healthcare policy leaders (Fig. 36.5).

In our health system, population health is managed under the guidance of the chief population officer. Important strategic priorities have been to build analytics and electronic medical record platforms, identify the most vulnerable populations, build community health maintenance programs, and match patient populations to resources based on risk (Fig. 36.6). Powerful population analytics platforms are needed to identify and manage specific segments of the population we are entrusted. Ochsner Health uses Epic's Healthy Planet and others. An example of the system's analytics capability is the identification of the population at highest risk (3%) for readmission. The ability to identify this vulnerable segment of patients has enabled

Fig. 36.2 US healthcare quality and outcome in relation to that of other nations (https://www.pgpf.org/blog/2020/07/how-does-the-us-healthcare-system-compare-to-other-countries). (Source: Organisation for Economic co-operation and Development, *OECD Health Statistics 2020*, July 2020. NOTES: Data are not available for all countries for all metrics. Data are for 2019 or latest available. ©2020 Peter G. Peterson Foundation)

us to direct our outpatient care management resources more intentionally to support patients who have the greatest need for care coordination and chronic disease management.

Besides analytics capability, organizations need to build programs and care management systems to address the needs of patients with specific chronic diseases, end-of-life concerns, and risks from social determinants of health. Ochsner Health is continuing to build the infrastructure needed for comprehensive population health management (Fig. 36.7).

This suite of programs is designed to work together to cover the health needs of our populations. The components are inpatient health liaisons to bridge care gaps after hospital discharge, outpatient complex and chronic care management, post-discharge transition of care outreach, in-home visits, digital tracking programs, post-acute care integration, home health interventions, and analytics/network management.

Fig. 36.3 Growth of cost and lives in value-based agreements at the Ochsner Health

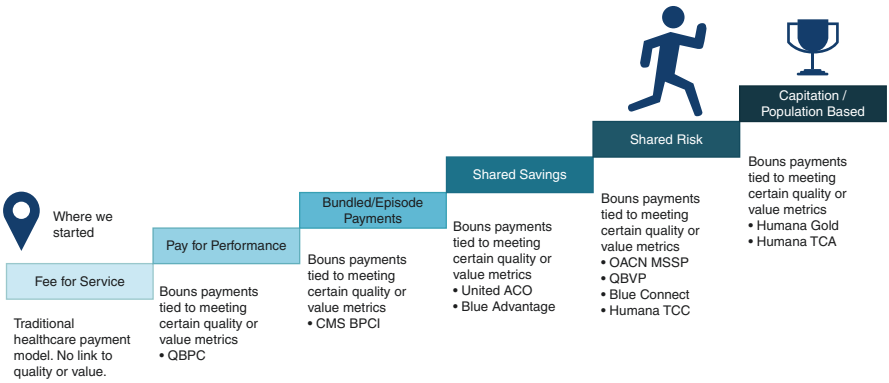


Fig. 36.4 Evolution of value-based payments and quality incentives at the Ochsner Health. CMS Centers for Medicare and Medicaid Services, BPCI Bundled Payment for Care Improvement, ACO Accountable Care Organization, OACN Ochsner Accountable Care Network (Ochsner Medicare ACO), QVBP Quality Value-Based Payment, QBPC Quality Blue Primary Care (Blue Cross capitated contract), QBVP Quality Blue Value Partnerships (Blue Cross commercial risk contract), Humana TCC Humana Total Care Commercial (narrow network insurance product for Ochsner Health provider network), Humana TCA Humana Total Care Advantage (narrow network Medicare full-risk advantage plan)

Key Concept

A population management approach by a health system includes a suite of programs that cover the health needs of its population. At Ochsner, these include post-discharge transitional care, in-home visits, chronic care management, home health interventions, post-acute care integration, and digital health tracking programs.

Fig. 36.5 Healthcare's Quadruple Aim

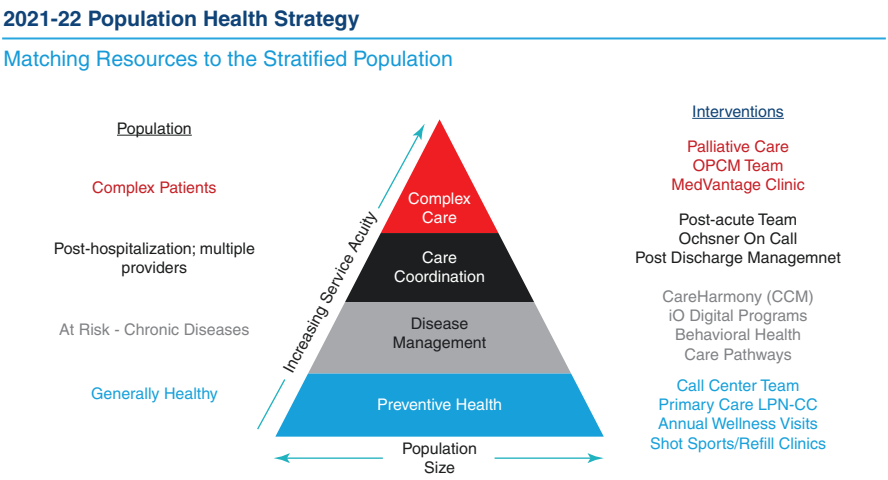


Fig. 36.6 Strategy of matching resources to risk-stratified populations at the Ochsner Health. CCM chronic care management, LPN licensed practical nurse, CC care coordinator, OPCM Outpatient complex case management

In designing programs to reduce avoidable service utilization among high-cost, high-need populations, longitudinal care management is key. Ochsner Health created an outpatient complex case management (OPCM) program for Medicare beneficiaries. A dedicated care coordinator is familiar with each enrolled patient's history. With the patient's care team, they assemble and communicate a personalized treatment plan. They assist with scheduling appointments, coordinate with

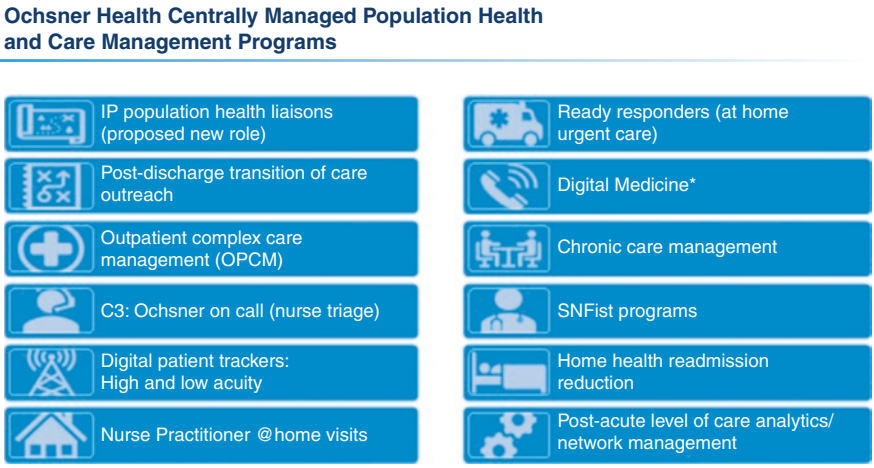


Fig. 36.7 Ochsner Health population and care management programs. SNF skilled nursing facility, IP inpatient

pharmacy and testing centers, arrange transportation, and leverage community support programs.

To expand access to care resources for discharged patients or for those who would otherwise utilize emergency departments (ED), we created alternative access points. The Ochsner-on-Call service provides free 24/7 access to expert advice on care options and health concerns. Ochsner-on-Call nurses render real-time help to remove the burden of deciding where to seek care in stressful situations. The Ochsner Anywhere Care program helps patients avoid the doctor's office. They can see a doctor now, obviating the need to call to make an appointment. This can all be done via the patient's or family member's smartphone without the need for a computer. The Ochsner Anywhere Care program offers patients complete cost transparency to pull down barriers and instill trust. The Ochsner Urgent Care system offers convenient in-person care for urgent conditions with later evening and weekend access. The Ready Responder program offers urgent care in the home. The Ready Responders program leverages technology to connect skills that already exist in the community to the people who need help. This rideshare-like service dispatches emergency medical technician (EMT)-certified personnel (EMTs, nurses, firefighters, etc.) to make an urgent home visit. Their goal is to arrive within 10 minutes. If needed, a physician can be added to the home visit via telehealth technology.

More access to care at home is created through the Nurse Practitioner at Home program that includes home care for the palliative care patient. This program, together with specialized clinics for highly complex and fragile patients ("Medvantage" Clinics), has resulted in a 57% reduction in hospital admissions for this population segment, while achieving 100% adherence to statin protocols, improved hemoglobin A1c levels, and blood pressure control. Ambulatory care coordinators can use medical staff-approved written order guidelines to enhance primary care goals. They also close care and prevention gaps through registry work, placing bulk orders, and initiating

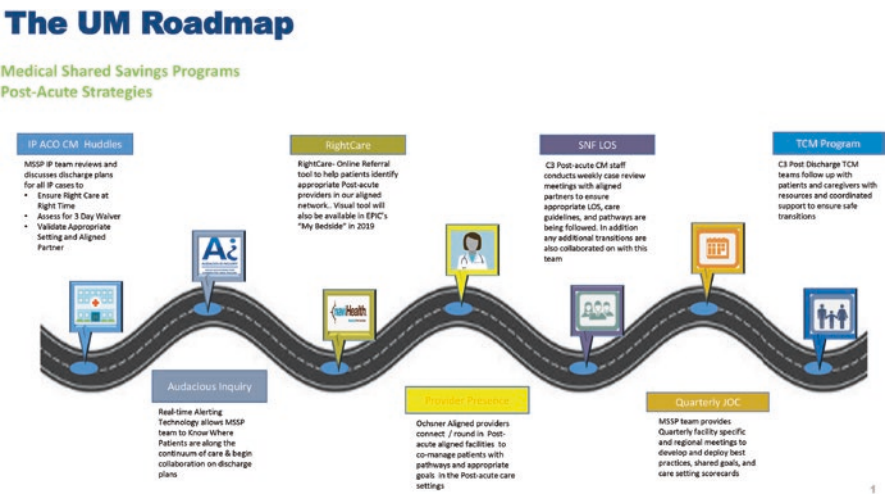


Fig. 36.8 Post-acute care strategies for the Medicare Shared Savings Program. JOC joint operating council

patient notifications. Another application of Ochsner Health population and care management tools was for the Medicare Shared Savings Program (MSSP), with a focus on post-acute care strategies (Fig. 36.8). Even with participation in bidirectional MSSP program variants, the Ochsner Health has been able to achieve annually increasing shared savings while maintaining or improving care quality.

36.2 Early Results from Ochsner Health Population Management Programs

The journey toward population health is long and arduous. When initiated, it may confuse team members who are used to thinking only in fee-for-service terms. It requires expenditures of resources that, at least for a time, appear to have uncertain returns. Yet it is the right thing to do for our community and our state. Ochsner Health leaders have identified improving the health of the state's population as an overarching goal and defined it as moving to a state health ranking of 40th from the current position by the year 2030. This is termed the "40 by 30" or "Healthy State" initiative.

Therefore, it has been gratifying to observe the early successes of population health management in our organization. Our OPCM programs have resulted in substantial reductions in hospital admissions and emergency department visits. This program targets 60–90-day intensive interventions for low- and high-risk populations, the latter defined as having at least two hospitalizations or ED visits within a 180-day period. While the most significant reductions in unnecessary admissions and ED visits were seen early (after 60 days), reductions persisted after 180 and 360 days (Fig. 36.9). Over a 4-year period, this program has resulted in more than $1000 in healthcare cost savings on a per member, per month basis regardless of

Outpatient Care Management Reduces Admissions and ED Visits

- **60-90 day intensive intervention** for high risk members
- **Algorithm** (multi-chronic; polypharmacy; acute utilization) **identifies 3% of at risk populations**
- **Significant improvements in utilization** at 60/180/360 days post-enrollment
- **A reduction in total costs of $1,038 pmpm was observed (Price Haywood et al, 2019)**

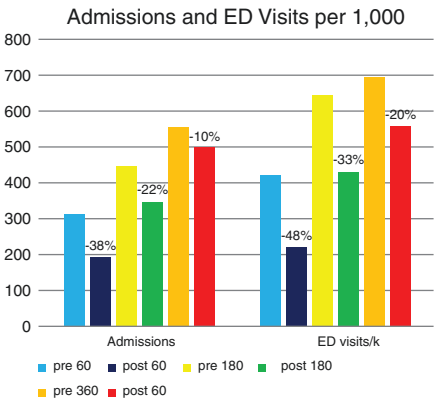


Fig. 36.9 Outpatient care management reduces hospital readmissions and ED visits. ED emergency department, visits/k visits per thousand members of the population

risk level [1]. Bringing a high-intensity lifestyle-based collaborative obesity treatment program to underserved populations in Louisiana has resulted in clinically significant and safely achieved weight loss [2] with a favorable effect on cardiometabolic risk factors [3].

Building integrated partnerships with a preferred network of post-acute care providers has likewise shown multiple benefits. Patients referred to these preferred partners required less time at skilled nursing facilities, were readmitted to acute care hospitals at lower rates, and had lower costs for skilled nursing care (Fig. 36.10). Preventive care interventions are being prioritized throughout our primary care and specialty clinical practices. Population health platforms within the electronic medical record support the targeting of sections of our population who have not yet experienced the benefits of these health-promoting interventions. A performance dashboard focuses awareness and drives action (Fig. 36.11).

36.3 Improving Documentation of Population Health

While started in the hospital inpatient setting, clinical documentation improvement (CDI) programs have increasingly emphasized ambulatory settings. Outpatient CDI attempts to assure the greatest accuracy in documentation for the ambulatory patient. Accurate representation of the patient's health profile informs risk adjustment for payment purposes; it also provides a sound basis for conducting successful population analytics. Accuracy is achieved with a combination of direct provider education, pre-chart reviews, and provider queries, among other interventions.

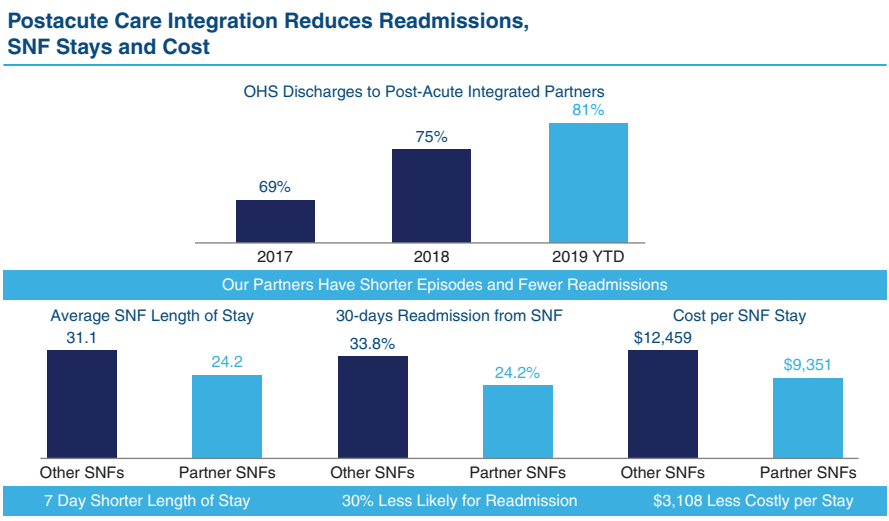
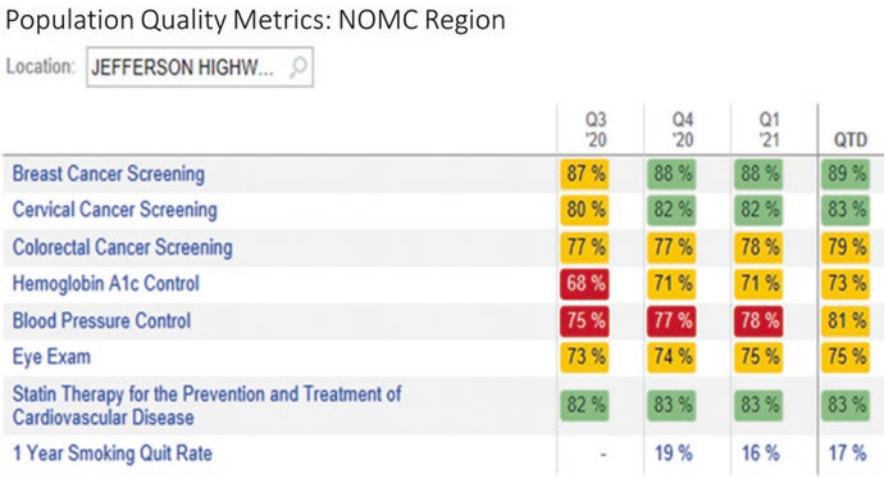


Fig. 36.10 Post-acute care integration reduces readmissions and SNF stays. OHS Ochsner Health system



	Q3 '20	Q4 '20	Q1 '21	QTD
Breast Cancer Screening	87 %	88 %	88 %	89 %
Cervical Cancer Screening	80 %	82 %	82 %	83 %
Colorectal Cancer Screening	77 %	77 %	78 %	79 %
Hemoglobin A1c Control	68 %	71 %	71 %	73 %
Blood Pressure Control	75 %	77 %	78 %	81 %
Eye Exam	73 %	74 %	75 %	75 %
Statin Therapy for the Prevention and Treatment of Cardiovascular Disease	82 %	83 %	83 %	83 %
1 Year Smoking Quit Rate	-	19 %	16 %	17 %

Fig. 36.11 Example of a population health quality dashboard in the New Orleans Medical Center Region. NOMC New Orleans Medical Center, Ochsner's Comprehensive Academic Medical Center, Q quarter, QTD quarter to date

Health severity risk adjustment (also referred to as value-based methodology) has been a trend for the past 10 years and calculates a payment against the cumulative severity of illness for a given practice or hospital patient population. Risk adjustment is a process used by the Centers for Medicare & Medicaid Services (CMS)/Department of Health and Human Services (HHS) to reimburse Medicare Advantage (MA) plans based on the health status of their members, set target prices (benchmarks) for value-based payment programs such as accountable care organizations and bundled payment initiatives, and establish commercial risk adjustment for commercial health plans to stabilize premiums. Diagnoses from the previous year are used to establish the capitation of payments per MA plan. The patient's risk-adjusted factor score is calculated by variables to predict the cost of healthcare. Variables include demographics, hierarchical condition categories (HCCs), Medicaid status, disabled status, and HCC interactions. Providers can control the capture of chronic conditions but not demographics. Therefore, capturing all documented diagnoses to highest level of specificity within a calendar year leads to better patient care and revenue to adequately provide support patient populations.

36.4 Hierarchical Condition Categories: Importance for Payment and Quality

HCCs are used for risk adjustment in the Medicare Advantage program. These are referred to as CMS-HCCs. HCCs are also used for risk adjustment in commercial payer arrangements. These are referred to as HHS-HCCs. HCCs must be reassessed, redocumented, and resubmitted annually to be taken into account in reconciling capitated payments.

HCC Risk Model The HCC risk model includes demographic variables such as age, gender, disability, and socioeconomic status. The model variables used for risk-adjusted capitation payment include clinically significant and high-cost medical conditions such as cancer, heart disease, hip fracture, and others. Despite the existence of more than 70,000 ICD-10 diagnosis codes, fewer than 10,000 are used to generate the over 200 HCCs; of these, fewer than 100 HCCs are used for risk adjustment. Therefore, it is valuable to have clear knowledge of these risk-adjusting diagnoses so that resources can be directed appropriately to support the health of populations in greatest need and at highest risk. The basic HCC categories are infection, neoplasm, diabetes, musculoskeletal openings (e.g., ostomies), amputations; cerebrovascular disease, transplants, skin injury, complications, substance abuse, as well as metabolic, liver, gastrointestinal, blood, psychiatric, spinal, neurological, heart, vascular, lung, eye and kidney disorders [4]. These condition themes focus on broad clinically meaningful chronic health conditions; they are not sensitive to acute conditions or multiple codes that are closely related.

Documentation Related to HCCs As mentioned, the HCC diagnosis must be redocumented and captured every 12 months. The impact of documenting a condition

to the highest level of specificity is beneficial as it will demonstrate a severity level of the patient's illness that a nonspecific code could not achieve. HCCs have associated weights called values that are additive in determining individual risk scores. Values can differ substantially. HCCs with some of the highest values include stage 3 and 4 pressure ulcers (1.34 and 2.49, respectively), amputee status (0.78), and presence of ostomies for feeding or elimination (0.65). By contrast, the HCC diabetes with complications has a value of only 0.11. Documentation of these chronic conditions is often missed, particularly in specialty clinics. Even in primary care, visits are frequently focused on acutely presenting conditions. Providers should be encouraged to document all comorbid conditions, not only those that pertain to the narrow reason for the visit. This is difficult to accomplish, and organizations, including our own, have adopted special programs to conduct annual health risk assessments with advanced practice providers. HCCs that are considered for risk adjustment and capitation payment are aggregated annually from both outpatient and inpatient claims. The impact of inpatient claims on HCC accumulation is small, as only about 7% of ICD-10 diagnoses are classified as complication or comorbidity (CC) or major complication or comorbidity (MCC) conditions, which are also designated as HCCs. Still, the majority of HCCs are also CCs or MCCs [4]. Commonly omitted conditions impacting HCCs are morbid obesity, chronic respiratory, hepatic and kidney disease, ostomies, plegias, seizures, dialysis status, device complications, and amputations.

Low Hanging Fruit

These conditions impact HCCs and are frequently overlooked: morbid obesity, chronic respiratory, hepatic and kidney disease, ostomies, plegias, seizures, dialysis status, device complications, and amputations.

The HHS-HCC diagnostic classification was developed from private claims data. Of the 264 HHS-HCCs, only 127 are included in HHS risk adjustment models. Again, HHS-HCCs represent clinically significant health conditions that substantially affect the cost of care and insurance risk. Important adult HHS-HCCs are diabetes, depression, asthma, chronic obstructive pulmonary disease, cancer, dysrhythmias, autoimmune disease, and heart failure.

Importance of HCCs in Quality Reporting

Quality leaders appreciate that HCCs are used for risk adjustment of federal alternative payment systems, including the quality gates governing the MSSP, the quality measures affecting the advanced CMS Bundled Payment for Care Improvement (BPCI) programs, and the CMS quality measures such as 30-day mortality and 30-day readmission rates and the measures related to the CMS value-based purchasing program. The benefits of accurate documentation of HCCs therefore go far beyond better reimbursement in capitated environments and affect risk attribution for a large portion of the US population.

Key Concept
Accurate documentation of hierarchical condition diagnoses affects risks adjustment for the CMS 30-day mortality and 30-day readmission measures as well as affecting quality measures in federal alternative payment systems, including the MSSP, BPCI, and VBP programs.

36.5 Provider Education

Educational efforts should aim to increase an understanding to report diagnosis codes if they were actively monitored, evaluated, assessed, or treated (MEAT) during face-to-face encounters. Chronic conditions that are being medically managed should be reported, even though the chronic condition is not the patient's primary reason for a visit. Education should offer context for ambulatory care providers. Adequate and appropriate documentation in the patient's medical record supports the analytic and other resources needed for population health and quality initiatives.

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Quality Metrics for CMS Care Bundles and Commercial Center of Excellence Status

37

G. F. Chimento, A. Chauffe, J. Wooldridge, and P. Oravetz

Increasingly, payer organizations are shifting the focus from payments for specific medical services to payment for episodes or bundles of care. This shift is intended to motivate provider organizations to adjust their care models for greater value generation. Value is defined as achievement of an outcome of care at a certain cost. For example, the Centers for Medicare & Medicaid Services (CMS) Comprehensive Care for Joint Replacement (CJR) program defines its incentives to hospitals by their ability to achieve certain cost targets based on a tier of quality measure performance. While there are other bundle payment arrangements, in this chapter, we focus on CMS bundles and the Employers Centers of Excellence Network (ECEN).

37.1 CMS Bundled Payment Programs

Cost pressure on federal payment systems from an aging population and escalating healthcare costs has led to the development of alternate payment models (APMs). Bundled payment care initiatives (BPCIs) and accountable care organizations (ACOs) are forms of APMs. BPCIs have been applied to total joint replacement, hip

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fracture, spine procedures, congestive heart failure, urinary tract infection, stroke, percutaneous coronary intervention, coronary artery bypass, chronic obstructive pulmonary disease, and other major conditions [1]. Participation is generally by choice, and hospitals must participate for 3 years with a possible extension period. Cost is bunded for each care episode, and participating organizations are eligible for payment or recoupment based on cost performance against a target price; payment is modified by quality gates.

In contrast, ACOs measure quality outcomes annually and require improved outcomes year over year for ACOs to be eligible for reconciliation payments [2]. ACOs follow several principles. They are provider-led organizations with strong primary care; an ACO is accountable for quality outcomes and per capita costs; payments are linked to improvement in quality and reduced costs; and ACOs have reliable measures of performance to support improvement and instill care team's confidence. A common APM is a bundled reimbursement model such as the voluntary Bundled Payments for Care Improvement (BPCI) and the mandatory CJR initiatives. Implementation of these bundled payment models has generally resulted in cost savings and quality improvements [3]. Successful provider organizations have found ways to reduce the number and severity of poor-quality outcomes within their at-risk populations. Comorbid conditions such as diabetes and cardiac, cerebrovascular, and pulmonary diseases contribute to poor postoperative outcomes, so tight care coordination is necessary, both to avoid surgical complications and exacerbations and sequelae of comorbidities.

37.2 The Comprehensive Care for Joint Replacement Model [4]

With the aging of the US population and improvements in survival to advanced age, total joint replacement procedures are projected to increase steadily. In response, CMS has transitioned to APMs in many health service areas. This CMS innovation aims to support better and more efficient care for beneficiaries undergoing hip and knee replacement surgery. These procedures are the most common inpatient surgeries for Medicare beneficiaries. Payment is bundled and quality measured for a 90-day episode of care related to hip and knee replacements (MS-DRG 469 – major joint replacement or reattachment of lower extremity with major complications or comorbidities, or MS-DRG 470 – major joint replacement or reattachment of lower extremity without major complications or comorbidities). Hospitals, physician groups, and post-acute care providers are financially incentivized to collaborate. This is meant to improve the quality and care coordination starting with the hospitalization for surgery through 90 days postdischarge. Quality improvement was to be driven through care standardization because of known substantial variation, for example, in the rate of infections and implant failures, as well as overall cost. This payment model began on April 1, 2016; on January 1, 2021, more than 400 hospitals in 67 geographic areas of the United States were participating in the CJR model. Initially set to run for 5 years, the CJR program was recently extended for 3 years

and now includes total joint replacement performed in an outpatient setting. Payments are made based on a participating hospital's ability to achieve its target price for the episode of care, determined by regional pricing benchmarks and adjusted by a 3% discount. The latter is further adjusted at reconciliation based on composite quality score [5].

37.2.1 Quality Measures for the CMS CJR Program

CMS publishes hospitals' quality outcomes from the CJR program on the Web [6]. Two quality measures included in the CJR model are complications and patient experience. The total hip and knee arthroplasty (THA/TKA) complication measure is endorsed by the National Quality Forum (NQF) as measure #1550. The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey measure (NQF #0166) relates to patient experience. The THA/TKA complication measure includes only elective THA/TKA patients. It excludes fractures which are, however, included in the CJR model. This measure represents a risk-standardized complication rate for 90 days following THA/TKA surgery. The components of this measure include acute myocardial infarction (AMI), deep vein thrombosis (DVT), pulmonary embolism (PE), pneumonia, bleeding, and others (see Chapter "Risk-Adjusted Complications"). Case selection for concurrent review should take into account how bundled payment programs like CJR measure care quality. Many of the conditions measured also represent AHRQ PSIs or may be captured with other metrics addressing complications. Organizations participating in bundled programs should assess whether their existing process for concurrent review adequately captures this group of patients.

Key Concept
CMS alternative payment methods require certain quality and patient safety outcomes to be met for hospitals to realize the maximum payment for bundled care such as for total hip and knee replacement.

The patient experience measure for the CJR model uses the HCAHPS linear mean rollup (HLMR) score. The HLMR score describes performance in the publicly reported HCAHPS measures, excluding the pain management domain. The HLMR is the average of the mean scores of the HCAHPS measures, using a weight of 100% for each of the six composite HCAHPS measures and a weight of 50% for the cleanliness, quietness, overall hospital rating, and recommend-the-hospital measures.

The CJR model incentivizes the submission of THA/TKA patient-reported outcomes for eligible elective primary THA/TKA procedures but does not require these data for reconciliation payment eligibility. CJR participants who successfully submit patient-reported outcomes data can increase their financial opportunity; they

receive points toward their composite quality score ranging from 0 to 20 points (10 for performance in complications, 8 for patient experience, and 2 for additional data reporting such as patient-reported metrics). Provider organizations are sorted into four quality categories along this spectrum: barely acceptable, acceptable, good, and excellent. Based on where organizations fall along this quality spectrum, their reconciliation payment (or repayment responsibility amount based on cost performance) will be reduced by a lesser or greater percentage. There is also a quality gate for organizations to be eligible for any reconciliation payments, meaning hospitals or groups that perform below a minimally acceptable quality standard are ineligible for incentive or reconciliation payments.

37.2.2 Experience with CJR at the Ochsner Health

Our experience with quality improvement through care standardization for major joint replacement began several years before CMS mandated CJR program participation in the New Orleans metropolitan statistical area. Through a collaboration of leaders from orthopedic surgery, anesthesia, perioperative pain management, case management, nursing, and physical therapy, the Ochsner Perioperative Surgical Home (PSH) model was initiated in 2014. Sustained success with this model of care pathway and algorithm set our total joint replacement program apart from others regionally and allowed for our program to become designated as a national center of excellence (COE).

The PSH model of care is a proven method of delivering perioperative value-based care. Clinical pathways and other care algorithms standardize care, while internal clinical benchmarking leads to continuous feedback and improvement [7]. PSH programs improve postoperative recovery and decrease hospital utilization by reducing hospital length of stay, utilization of opioids, and discharge to nonhome locations of care [8]. Through a collaborative approach, the PSH allows for programmatic, multidisciplinary participation in the periprocedural care for total joint patient populations [9]. A multidisciplinary team engages with the patient from the time of surgical decision to 90 days postoperatively. Care is given through standardized evidence-based protocols. Care pathways built into the electronic medical record (EMR) require documentation of adherence to each pathway step. Weekly reports are generated and team-reviewed for improvement opportunity.

Introducing the PSH model resulted in significant total cost savings, decreased hospital length of stay, and fewer readmissions within 30 days of discharge. Some of the components of PSH approach are not new. A randomized prospective study [10] demonstrated that a pathway-controlled physical therapy regimen led to enhanced recovery and reduction of adverse events in the post-acute phase when compared to a non-pathway regimen. In addition to standardizing physical therapy, the PSH model achieves superior outcomes through preoperative patient optimization and comorbidity management, standardized pain and anesthesia regimens, enhanced postoperative monitoring, standardized discharge orders, and increased coordination of care between hospital and community health providers.

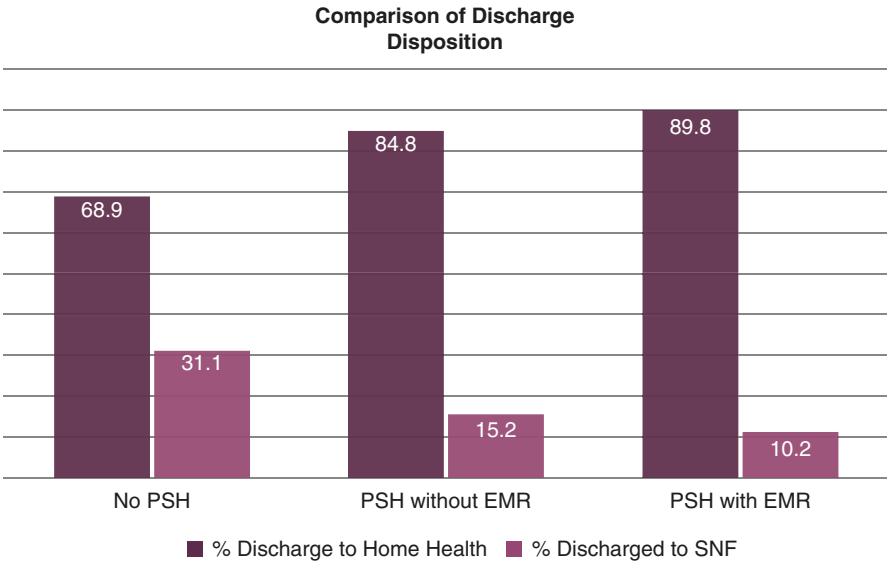

Fig. 37.1 Evolution of discharge disposition performance in the Ochsner PSH model. (© Ochsner Health)

The PSH model of care was begun without fully integrating all its pathways into the EMR. Neither did EMR reporting capability exist initially. Even without these features, our teams were able to achieve remarkable (20–50%) improvements in cost, length of stay, home health discharge, and skilled nursing facility (SNF) utilization. PSH implementation reduced 30-day readmission rates from 4.3% to 1.9%. EMR integration did not significantly affect readmission rate [11, 12]. However, adding EMR integration to the PSH model further reduced certain costs and increased home discharge while decreasing reliance on SNF care [11]. EMR integration further increased home health discharge and decreased SNF discharge (Fig. 37.1). Our participation in the CMS CJR program has been successful. Our organization has been eligible for reconciliation payments year over year. For the most recent composite CJR quality scores, we achieved a ten of ten points level of performance [6].

37.3 Employers Center of Excellence Network

As employers experience significant health costs for their employees, they look to increase the value they realize for their investment. Such value derives from the avoidance of unnecessary healthcare utilization, with care outcomes that are unchanged or better than care received outside of the COE network. An example of such value generated is that COE patients avoided surgery 20% of the time after referral. When surgery was performed in the COE setting, COE care teams were able to avoid SNF-based post-acute care utilization [13]. Our own experience

supports the ability of a care coordination and perioperative population management program to reduce such post-acute care utilization after total joint replacement [12]. Reports of provider organizations' bundled arrangement experience with private payers exist [14]. The arrangements generally resulted in lower costs due to reduced utilization and improved quality from reductions in complications and readmissions.

Employers look for provider organizations that are an optimal fit with their culture and care philosophy for their employees. They seek highly reliable organizations to help solve for utilization, standardization, and cost of care while achieving the best possible patient experience and care outcomes. Employers find COE partners through convenors (also referred to as third-party administrators) such as the Health Design Plus. These third-party organizations conduct a thorough assessment on behalf of their employer's clients. They look closely at publicly available cost and quality information about the organization and surgeons; a site visit is part of the due diligence to determine whether they recommend pursuing a COE partnership. A hospital cannot unilaterally apply to be an employer COE; if the hospital meets the criteria the employer sets, the third-party administrator invites the hospital to apply. Organizations desiring to establish employer COE partnerships need to be aware of the significant resources required for participation. Principally, such resources are necessary to assure success in what is essentially an arrangement where the provider organization takes risk for an episode of surgical or interventional care. An initial investment is required to apply for and stand up the program. The most resource-intensive ongoing activities under such programs are care navigation, care review, financial systems, continuous learning, and data analytics/reporting. For example, our financial systems needed rebuilding to allow service provision without authorization and billing. Our relationship as a Walmart's COE has required the dedication of three patient and access navigators.

From the medical perspective, organizations should have experience in well-functioning processes and programs to coordinate perioperative care that can assure process reliability, harm avoidance, and avoidance of unnecessary utilization. This generally incudes a preoperative optimization process, care pathways hardwired into the EMR, and algorithms for tailored application of higher-level resources based on patient data (e.g., a surgical home program). Our group practice model organization facilitates the provision of cross-disciplinary services such as radiology, anesthesia, surgeons' fees, and hospital charges that can all be furnished by the same provider entity, as well as patient-centered services such as hotel accommodation, outpatient therapy, durable medical equipment, and transportation.

Patients often travel from far away, including from other states. After discharge, they are housed in a hospital-affiliated hotel. They receive physical therapy in the hotel. If they have a minor medical or postsurgical issue, they can be seen in the hotel room for their convenience. Organizationally and administratively, COE programs require health system executive support, alignment of transportation, care management, appointment navigation, hospitality, medical equipment procurement, outpatient therapy (e.g., physical therapy services delivered in the hotel), concierge services, medical informatics, information technology, and finance teams.

37.3.1 Quality Metrics Monitored in ECEN Programs

The quality indicators monitored and reported by employer networks generally encompass a 30-day period after the procedure. They include 30-day mortality and readmissions, PE, DVT, surgical site infection (SSI), surgical site bleeding, wound dehiscence, and unplanned return to operating room (ROR) [15]. Hospital length of stay is also reported as part of the ECEN quality dashboard, as is AMI, pneumonia, or sepsis within 7 days, unplanned medical management after discharge, and completion of total joint-related patient questionnaires documenting functional outcomes.

Key Concept
To be chosen as a national center of excellence by major employers, hospitals must meet network care philosophy, volume, and quality criteria. Quality metrics include complications and process metrics. Systems for reporting and concurrent review need to be set up or adjusted to account for these requirements.

37.3.2 Experience with ECEN at the Ochsner Health

Adoption of the PSH at our hospitals, with systemwide adoption of hardwired care pathways in the EMR, set the stage for successful entry into the ECEN. To date, surgical patients referred to Ochsner as part of the ECEN designation include those considered for hip replacement, knee replacement, spine surgery, and bariatric surgery.

Our experience is most comprehensive with joint replacement surgery. Among the 11 health systems for which quality data were most recently available, Ochsner had complication rates of PE, DVT, SSI, wound dehiscence, and ROR, which were below the group means of the participating centers. Readmission rates were near the mean but improved substantially year over year.

Our journey toward a bariatric ECEN contract arrangement entailed a multistep process. We were initially approached with a high-level data request to assess our group's fit for the network program. The information requested comprised of our bariatric center's volumes, accreditation status, and patient outcomes. Patient outcome data sought by ECEN surrogates included readmission rates, length of stay, and infection rates. Once these data were found acceptable, we were able to move to the next step which involved a more formal application and telephone interview. The full application included more detailed information about the Ochsner bariatric program and our institution. In particular, detail was sought regarding safety culture and performance within the hospital and within the division of bariatrics. The application also included questions about our EMR and its adaptability to facilitate the network program for bariatric referral. Our application acceptance prompted an

onsite visit. Once full approval to proceed was obtained, program details were worked out, including data sharing and payment arrangements. Moving forward, we have planned yearly safety and quality evaluations using data from our previous year. This process compares our data to that of the other participating centers. Our continued participation in the program is dependent on these quality outcomes, which include minimum case activity for the facility and each surgeon.

37.4 Summary and Future Considerations

Population management has become a strategic priority at the Ochsner Health. The group practice model, aided by health system information technology and care coordination resources, has been able to support a substantial entry into perioperative population management. Our experience has been that perioperative patient engagement through preoperative classes for patients and family, reinforcement during preoperative visits, and intentionally timed postoperative contacts have all contributed materially to improved outcomes, patient experience, and efficiency of care. A system for accurate medical record documentation and quality metric reporting, augmented by our concurrent review process, is key to successful participation in bundled care arrangements. Our COE patients' feedback has been overwhelmingly positive. While substantial resources needed to be invested to support them, the program's high-touch, encouraging outcomes have continued to energize our care teams.

Targeted access to electronic platforms for patient engagement will be critical to the success of perioperative population management [16]. Accordingly, we have initiated the use of such platforms (e.g., Epic Care Companion, telemedicine pre- and postoperative visits facilitated through the Ochsner Health patient portal). We envision continuing to expand their use. Personnel, such as unit-based providers and care navigators, are being aligned to encourage patients to sign on to and adopt their use prior to and during hospitalization.

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Reducing Readmission Penalty and Cost Risks Through Comprehensive Care Transition and Accurate Documentation

38

L. Davies, A. Schubert, R. Guthrie, and P. Oravetz

During the past decade, the readmission rate of hospitals has improved. Yet, the focus on readmission reduction remains unabated. The reason for this is the high cost of avoidable hospital readmission. This cost is increasing as patients' medical complexity rises. At our organization, the cost of all services provided during a hospital readmission has recently been estimated at $12,500. Considered one of drivers of wasteful healthcare spending, readmission has become a target for payers to penalize provider organizations. This is certainly true for federal payment programs such as the CMS Hospital Readmissions Reduction Program (HRRP). In 2021, the CMS Medicare Shared Savings Programs will, for the first time, include readmission performance as a condition to realize savings under the program's payment schemes. Provider organizations that cannot pass the readmission quality gate will forfeit any shared savings advantages otherwise due to them under an upside risk arrangement.

38.1 Readmission Drivers and Interventions

Hospital readmission reduction has been well studied. It is generally acknowledged that readmissions can be reduced by a number of interventions aimed at improved coordination of patient care across the care continuum from the community setting

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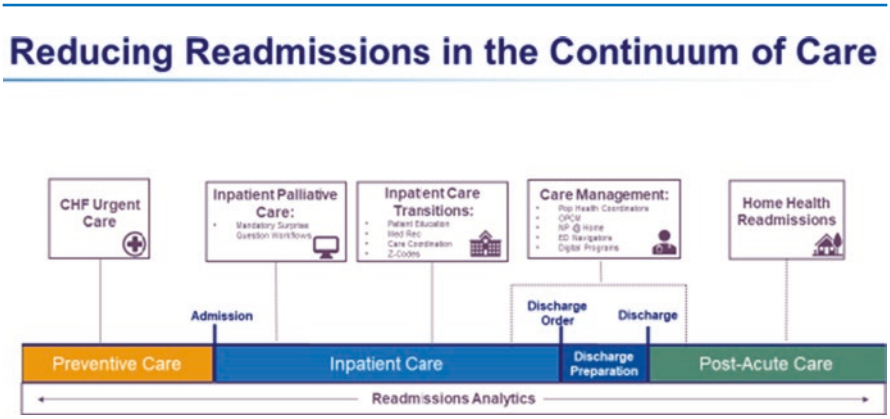

Fig. 38.1 Conceptual approach to readmission reduction at the Ochsner Health. (© Ochsner Health)

to the hospital environment and back to integrating the patient's care unto the community with appropriate handover communication and follow-up (Fig. 38.1). This is especially important for patients with social risk factors such as housing instability, depression, drug abuse, and poor social support since readmission rates are higher for patients where these conditions were identified in the medical record [1]. For heart failure, the most important causes for 30-day readmission include medication noncompliance, smoking, noncompliance with sodium- and fluid-restricted diet, poor documentation of discharge information, failures in patient education, and the influence of comorbidities (hypertension, diabetes mellitus, metabolic syndrome, atherosclerotic disease, anemia, depression) [2].

Important interventions hospitals and health systems have undertaken to reduce readmission include risk stratification of patients on or shortly after admission, intense education of patients and family members, conduction of accurate medication reconciliation, discharging patients with a supply of medications in hand, and assuring timely follow-up with the patient's primary care physician. After discharge, interventions continue with efforts such as reeducating patients and family members, contacting patients virtually or by telephone, assuring they are following post-discharge instructions, and giving them the medications and information they need. In addition, organizations who are successful at readmission reduction partner with community health programs and post-acute care facilities, such as by placing providers in nursing homes and arranging home visits.

There are a number of programs that have been studied in the quest to reduce heart failure readmission. Multidisciplinary heart failure clinics reduce all-cause readmission rates by 19–44% [3, 4]. Visiting nurse services and nurse specialist have been reported to reduce all-cause readmission rates by 37% [2], a physician-directed heart failure transitional care program by 21% [5], and home tele-monitoring. Meta-analyses of structured post-discharge phone calls indicate a 25% reduced heart failure readmission rate, without affecting all-cause readmission [6] though some have observed a 20% reduction [7].

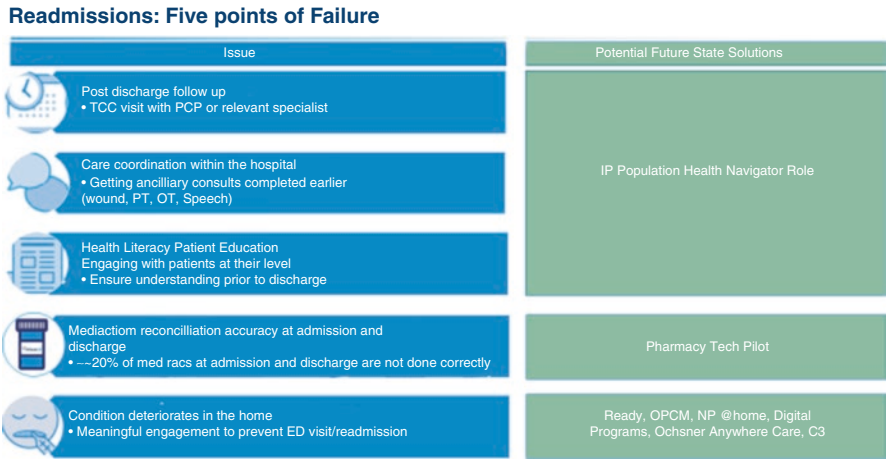

Fig. 38.2 Areas of emphasis for hospital management of readmission reduction. PT physical therapy, OT occupational therapy, NP nurse practitioner, OPCM outpatient care management, C3 Ochsner on-call program. (© Ochsner Health)

Follow-up within one-week post-discharge reduces all-cause readmission rates by 10–15% while a transitional care home program may reduce all-cause readmission rates by 6–12% [8]. Our organization has identified important gaps in the care of hospital inpatients who are discharged. We believe that our hospitals will benefit from focusing on five areas of emphasis, dubbed the "five points of readmission failure" (see Fig. 38.2).

38.2 Special Populations and Considerations

While the above interventions have been successfully employed for general patient populations, other factors may need to be considered, including for surgical patients. For example, the occurrence of Patient Safety Indicator events during the index admission may predict risk of readmission. Bath et al. [9] showed that the presence of any PSI (patient safety indicator) event during hospital admission for open or endovascular abdominal aortic aneurysm surgery resulted in a 71% higher risk of a 30-day readmission. Using NSQIP (National Surgical Quality Improvement Program) data, Hughes et al. [10] identified patients undergoing colectomy as having among the highest rates of complications, including readmission. Readmission rate in vascular patients was found to decrease after a preoperative smoking cessation program was initiated [11]. Study of patients with inflammatory bowel disease revealed opportunity for care modification [12]. Patients with epilepsy are known to have a high rate of readmission for psychiatric disorders [13, 14]. Likewise, readmission risk may be reduced by focusing on readmission for pulmonary edema in dialysis patients [15].

Elective surgical patients also experience higher readmission rates when their pain is uncontrolled preoperatively and when their chronic opioid usage is high. A beneficial effect on readmission rate of surgical patients was observed when preoperative opioid consumption could be reduced, such as decreasing morphine equivalents by 50% [16]. Specialty surgical populations such as those undergoing bariatric surgery may experience readmission risk from such conditions as dehydration from poor oral intake. Our bariatric program was able to reduce readmissions by reinvigorating its navigator program to remind discharged bariatric surgery patients of the need for appropriate diets and fluid intake. Readmission rates for patients having undergone head and neck cancer operations are influenced substantially by the specific procedure (e.g., flap procedures and laryngectomy, where readmission rate is very high). Reasons for readmission in this population were often infection, wound dehiscence, dysphagia, and electrolyte disorders [17]. Knowledge of specific risk factors in surgical specialty population can inform targeted postoperative care management programs with nutritional support, close monitoring for infection, and control of medical comorbidities associated with poor wound healing such as diabetes.

38.3 The CMS Hospital Readmissions Reduction Program

The CMS Hospital Readmissions Reduction Program (HRRP) is part of the Medicare value-based purchasing program that was instituted to link payment for services to the quality of hospital care. CMS has reported risk-standardized readmission rates (RSRRs) since 2009. The premise of this program is that hospital would invest in systems that can improve communication and care coordination so that unnecessary hospital readmissions can be avoided [18]. Under this CMS value-based payment program, payments to Inpatient Prospective Payment System hospitals are reduced for excess readmissions. Since 2019, CMS also benchmarks hospitals' readmission performance compared to other hospitals with a similar proportion of dually eligible for Medicare and full Medicaid benefits. To do this, CMS considers six diagnostic categories and procedures for determination of a hospitals' 30-day risk-standardized unplanned readmission measures. They are (1) acute myocardial infarction (AMI), (2) chronic obstructive pulmonary disease (COPD), (3) heart failure (HF), (4) pneumonia, (5) coronary artery bypass graft (CABG) surgery, and (6) elective primary total hip arthroplasty and/or total knee arthroplasty (THA/TKA).

The payment reduction is calculated based on performance during a rolling three-year performance period. A hospital can be penalized by a maximum of 3% of all of its Medicare fee-for-service base operating diagnosis-related group payments during the fiscal year of October 1–September 30. HRRP data are publicly reported on the Hospital Compare website.

38.4 Beyond CMS HRRP

Organizations increasingly have risk for the management of illness based on contracted arrangements with payers, such as capitated contracts with commercial insurers or preferred contracted referral such as through the Employer Centers for Excellence Network (see Chap. 37). Alternatively, there may be populations for whom the organization is completely or partially at risk, such as its own employees under an employer-sponsored health plan, or if the organization itself offers an insurance product.

At our organization, the number of patients and revenue affected by such arrangements have risen progressively. At the same time, population health IT platforms, shared electronic medical record, and increasing presence of community transition programs have made it easier to relaunch a comprehensive health system-wide readmission effort (see Fig. 38.3).

38.5 Priority Components of Readmission Programs Accomplished in the Hospital Setting

Despite the enormous benefit of community programs to reduce hospital admissions, our organization's preliminary data point to a number of opportunities that can be taken advantage of even in the hospital setting. They are medication

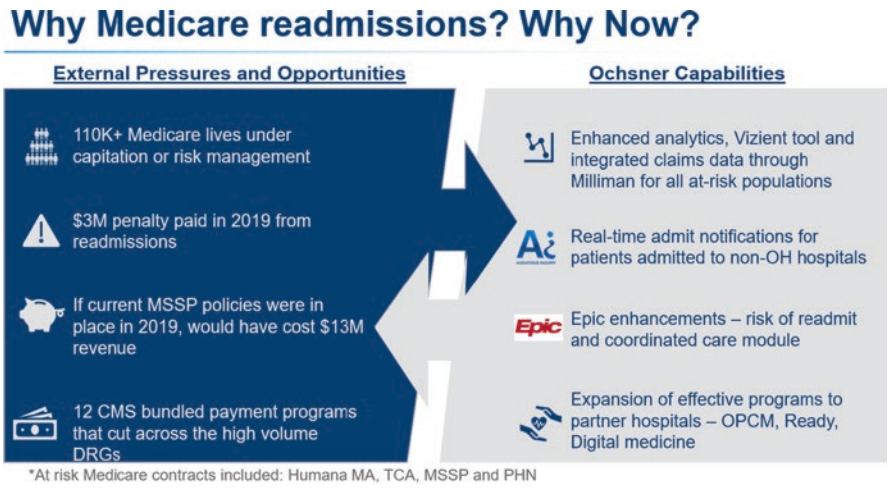

Fig. 38.3 The case for readmission reduction at the Ochsner Health. DRG diagnosis-related group, MA medicare advantage, MSSP Medicare Shared Savings Program, PHN physicians health network. (© Ochsner Health)

reconciliation [19], bedside medication delivery, patient education tailored to health literacy, care coordination, and timely handoff to a provider after hospital discharge.

These areas of focus were identified based on review of data from our own patients. For example, we found that most of our patients are being discharged without a scheduled follow-up appointment. Patients, who did not have a follow-up visit scheduled with a provider at the time of discharge, were nearly twice as likely to experience a readmission within 30 days. A follow-up visit is defined as a visit with any provider within 14 days of discharge including virtual visits. Over 35% of our readmissions occur within the first week of discharge. The top readmitting conditions are consistently CHF (congestive heart failure) and sepsis.

As a result, we have started to focus on performance indicators that relate to these key program priorities (see Fig. 38.4). Our analytic platforms are being rebuilt to reflect the need for internal transparency and timeliness in reporting. In addition, we have begun the process of "close-in" readmission case reviews that focus on readmissions within seven days to identify further opportunities for medical practice, medication management, and care coordination.

While it is critical to assure timely outpatient follow-up after hospital discharge, hospital care teams also must be aware of the outpatient resources available to which to connect discharged patients. This should be done based on the patients' discharge disposition, medical complexity, and specific diagnoses (see Fig. 38.5).

Improvement in readmission rates has been reported to be associated with increased post-hospital discharge mortality. This was reported for both the CMS HRRP heart failure and COPD (chronic obstructive pulmonary disease) diagnostic cohorts [20, 21]. While confounding factors may well be able to account for some

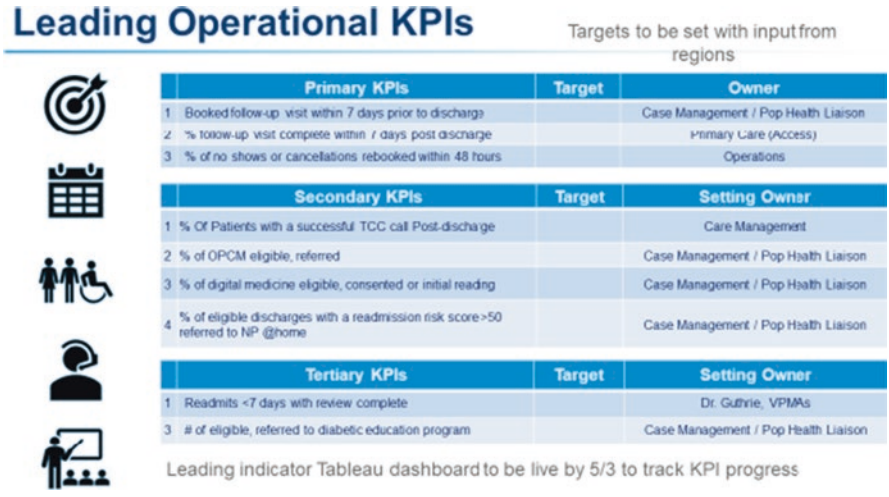

Fig. 38.4 Key performance indicators (KPI) to focus Ochsner Health hospital management teams on readmission reduction. TCC transitional care coordinator, Pop population, VPMA vice president of medical affairs. (© Ochsner Health)

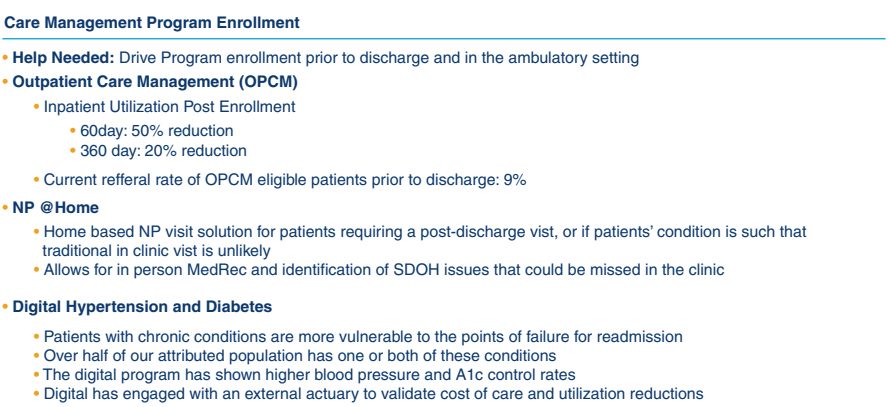

Fig. 38.5 Opportunity to enroll discharging patients into the Ochsner Heath outpatient care management programs. SDOH social determinants of health, A1c hemoglobin A1c. (© Ochsner Health)

of these observations [22], sufficient lack of clarity around this observation exists [23] to justify including mortality as a balancing measure in improvement efforts designed to reduce readmission rate.

38.6 Accuracy of Documentation for Readmission

The metrics used in the CMS Hospital Readmission Penalty Program are well documented [18]. It focuses on unplanned readmissions within 30 days from a short-term acute care hospital patient discharge. CMS considers the 30-day time frame a "clinically meaningful period for hospitals to collaborate with their communities in an effort to reduce readmissions." In this section, we discuss the diagnostic categories included in the HRRP penalty calculations and highlight the opportunities for review of diagnostic accuracy, including related to the diagnoses CMS uses for risk-standardized readmission rates (RSRRs). Risk adjustment includes both comorbid medical conditions and procedural information. RSRR risk adjustment methodology does not include codes related to social determinants of health.

CMS defines an index admission as the hospitalization to which the readmission occurrence is attributed. Patients are included if they have a principal discharge diagnosis of AMI, COPD, HF, or pneumonia or had an admission for CABG (coronary artery bypass graft) and hip or knee replacement surgery. Only patients aged 65 or older who are enrolled in the Medicare Fee-For-Service Part A and Part B for 12 months prior to the index admission are included. Patients who are transferred to another acute care facility are excluded. Transfers are defined as occurring when the second inpatient admission occurs on the same day or the next calendar day following discharge from the first inpatient admission in acute care hospital. Patients readmitted to the same hospital on the same calendar day of discharge for the same condition as the index admission are not considered readmissions unless the principal diagnosis for the readmission is different from the index admission. It would go

beyond the scope of this chapter to provide an exhaustive recounting of the complete CMS HRRP. For a complete understanding of the methodology used by CMS, readers are referred to the CMS website [24].

A. *Acute myocardial infarction (AMI):* Review for this readmission stratum should focus on assuring that a diagnosis of myocardial infarction was actually confirmed or ruled in by the managing physician. Table 38.1 indicates which diagnosis codes for the index admission are used to determine whether a readmission is counted toward in the CMS Hospital Readmission Penalty Program. It also gives the conditions which are excluded because of pre-identified unavoidable planned readmissions, such as for maintenance chemotherapy or bone marrow transplant. It will be important to document and characterize such readmissions accurately, so that no doubt exists over why the patient is being readmitted. This in turn will allow coders to assign the appropriate DRG.

   Readmission rates are risk adjusted. Table 38.2 shows the variables used in risk adjustment. A subset of these is not used in risk adjustment if they are mentioned only in the index admission.

   The risk adjustment model for AMI procedure codes for PTCA (percutaneous transluminal coronary angioplasty), CABG, and CABG-related complications (such as displacement, leakage, or breakdown).

B. *Chronic obstructive pulmonary disease (COPD):* This category of readmission type is defined by a number of different respiratory disease diagnoses that extend beyond chronic bronchitis or emphysema. Also included are cases with a principal diagnosis of acute and chronic respiratory failure, respiratory distress, and respiratory arrest, as long as a chronic bronchitis diagnosis is also included as a secondary diagnosis (Table 38.3). Therefore, the HRRP COPD measure cohort also includes admissions with a principal diagnosis of acute respiratory failure and a secondary diagnosis of COPD with exacerbation. Note that this listing also includes planned readmissions which are excluded.

   Risk adjustment is accomplished with a list of comorbidities including morbid obesity, sleep-disordered breathing, cancer, diabetes mellitus, malnutrition, fluid/electrolyte/acid base disorders, gastrointestinal disorders, hematological conditions, dementia, depression, neurological disorders, stroke, congestive heart failure, acute coronary syndrome, renal failure, mechanical ventilation history (within past 12 months), pulmonary fibrosis, pneumonia, respirator dependency, psychiatric disorders, pressure ulcers, vascular disease, amputation, vertebral fractures, and others. As with the AMI HRRP measure, many of these diagnoses must be present both during the index admission and the readmission to be considered for risk adjustment. A detailed list is available on the CMS website.

C. *Heart failure (HF):* Heart failure readmission rates are among the highest within the CMS HRRP diagnostic categories, amounting to 20–25% [2]. Table 38.4 shows the principal diagnoses that are included and excluded. Note that both acute and chronic, right and left, and biventricular failures are included. Heart failure linked to hypertension and chronic kidney disease is also part of the list

Table 38.1 ICD-10 acute myocardial infarction measure diagnosis codes for CMS HRRP

ICD-10-CM code (index claim, principal diagnosis code)	**Description**
I21.01	ST-elevation myocardial infarction involving the left main coronary artery (STEMI)
I21.02	ST-elevation myocardial infarction involving the left anterior descending (STEMI) coronary artery
I21.09	ST-elevation myocardial infarction involving other coronary arteries of the (STEMI) anterior wall
I21.11	ST-elevation myocardial infarction involving the right coronary artery (STEMI)
I21.19	ST-elevation myocardial infarction involving other coronary arteries of the (STEMI) inferior wall
I21.21	ST-elevation myocardial infarction involving the left circumflex coronary artery (STEMI)
I21.29	ST-elevation myocardial infarction involving other sites (STEMI)
I21.3	ST-elevation myocardial infarction of unspecified site (STEMI)
I21.4	Non-ST-elevation myocardial infarction (NSTEMI)
I21.9	Acute myocardial infarction, unspecified
CCS procedure category (readmission claim, any procedure position)	Planned readmission procedures (exclusions)
64	Bone marrow transplant
105	Kidney transplant
176	Other organ transplantations (other than bone marrow corneal or kidney)
CCS diagnosis category (readmission claim, principal diagnosis code)	Planned readmission diagnoses (exclusions)
45	Maintenance chemotherapy, radiotherapy
254	Rehabilitation care; fitting of prostheses; and adjustment of devices

Table 38.2 AMI readmission all risk variables

Risk variable	Description
Age minus 65 (years above 65, continuous)	Mean age minus 65
Male	Male (%)
Anterior myocardial infarction	Anterior myocardial infarction (see AMIReadm RVs defined by ICD tab, Risk Variable ID #3)
Non-anterior location of myocardial infarction	Non-anterior location of myocardial infarction (see AMIReadm RVs defined by ICD tab, Risk Variable ID #4)
History of coronary artery bypass graft (CABG) surgery	History of coronary artery bypass graft (CABG) surgery (see AMIReadm RVs defined by ICD tab, Risk Variable ID #2)
History of percutaneous transluminal coronary angioplasty (PTCA)	History of percutaneous transluminal coronary angioplasty (PTCA) (see AMIReadm RVs defined by ICD tab, Risk Variable ID #1)
Severe infection, other infectious diseases (CC 1, CC 3–CC 7)	HIV/AIDS (CC 1) bacterial, fungal, and parasitic central nervous system infections (CC 3), viral and late effects, central nervous system infections (CC 4), tuberculosis (CC 5), opportunistic infections (CC 6), and other infectious diseases (CC 7)
Metastatic cancer and acute leukemia (CC 8)	Metastatic cancer and acute leukemia (CC 8)
Cancer (CC 9–CC 14)	Lung and other severe cancers (CC 9), lymphoma and other cancers (CC 10); colorectal, bladder, and other cancers (CC 11); breast, prostate, and other cancers and tumors (CC 12); other respiratory and heart neoplasms (CC 13); and other digestive and urinary neoplasms (CC 14)
Diabetes mellitus (DM) or DM complications (CC 17–CC 19, CC 122–CC 123)	Diabetes with acute complications (CC 17), diabetes with chronic complications (CC 18), diabetes without complications (CC 19), proliferative diabetic retinopathy and vitreous hemorrhage (CC 122), and diabetic and other vascular retinopathies (CC 123)
Protein-calorie malnutrition (CC 21)	Protein-calorie malnutrition (CC 21)
Other significant endocrine and metabolic disorders and disorders of fluid/electrolyte/acid-base balance (CC 23–CC 24)	Other significant endocrine and metabolic disorders (CC 23) and disorders of fluid/electrolyte/acid-base balance (CC 24)
Iron deficiency or other/unspecified anemias and blood disease (CC 49)	Iron deficiency or other/unspecified anemias and blood disease (CC 49)
Dementia or other specified brain disorders (CC 51–CC 53)	Dementia with complications (CC 51), dementia without complications (CC 52), nonpsychotic organic brain syndromes/conditions (CC 53)
Hemiplegia, paraplegia, paralysis, functional disability (CC 70–CC 74, CC 103–CC 104, CC 189–CC 190)	Quadriplegia (CC 70), paraplegia (CC 71), spinal cord disorders/injuries (CC 72), amyotrophic lateral sclerosis and other motor neuron diseases (CC 73), cerebral palsy (CC 74), hemiplegia/hemiparesis (CC 103), monoplegia, other paralytic syndromes (CC 104), amputation status, lower limb/amputation complications (CC 189), amputation status, and upper limb (CC 190)
Congestive heart failure (CC 85)	Congestive heart failure (CC 85)

Table 38.2 (continued)

Risk variable	Description
Acute coronary syndrome (CC 86–CC 87)	Acute myocardial infarction (CC 86) and unstable angina and other acute ischemic heart diseases (CC 87)
Angina pectoris (CC 88)	Angina pectoris (CC 88)
Coronary atherosclerosis/ other chronic ischemic heart diseases (CC 89)	Coronary atherosclerosis/other chronic ischemic heart diseases (CC 89)
Valvular and rheumatic heart disease (CC 91)	Valvular and rheumatic heart disease (CC 91)
Specified arrhythmias and other heart rhythm disorders (CC 96–CC 97)	Specified heart arrhythmias (CC 96) and other heart rhythm and conduction disorders (CC 97)
Stroke (CC 99–CC 100)	Cerebral hemorrhage (CC 99) and ischemic or unspecified stroke (CC 100)
Cerebrovascular disease (CC 101–CC 102, CC 105)	Precerebral arterial occlusion and transient cerebral ischemia (CC 101); cerebrovascular atherosclerosis, aneurysm, and other diseases (CC 102); and late effects of cerebrovascular disease, except paralysis (CC 105)
Vascular or circulatory disease (CC 106–CC 109)	Atherosclerosis of the extremities with ulceration or gangrene (CC 106), vascular disease with complications (CC 107), vascular disease (CC 108), and other circulatory diseases (CC 109)
Chronic obstructive pulmonary disease (COPD) (CC 111)	Chronic obstructive pulmonary disease (COPD) (CC 111)
Asthma (CC 113)	Asthma (CC 113)
Pneumonia (CC 114–CC 116)	Aspiration and specified bacterial pneumonias (CC 114), pneumococcal pneumonia, empyema, lung abscess (CC 115), viral and unspecified pneumonia, and pleurisy (CC 116)
Dialysis status (CC 134)	Dialysis status (CC 134)
Renal failure (CC 135–CC 140)	Acute renal failure (CC 135); chronic kidney disease; stage 5 (CC 136), chronic kidney disease; severe (stage 4) (CC 137), chronic kidney disease; moderate (stage 3) (CC 138), chronic kidney disease; and mild or unspecified (stages 1–2 or unspecified) (CC 139) and unspecified renal failure (CC 140)
Other urinary tract disorders (CC 145)	Other urinary tract disorders (CC 145)
Decubitus ulcer or chronic skin ulcer (CC 157–CC 161)	Pressure ulcer of the skin with necrosis through to the muscle, tendon, or bone (CC 157), pressure ulcer of the skin with full-thickness skin loss (CC 158), pressure ulcer of the skin with partial-thickness skin loss (CC 159), pressure pre-ulcer skin changes or unspecified stage (CC 160), and chronic ulcer of the skin, except pressure (CC 161)

of inclusion diagnoses, as is high-output failure. Especially important for centers with advanced heart failure programs are the exclusion procedure codes such as for ventricular assist devices and heart transplantation. It is worth noting that readmissions are excluded if these procedures were reported during the index admission or up to 12 months prior to the index admission. The list of comorbid diagnoses used for risk adjustment is similar to the one for COPD,

Table 38.3 COPD measure diagnosis codes for CMS HRRP

ICD-10-CM code (index claim, principal diagnosis code)	Description
J41.0	Simple chronic bronchitis
J41.1	Mucopurulent chronic bronchitis
J41.8	Mixed simple and mucopurulent chronic bronchitis
J42	Unspecified chronic bronchitis
J43.0	Unilateral pulmonary emphysema [MacLeod's syndrome]
J43.1	Panlobular emphysema
J43.2	Centrilobular emphysema
J43.8	Other emphysema
J43.9	Emphysema, unspecified
J44.0	Chronic obstructive pulmonary disease with acute lower respiratory infection
J44.1	Chronic obstructive pulmonary disease with (acute) exacerbation
J44.9	Chronicobstructive pulmonary disease, unspecified
J96.00	Acute respiratory failure, unspecified whether with hypoxia or hypercapnia
J96.01	Acute respiratory failure with hypoxia
J96.02	Acute respiratory failure with hypercapnia
J96.20	Acute and chronic respiratory failure, unspecified whether with hypoxia or hypercapnia
J96.21	Acute and chronic respiratory failure with hypoxia
J96.22	Acute and chronic respiratory failure with hypercapnia
J96.90	Respiratory failure, unspecified, unspecified whether with hypoxia or hypercapnia
J96.91	Respiratory failure, unspecified with hypoxia
J96.92	Respiratory failure, unspecified with hypercapnia
R06.03	Acute respiratory distress
R09.2	Respiratory arrest

Table 38.3 (continued)

CCS procedure category(readmission claim, any procedure position)	**Planned readmission procedures (exclusions)**
64	Bone marrow transplant
105	Kidney transplant
176	Other organ transplantations (other than bone marrow corneal or kidney)
CCS diagnosis category(readmission claim, principal diagnosis code)	**Planned readmission diagnoses (exclusions)**
45	Maintenance chemotherapy, radiotherapy
254	Rehabilitation care, fitting of prostheses, and adjustment of devices

Table 38.4 Heart failure measure diagnosis codes for CMS HRRP

ICD-10-CM code (index claim, principal diagnosis code)	**Description**
I11.0	Hypertensive heart disease with heart failure
I13.0	Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease
I13.2	Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease or end-stage renal disease
I50.1	Left ventricular failure, unspecified
I50.20	Unspecified systolic (congestive) heart failure
I50.21	Acute systolic (congestive) heart failure

(continued)

Table 38.4 (continued)

I50.22	Chronic systolic (congestive) heart failure
I50.23	Acute on chronic systolic (congestive) heart failure
I50.30	Unspecified diastolic (congestive) heart failure
I50.31	Acute diastolic (congestive) heart failure
I50.32	Chronic diastolic (congestive) heart failure
I50.33	Acute on chronic diastolic (congestive) heart failure
I50.40	Unspecified combined systolic (congestive) and diastolic (congestive) heart failure
I50.41	Acute combined systolic (congestive) and diastolic (congestive) heart failure
I50.42	Chronic combined systolic (congestive) and diastolic (congestive) heart failure
I50.43	Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure
I50.810	Right heart failure, unspecified
I50.811	Acute right heart failure
I50.812	Chronic right heart failure
I50.813	Acute on chronic right heart failure
I50.814	Right heart failure due to left heart failure
I50.82	Biventricular heart failure
I50.83	High-output heart failure
I50.84	End-stage heart failure
I50.89	Other heart failures
I50.9	Heart failure, unspecified

Table 38.4 (continued)

ICD-10-PCS code (index claim or claim within 12-months prior to index, any procedure position)	Exclusions
02HA0QZ	Insertion of implantable heart assist system into heart, open approach
02HA0RJ	Insertion of short-term external heart assist system into heart, intraoperative, open approach
02HA0RS	Insertion of biventricular short-term external heart assist system into heart, open approach
02HA0RZ	Insertion of short-term external heart assist system into heart, open approach
02HA3QZ	Insertion of implantable heart assist system into heart, percutaneous approach
02HA3RJ	Insertion of short-term external heart assist system into heart, intraoperative, percutaneous approach
02HA3RS	Insertion of biventricular short-term external heart assist system into heart, percutaneous approach
02HA3RZ	Insertion of short-term external heart assist system into heart, percutaneous approach

(continued)

Table 38.4 (continued)

02HA4QZ	Insertion of implantable heart assist system into heart, percutaneous endoscopic approach
02HA4RJ	Insertion of short-term external heart assist systeminto heart, intraoperative, percutaneous endoscopic approach
02HA4RS	Insertion of biventricular short-term external heart assist system into heart, percutaneous endoscopic approach
02HA4RZ	Insertion of short-term external heart assist system into heart, percutaneous endoscopic approach
02YA0Z0	Transplantation of heart, allogeneic, open approach
02YA0Z1	Transplantation of heart, syngeneic, open approach
02YA0Z2	Transplantation of heart, zooplastic, open approach

except that it includes COPD and structural (valvular) heart disease. Procedure codes for CABG and CABG-related complications (such as displacement, leakage, or breakdown) are also included in the risk model. Again, there are about 30 diagnoses that are not used for readmission risk adjustment if they only occur during the index admission and are not documented in the readmission.

D. *Pneumonia:* The inclusion diagnoses for the diagnostic category of pneumonia are listed in Table 38.5. It is noteworthy that this list includes principal diagnosis codes that denote sepsis. To be included, the principal sepsis diagnosis codes require (1) a secondary diagnosis of pneumonia or aspiration pneumonia recorded as present on admission and (2) the absence of a secondary diagnosis of severe sepsis coded as present on admission. Again the risk adjustment model is similar to the other HRRP diagnostic categories and includes them. The risk model includes CABG procedures performed within 12 months prior to the index admission. As with other HRRP diagnostic categories, a list of about 30 diagnoses must be present on both admissions to be included in the model.

E. *Coronary artery bypass graft (CABG) surgery:* Included are all CABG procedure codes, regardless of the number of grafts and the type of graft utilized. Excluded are all other cardiac procedures (such as bypass grafts to the pulmonary circulation) or grafts involving the aorta or vena cava. Readmissions for bone marrow, kidney, and other major organ transplantations are also excluded.

Table 38.5 Pneumonia measure diagnosis codes for CMS HRRP

ICD-10-CM code (index claim)	Description
J69.0	Pneumonitis due to inhalation of food and vomit
A48.1	Legionnaires' disease
J09.X1	Influenza due to identified novel influenza A virus with pneumonia
J10.00	Influenza due to other identified influenza virus with unspecified type of pneumonia
J10.01	Influenza due to other identified influenza virus with the same other identified influenza virus pneumonia
J10.08	Influenza due to other identified influenza virus with other specified pneumonia
J11.00	Influenza due to unidentified influenza virus with unspecified type of pneumonia
J11.08	Influenza due to unidentified influenza virus with specified pneumonia
J12.0	Adenoviral pneumonia
J12.1	Respiratory syncytial virus pneumonia
J12.2	Parainfluenza virus pneumonia
J12.3	Human metapneumovirus pneumonia
J12.81	Pneumonia due to SARS-associated coronavirus
J12.89	Other viral pneumonia
J12.9	Viral pneumonia, unspecified
J13	Pneumonia due to Streptococcus pneumoniae

(continued)

Table 38.5 (continued)

J14	Pneumonia due to Haemophilus influenzae
J15.0	Pneumonia due to Klebsiella pneumoniae
J15.1	Pneumonia due to Pseudomonas
J15.20	Pneumonia due to staphylococcus, unspecified
J15.211	Pneumonia due to methicillin-susceptible Staphylococcus aureus
J15.212	Pneumonia due to methicillin-resistant Staphylococcus aureus
J15.29	Pneumonia due to other staphylococcus
J15.3	Pneumonia due to streptococcus, group B
J15.4	Pneumonia due to other streptococci
J15.5	Pneumonia due to Escherichia coli
J15.6	Pneumonia due to other Gram-negative bacteria
J15.7	Pneumonia due to Mycoplasma pneumoniae
J15.8	Pneumonia due to other specified bacteria
J15.9	Unspecified bacterial pneumonia
J16.0	Chlamydial pneumonia
J16.8	Pneumonia due to other specified infectious organisms
J18.0	Bronchopneumonia, unspecified organism
J18.1	Lobar pneumonia, unspecified organism
J18.8	Other pneumonia, unspecified organism
J18.9	Pneumonia, unspecified organism
A02.1	Salmonella sepsis
A22.7	Anthrax sepsis
A26.7	Erysipelothrix sepsis

Table 38.5 (continued)

A32.7	Listerial sepsis
A40.0	Sepsis due to streptococcus, group A
A40.1	Sepsis due to streptococcus, group B
A40.3	Sepsis due to Streptococcus pneumoniae
A40.8	Other streptococcal sepses
A40.9	Streptococcal sepsis, unspecified
A41.01	Sepsis due to methicillin-susceptible Staphylococcus aureus
A41.02	Sepsis due to methicillin-resistant Staphylococcus aureus
A41.1	Sepsis due to other specified staphylococcus
A41.2	Sepsis due to unspecified staphylococcus
A41.3	Sepsis due to Haemophilus influenzae
A41.4	Sepsis due to anaerobes
A41.50	Gram-negative sepsis, unspecified
A41.51	Sepsis due to Escherichia coli [E. coli]
A41.52	Sepsis due to Pseudomonas
A41.53	Sepsis due to Serratia
A41.59	Other Gram-negative sepses
A41.81	Sepsis due to Enterococcus
A41.89	Other specified sepses
A41.9	Sepsis, unspecified organism
A42.7	Actinomycotic sepsis
A54.86	Gonococcal sepsis
B37.7	Candidal sepsis

(continued)

Table 38.5 (continued)

T81.44XA	Sepsis following a procedure, initial encounter
T81.44XD	Sepsis following a procedure, subsequent encounter
T81.44XS	Sepsis following a procedure, sequela
ICD-10-CM code (index claim, secondary diagnosis code)	**Exclusions**
R65.20	Severe sepsis without septic shock
R65.21	Severe sepsis with septic shock

The risk adjustment model includes many of the conditions from other HRRP risk adjustment lists but also includes cardiogenic shock and history (within 12 months prior to the index diagnosis) of prior heart surgery (CABG or valve) or heart surgery-related complications.

F. *Elective primary total hip arthroplasty and/or total knee arthroplasty (THA/TKA):*

CMS publishes a comprehensive list of codes that exclude cases from being included in the count of readmission for the purposes of determining the HRRP readmission penalty. For the THA/TKA readmission measure, these exclusion codes pertain to different types of hip or lower extremity fractures (including stress fractures or pathological fractures), whether displaced or nondisplaced and whether represented in a primary or secondary position. Other types of exclusionary procedure codes capture conditions requiring partial arthroplasty, cases requiring revision, removal or resurfacing, and diagnoses related to mechanical complications. Readmissions for bone marrow, kidney, and other major organ transplantations are also excluded. Risk adjustment is via the general model of medical comorbidities used for other readmission categories. In addition, the number of procedures performed, congenital deformities, posttraumatic osteoarthritis, and whether the index admission had an elective total hip arthroplasty procedure are taken into account.

38.7 Review for Readmission Risk

Completeness of diagnostic profile for optimal risk adjustment Concurrent review should assure that risk variable diagnoses are accurately represented. If a diagnosis was present during the index admission, review should include an assessment for clinical indicators showing it was still present on readmission. These diagnoses include infectious diseases, diabetes with acute complications, fluid/electrolyte/

acid-base disorders, congestive heart failure, acute myocardial infarction, unstable angina, arrhythmias, cardiac conduction disorders, cerebral hemorrhage, stroke, TIA (transient ischemic attack), hemiplegia, hemiparesis, atherosclerosis or vascular disease of the extremities, bacterial pneumonias, empyema, lung abscess (see Table 38.6), dialysis status, renal failure, pressure ulcers and pressure injury, and amputation status. Because risk models include procedure codes documented up to 12 months prior to index admission, accuracy of procedural documentation is critical.

Exclusionary conditions The CMS HRRP methodology allows for certain diagnoses to exclude a patient's record from being included in the readmission measure. An example would be in the case of readmission for pneumonia (see Table 38.5). We have encountered situations where a stress fracture was missed in the preliminary coding profile. Only on concurrent review did it become evident that accurate

Table 38.6 Diagnoses only conditionally used by CMS for heart failure risk adjustment (not used unless documented in both the index and readmission)

Diabetes with acute complications
Disorders of fluid/electrolyte/acid-base balance
Acute liver failure/disease
Peptic ulcer, hemorrhage, and other specified gastrointestinal disorders
Cardiorespiratory failure and shock (+ R09.01 and R09.02)
Congestive heart failure
Acute myocardial infarction
Unstable angina and other acute ischemic heart diseases
Specified heart arrhythmias
Other heart rhythm and conduction disorders
Cerebral hemorrhage
Ischemic or unspecified stroke
Hemiplegia/hemiparesis
Monoplegia and other paralytic syndromes
Atherosclerosis of the extremities with ulceration or gangrene
Vascular disease with complications
Vascular disease
Other circulatory diseases
Aspiration and specified bacterial pneumonias
Pneumococcal pneumonia, empyema, and lung abscess
Dialysis status
Acute renal failure
Unspecified renal failure
Nephritis
Pressure ulcer of the skin with necrosis through to the muscle, tendon, or bone
Pressure ulcer of the skin with full-thickness skin loss
Pressure ulcer of the skin with partial-thickness skin loss
Pressure pre-ulcer skin changes or unspecified stage
Amputation status and lower limb/amputation complications
Amputation status and upper limb

representation of this diagnosis would exclude the case from becoming a readmission event.

Accuracy of the diagnosis It is critical to assure the accuracy of the index diagnosis ruling in a readmission event. An example of this is a situation where an elevation in troponin levels prompts documentation of a differential diagnosis in the medical record which includes NSTEMI. On further evaluation, the patient is found to have demand ischemia. Because the latter is not a diagnosis leading to an index admission under the HRRP, a denominator event is avoided if the diagnosis is represented correctly.

38.8 Medical Staff Awareness, Education, and Engagement

Hardwiring processes to drive better outcomes coupled with education to key resources and provider engagement allow the medical staff to act a principal element in the reduction of readmissions.

Several best practices have been proven to reduce readmissions 25–50% [25]. These practices – as discussed in detail above – include complete medication reconciliation, appropriate post-hospital care coordination, and proper medical documentation, among others. While each of these items applied independently provide readmission risk reduction, research has revealed that a broadly applied and multifaceted approach yields the greatest impact. Marshalling the necessary resources to reduce readmissions may seem intuitive to some medical staff; however, studies have revealed that it is consistently difficult for individual providers to anticipate which patients will be readmitted and to correctly direct services that can control for increased readmission risk [26].

Several organizations have effectively strengthened provider vigilance through electronic health record (EHR) enhancements that allow for standardized identification of patients with readmission episodes as well as readmission risk for potential subsequent hospitalizations. This identification of at-risk patients drives targeted interventions to be applied in a more consistent and systematic fashion. Our organization aims to augment patient-provider care interface with similar interventions for more uniform identification of readmission and readmission risk. It is the well-established expectation that all Ochsner providers effectively coordinate with inpatient care as well as complete all discharge orders and documentation in a timely fashion. This established patient care construct will be further supported by EHR-embedded cues that will allow providers to be more precise with the deployment of additional services such as outpatient case management, at-home provider services, and telehealth services, among others, for patients carrying an increased risk of readmission.

Alongside of bolstered EHR solutions to drive increased awareness of readmissions and hardwiring actions accordingly to higher-risk patients, education is necessary with the medical staff to have a clear understanding of the resources to be utilized in better supporting their patients beyond the hospital. As several of these

innovative solutions are new to our health organization, socializing these programs with our medical staff is essential in ensuring program adoption and stewardship.

Moving beyond the paradigm of awareness and education, effective examples of medical staff engagement complementing automated solutions and readmission program support have also been noted in medical literature. The most notable of these examples position providers as program champions through forums in which administrative data is reviewed and match to providers' perspective to allow for adaptations in program models to be adopted [27]. Whether in committee structure or individual case review, by engaging medical staff through purposeful reflection and feedback, the medical staff was a more empowered stakeholder in readmission efforts helping to afford meaningful change and adherence to standard processes. Some review processes have even included patient input or patient participation on committee to drive better outcome [28].

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Part V

Team Engagement and Teaching

Engaging the Hospital's Medical Staff

39

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Education of the medical staff about accurate documentation practices is thought to be the panacea for assuring accurate quality reporting as well as optimizing payment for services rendered. This premise is both maddeningly simple and complex. One need only peruse many of the prior chapters to get a glimpse of how difficult it would

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be for the average hospitalist, cardiologist, or surgeon to learn the implications of their acquired medical record documentation practices. We identify barriers to understand and education of the medical staff while illustrating some promising approaches to engaging them in documentation improvement based on our experience.

39.1 Barriers and Challenges to Physician Education

First, the greatest priority on a physician's mind is the Hippocratic calling. This will always be taking care of the patient, assuring the best therapy is chosen and administered, with the least risk of complications or adverse occurrences. Documentation of the process that healthcare providers go through to get to the best-fitting diagnosis is simply not even close in priority to the Hippocratic oath; neither is documenting what conditions were present on admission (POA). Second, there are so many nuances in the practice of medicine, with few clear-cut clinical pictures. The requirement to document a seemingly definitive diagnosis becomes especially difficult with the need to document contemporaneously in the medical record before all the relevant clinical information becomes available. The patient may have a degree of heart failure while also possibly having a pneumonitic process accounting for respiratory insufficiency, that is, in the provider's mind, not yet frank respiratory failure. The patient admitted with a stroke may have aspirated at home but may not yet exhibit signs of respiratory failure until the second day after admission. For the physician, it is difficult to tell and not worth valuable time to try to make that distinction or write about it in the medical record. Third, many physicians feel that what they write in the medical record should stand by itself and lead coders and clinical documentation improvement (CDI) professionals to the correct diagnosis that would seem obvious to the provider. They do not understand that coders are not allowed to make inferences from what they see; instead, they are bound to take whatever providers write in the medical record at face value. They do not understand that this is true even in a situation where the presence of certain clinical circumstances might paint quite a different clinical picture of the patient. Therefore, a diagnosis may be coded that does not accurately represent the patient's true clinical status. Moreover, there may be a certain amount of paranoia and disengagement regarding the importance of medical record documentation by physicians who are not part of an integrated health system and who feel less of a connection to hospital management and their priorities. They may reason that documenting in the hospital medical record has little to do with their reputation in the community and their ability to generate referrals.

39.2 Approach to Physician Education

Given these and other barriers, it is daunting to envision how physicians and advanced practice providers might be engaged and educated efficiently and in such a way that it represents a valuable experience for the medical staff. Traditionally, CDI professionals, physician advisors, and quality leaders have educated the

medical staff about documentation accuracy in venues such as presentations at departmental and general medical staff meetings. This can be facilitated by making educational credits available and scheduling such meetings at times conducive to providers' clinical schedules.

The effectiveness of physician education for documentation improvement has been studied in some settings. In a systematic review of such investigations in emergency department settings, Lorenzetti et al. found that audit, feedback, reminders, templates, and multipronged education interventions were effective approaches for improving physician documentation [1]. Others have assessed education efforts designed to improve documentation in the context of the electronic health record [2]; they found education to be among effective interventions, as was the implementation of reporting tactics based on the electronic medical record. An educational intervention designed to improve quality measures for oncology patients significantly improved nurse practitioners' understanding of quality metrics and drove improved performance in these metrics through the use of electronic medical record shortcuts called SmartPhrases [3]. A metric to track the effect of education efforts has been described. Rosenbaum et al. report developing and using a normalized case mix index measure that allows comparison of hospitalizations across multiple unrelated Medicare Severity Diagnosis Related Groups (MS-DRGs) [4].

39.3 Experiences at an Independent Academic Medical Center

The approach we have found to be most effective is the recruitment and development of physician champions for defined medical specialties or groups. At Ochsner's comprehensive academic medical center (CAMC), as well as at our health system community hospitals, we identified a group of documentation champions who are members of the medical staff. While documentation champions are not needed for every medical specialty, we have found it useful for physician documentation champions to be identified by their specialty medical leaders. Our CAMC documentation champions have been in place now for several years, representing the specialties of general surgery, colorectal surgery, oncology, ENT (ear, nose and throat), urology, cardiology, cardiothoracic surgery, neurocritical care, organ transplantation, and hospital medicine. Selection of these champions should not be based only on clinical and documentation knowledge. Importantly, these individuals should have personal, trusting relationships with the providers they are championing. This may mean having multiple champions across a health system or even within a department. Physician-led efforts to improve documentation and the resulting operational performance improvements have been described [5].

Keeping documentation physician champions engaged From our work with a large number of physician champions, we have been able to prioritize a few themes for generating their enduring interest and engagement: (1) listening to their colleague's perspective, (2) tailoring educational themes around cases from their own

practice, (3) making a clear connection to quality and outcomes of care, and (4) seeking win-win scenarios for them and their colleagues. The first priority we set, after the specialty physician champion had been appointed by their medical leader (or, in some cases, after they had volunteered), was to listen to their perspective after hearing an introductory discussion of how publicly reported quality metrics are determined. In many cases, they identified themselves how they wished to proceed to improve documentation accuracy. One example was the hugely insightful recognition by our neurocritical care physician champion relating to the way that his group documented brain edema, a key factor in determining the accuracy of risk adjustment in patients with intracranial neurological disease. He was instrumental in engaging his colleagues through a number of media, including a regularly updated documentation dashboard posted on their home unit (Fig. 39.1).

Through this physician's championship, the neurocritical care service line achieved a notable increase in case mix index.

Finding Relevant and Interesting Cases for Review Key to keeping the interest and engagement of the medical staff is to find cases that recently occurred in their own practice. A recent case is likely remembered better, along with the clinical picture and potential opportunities for documentation accuracy. By selecting cases from concurrent quality review, one can generally come within 2–3 weeks of hospital discharge. Case selection is based on the teaching area to be emphasized, for example, the accurate representation of malnutrition or ileus in general or colorectal surgery patients.

Making a clear connection to care quality: This involves being able to outline succinctly how a more accurate diagnosis would result in either (1) greater risk adjustment impact by increasing expected rates of occurrence or (2) avoidance of a publicly reported complication for the patient. In the first case, one can draw the connection between diagnoses that are POA and risk adjustment since many risk

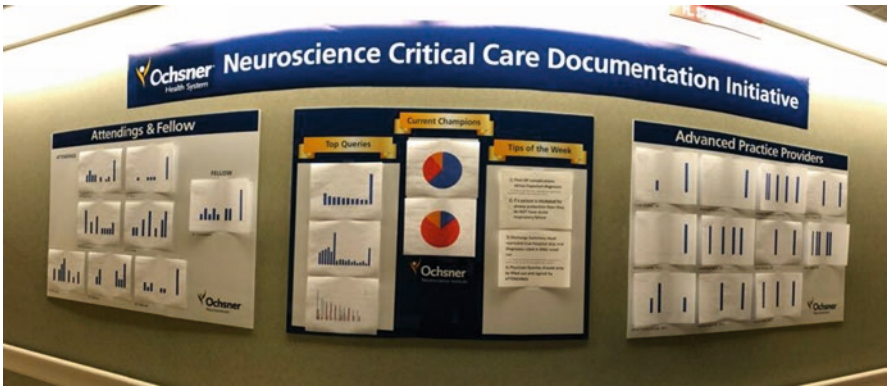

Fig. 39.1 Example of a medical staff-led documentation initiative

models only consider POA diagnoses. Moreover, impactful diagnoses can be highlighted, that is, those whose weight is considerable in the particular risk model highlighted, such as sepsis, acute tubular necrosis, or severe malnutrition. An even more sophisticated approach determines those diagnoses in a group's or hospital's practice environment which appear to be documented much less frequently than by applicable peers. When diagnoses exclusionary for complications are present but not well documented, it is relatively easy to identify the impact of accurate documentation on publicly reported quality metrics such as Agency for Healthcare Research and Quality (AHRQ) patient safety indicators (PSIs).

While the validity of many publicly reported quality metrics has been questioned, evidence from the literature also points out some distinct benefits of collecting and reporting these data, such as their ready availability and increasing refinement. An example of the latter is the requirement to report whether a diagnosis was present on admission or not.

Examples like these may help physician champions and quality leaders engage our colleagues by making a more direct connection between documentation and quality. Investigators from the University of Missouri and the Rutgers Robert Wood Johnson Medical School showed that any reported AHRQ PSI event was associated with a 71% increase in the risk of a 30-day readmission after open or endovascular abdominal aortic aneurysm (AAA) surgery [6]. Especially impactful were PSI-10, PSI-11, PSI-9, and PSI-3. The occurrence of any PSI event was also associated with longer hospital and intensive care unit stays, as well as hospital cost. Therefore, knowing about accurately reported AHRQ PSI events may be helpful in identifying and proactively monitoring patients at greatest risk for readmission after AAA repair.

Low-Hanging Fruit
Medical staff can be engaged by using credible data to improve care. Evidence indicates that AHRQ PSIs can be used to predict patients at risk for readmission after AAA surgery.

Making the relationship of the physician documentation champion with his or her colleagues, a win-win scenario is the most difficult but also the most impactful area to manage. Champions who have the respect and ear of their group can excel, provided they are supported by leadership with the appropriate material and information. One way to do this is to facilitate the physician champions' ability to bring back a quick win to their colleagues, especially one that is related to their championship. We were able to arm our neurocritical care champion with data that proved the impact on quality metrics stemming from better documentation of brain compression. Other tactics are to simplify the message and set priorities at any time for the group to concentrate on (Table 39.1). One must strive also to help the physician documentation champion bring tools to the group that reduce the burden of additional work-related to medical record documentation. An example is the reduction

Table 39.1 Example of educational material for physician education about PSI-4 (failure to rescue)

Priority issue	Main points
Why is PSI-4 important: This patient safety indicator was developed by the Agency for Healthcare Research and Quality to give hospitals feedback regarding its ability to rescue a surgical or procedural patient from serious by treatable conditions.	These five medical conditions are considered severe but treatable: 1. Pneumonia 2. Sepsis 3. Shock or cardiac arrest 4. Deep vein thrombosis (DVT) or pulmonary embolism (PE) 5. Gastrointestinal (GI) bleeding
What the attending surgeon/ proceduralist should do: To accurately represent PSI-4, keep these actions in mind for all surgical/ procedural mortalities <90 years old who had elective surgery/major procedure or surgery within 2 days of admission.	1. Immediately review discharge summary and problem list diagnoses. 2. Specifically review if shock, cardiac arrest, sepsis, pneumonia, DVT, PE, and GI hemorrhage were present or were ruled out. 3. Indicate what you consider the correct *principal* diagnosis (the principal reason for which the patient was treated at the hospital). 4. Review if other exclusion diagnoses were correctly mentioned and addressed in the medical record. 5. If you find gaps in documentation or need for amendment, please make an addendum to the hospital discharge summary.
Epic preference lists: This tool makes it easier to remember and document these diagnoses that could exclude the patient from being reported as a PSI-4.	1. Find out what are the most important exclusionary diagnoses. 2. Add these designated diagnoses to your group's diagnosis preference list.

of the burden of answering queries when the diagnosis is accurately represented in the medical record. Another is the use of pocket cards or badge buddies (Fig. 39.2). Win-win scenarios can also result when the physician champion in collaboration with the medical group's leader can emphasize the importance of public or consumer ratings in driving referrals. When improved documentation efforts lead to better ratings, everyone wins.

39.4 Engaging the Medical Staff at a Community Hospital

Engaging nonemployed providers to participate in these efforts can be challenging but is worthwhile and achievable. We recommend a number of approaches that we have found helpful.

Engage governing bodies such as the medical executive committee A brief presentation about the effects of documentation on national quality metrics is helpful, as most physicians have little background in this area. Presenting how quality is measured and how rankings are decided will usually prompt physicians to ask "What can I do to impact this?"

Tips for provider skin integrity diagnosis and documentation

- **Stop** when getting a query relating to pressure injury, DTI, or DTPI.
- **Get help** to answer the query correctly.
- Help is available from Dr. _____, a medical director of wound care.
- She can be reached at (e-mail) or text (phone #).
- Alternative resources are our wound-trained NPs and PAs: call (phone #) for names and contact information.
- **First** determine accurate diagnosis: a skin lesion is "pressure" diagonsis or not?
- Lesion could be a non-pressure diagnosis such as moisture-associated dermatitis, intertrigo, tear, shear injury, venous ulcer, vascular ischemic ulcer, end-of-life skin changes, and intergluteal cleft ulcer.
- Do not commit to pressure diagnosis too quickly as nature of lesion may not yet be evident.
- **SECOND** document on query if skin lesion was likely, possibly, or probably present on admission.
- **Never pull an LDA into your note** from nursing or wound care nursing.
- **Never delegate making the diagnosis to nursing;** in LA, this is not in the nursing scope of practice.
- When in doubt, describe the appearance of the skin lesion before committing to a pressure diagnosis.

Fig. 39.2 Laminated badge insert cognitive aid for medical staff dealing with skin integrity diagnoses. LDA Lines Drains Airway, an EPIC electronic medical record feature for documenting devices and wounds, LA State of Louisiana

Focus on high-volume groups We have found it prudent to focus efforts with groups of physicians who touch the greatest number of patients in the hospital, such as hospitalists. Providing simple educational materials, expert staff to clarify questions, and transparent data for feedback are essential. One of the best ways for some providers to learn is to have a coding expert, such as a CDI nurse, sit with the provider for a few hours after rounds while they are writing notes. This hands-on approach produces a better mastery of the material, longer retention, and increased engagement and compliance. We recommend this also as part of the onboarding for new physicians, scheduled about 3–6 months after their appointment to the medical staff.

When time is precious For physicians without the patience or physical presence for such activities, we have employed an alternative approach. We have had success in presenting retrospective reviews of recent PSI events, examples of confusing issues between physicians and coders, and common opportunities for physician

documentation and medical record query efficiency. Fortunately, most physicians inherently want to be better and respond favorably to being shown their own results in comparison to their peers. These traits can be leveraged by medical staff documentation champions to inspire improvement in primary medical record documentation and physician query responses. This approach has been helpful in both community and academic campus settings within our health system.

Identify patients with the most impactful diagnoses Specifically looking at cardiology, one can see that heart failure, acute myocardial infarction, and placement of a drug-eluting stent account for more than half of all patients (see Table 39.2). Knowing this allowed us to create educational material focused on those three diagnoses.

Table 39.2 Heart failure-related discharge volume by DRG

MS DRG	MS DRG description	Count of MS DRG patient accounts
291	HEART FAILURE SHOCK WITH MCC OR PERIPHERAL MEMBRANE OXYGENATION (ECMO)	180
	HEART FAILURE SHOCK WITH MCC	27
247	PERC CARDIOVASC PROC WITH DRUG-ELUTING STENT WITHOUT MCC	88
280	ACUTE MYOCARDIAL INFARCTION, DISCHARGED ALIVE WITH MCC	69
281	ACUTE MYOCARDIAL INFARCTION, DISCHARGED ALIVE WITH CC	46
292	HEART FAILURE SHOCK WITH CC	42
308	CARDIAC ARRHYTHMIA CONDUCTION DISORDERS WITH MCC	37
309	CARDIAC ARRHYTHMIA CONDUCTION DISORDERS WITH CC	36
246	PERCUTANEOUS CARDIOVASCULAR PROCEDURES WITH DRUG-ELUTING STENT W MCC OR 4+ ARTERIES OR STENTS	31
305	HYPERTENSION WITHOUT MCC	29
304	HYPERTENSION WITH MCC	27
310	CARDIAC ARRHYTHMIA CONDUCTION DISORDERS WITHOUT CC/MCC	23
270	OTHER MAJOR CARDIOVASCULAR PROCEDURES WITH MCC	21
252	OTHER VASCULAR PROCEDURES WITH MCC	19
282	ACUTE MYOCARDIAL INFARCTION, DISCHARGED ALIVE WITHOUT CC/MCC	17
283	CIRCULATORY DISORDERS EXCEPT AMI, WITH CARD CATH WITH MCC	13
Grand total		**705**

Keep it simple Expecting full capture of all medical diagnoses in perfect coding language is not only unrealistic but can result in disengagement. Rather than sharing everything that can impact coding all at once, we found it important to prioritize the most impactful topics. For example, at one of our community campus locations, we analyzed a year's worth of the most commonly billed DRGs at discharge by service line. We found that a large majority of patients are included in only 3–5 DRGs (see Table 39.2). Learning how to document those conditions well had a much bigger impact than focusing on documentation in general. We then created a PowerPoint deck for each service with their top five or so DRGs and the supporting CC/MCCs (complication or comorbidity/major complication or comorbidity) that help accurately reflect severity of illness. Many of the teams printed their five slides and posted them on the wall in the office where they do their documenting. Knowing that they can focus on 3–5 types of patients makes learning these strategies much less daunting.

In summary, education of the medical staff is critical to the quest for greater accuracy in documentation and reporting of patients' illness profiles. We have attempted to point out approaches undertaken by our quality and medical staff leaders, assisted by interested and dedicated physician champions. A robust medical staff education program recognizes that education is necessary and must be able to be repeated and refreshed reliably. We discuss engagement and education for house staff in a different chapter, and important educational principles can be adopted from educational-related to trainee education [7].

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Engaging the Hospital's House Staff

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In response to the challenge of preparing doctors to be workforce competent in the twenty-first century, the Accreditation Council for Graduate Medical Education (ACGME) Clinical Learning Environment Review (CLER) released the CLER Pathways to Excellence: Expectations for an Optimal Clinical Learning Environment to Achieve Safe and High-Quality Patient Care in January 2014, as guidance for the graduate medical education (GME) community [1]. GME leadership and the highest level of executive leadership of the clinical environment must collaborate to model in everyday practice for the trainees how to excel in the six key focus areas: patient safety, healthcare quality, care transitions, supervision, well-being, and professionalism. It is critical that teaching hospitals engage their learners early in their career to ensure they are prepared to meaningfully practice in, and lead, the transformations in healthcare upon graduation [2]. We provide a few examples of how we have been doing this at the Ochsner Health and share some of the lessons we learned along the way.

40.1 Quality Improvement

Under the ACGME Common Program Requirements [3], faculty members must pursue faculty development designed to enhance their skills in quality improvement and patient safety at least annually. Residents must demonstrate competence in

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systematically analyzing practice using quality improvement methods and implementing changes with the goal of practice improvement. Finally, residents must receive training and experience in quality improvement processes, including an understanding of healthcare disparities.

Engaging the house staff in patient safety and healthcare quality initiatives requires more than completing an online module [4]. Integration into departmental- and hospital-wide initiatives reinforces the science behind healthcare improvement through experiential learning and illustrates how physicians can improve the quality of care delivered. We first embarked on this journey in 2009 when we worked on the Alliance of Independent Academic Medical Centers (AIAMC) National Initiative II to develop a quality improvement team led by a resident or faculty members. For that project, we asked each training program to identify a faculty/resident dyad who would work together to implement a locally relevant quality improvement project. Each group was given access to the Institute for Healthcare Improvement (IHI) Open School course on quality improvement. The project comprised three parts – tracking compliance with IHI module completion, developing a quality improvement project, and presenting the work to our entire GME community. Overall, the project was well received by the participants and served as the pilot project to guide the rollout to all our house officers. The themes addressed by house staff quality improvement projects have been studied. Schreyer et al. reported that house staff improvement projects mapped to Vizient quality domains [5]. Twenty-three percent were related to efficiency, 12% each to patient centeredness and effectiveness, 8% to equity, and 7% to mortality.

As with all projects, there were lessons learned. We had very high satisfaction with the quality and engagement of the IHI online modules. The main concerns were that the modules were time-consuming and additive to all the other responsibilities of a house officer. In response to this feedback, we now require all trainees to complete the IHI modules before orientation starts in the free time between medical school graduation and residency. The second major lesson we learned was the importance of having faculty champions who work with residents. While bench and clinical research endeavors seem beyond the expertise of most clinical educators, all our faculty were excited about getting involved with quality improvement and patient safety projects. It was especially empowering to know that these projects can generate academic currency by being published in peer-reviewed journals. During the last 10 years, many of these smaller projects became system-wide initiatives, and the positive returns on investment have kept the higher hospital administration engaged with these activities as well. In academic year 2019–2020, we continued to make progress in advancing house staff participation through patient safety and quality initiatives, with 199 unique house staff-initiated or ongoing projects.

40.2 Quality Reporting

Another ACGME Common Program Requirement [3] is that residents and faculty members must receive data on quality metrics and benchmarks related to their patient populations. Quality improvement initiatives must utilize data to measure

the effectiveness of each Plan-Do-Study-Act (PDSA) cycle. Residents are comfortable with the concept of collecting and analyzing data in the context of research projects. Unfortunately, most residents do not appreciate how healthcare systems must capture and report data to national organizations to allow for public reporting and grading of hospital performance, so consumers can find the highest value care.

ACGME requires that residents and faculty receive reports on quality metrics and benchmarks related to their patients. The intent is that residents learn how the quality of care they are providing their patients is graded and the steps they can take to improve their performance. The reflection on performance and the resulting mini-PDSA cycle all physicians undertake as we maintain our certification through lifelong learning are skills that must be intentionally taught to residents and fellows.

At Ochsner, we publish our monthly inpatient quality dashboards to all residents and faculty by campus. This dashboard includes reports on hand hygiene, hospital-acquired methicillin-resistant *Staphylococcus aureus* bloodstream infection events, catheter-associated urinary tract infection (CAUTI), and central line-associated bloodstream infections (CLABSI). Our challenge has been getting resident-specific information through electronic medical record and administrative data. One strategy we are investigating is how properly updated care team information will allow us to better attribute patient panels to residents, so we can report the quality of care seen in those cohorts.

40.3 Interprofessional Teams

The ACGME Common Program Requirements [3] call for residents to demonstrate competence in working in interprofessional teams to enhance patient safety and improve patient care quality. Residents must have the opportunity to participate in interprofessional quality improvement activities with a focus on the importance of communication and mutual respect that are necessary to navigate the complex world of healthcare. The learning environment must afford opportunities to engage all our learners (allied health, medical students, residents, fellows). The call for changes in our learning environment carries over to additional expectations from sponsoring institutions. The ACGME SI2025 Task Force illustrates the need to develop new and more effective tactics to engage and support faculty in ways that align healthcare design with a commitment to GME. For example, faculty need to teach how to lead multidisciplinary teams that serve as models for effective and efficient patient care [6].

Key Concept
Engaging the house staff in patient safety and healthcare quality initiatives requires more than completing an online module. Integration into departmental- and hospital-wide initiatives reinforces the science behind healthcare improvement through experiential learning and demonstrates how physicians can improve the quality of care delivered.

Most recently, our team completed a teaming pilot project in the labor and delivery suite as part of the AIAMC National Initiative VII. The large team that works on labor and delivery includes anesthesiology residents and attendings, obstetricians, maternal fetal medicine attendings, obstetric hospitalists, obstetric residents, obstetric anesthesiology fellows, midwives, and nursing professionals. Our project focused on teaching teaming principles to the team. To create an environment where team members engage in purposeful interactions to coordinate care that is safe and efficient, we focused on interprofessional educational programs that help develop enhanced interprofessional skills, respectful communication styles, and situational leadership.

There are many existing programs that help teach teams how to team. We used the Agency for Healthcare Research and Quality's TeamSTEPPS® 2.0 curriculum [7] as the foundation for our curriculum. During the initial phase of our project, it was clear that major team participants were missing in our labor and delivery team: they were pediatrics, mother-baby nursing leaders, and the patient!

When we conducted focus group interviews of former patients on labor and delivery to hear about their experience, a few interesting lessons were learned. While their overall satisfaction with the birthing experience was high, there were concerns about (1) the number of new faces they saw throughout their experience without a clear understanding of everyone's role and (2) communication with the patients which significantly decreased in times of emergencies.

We have since moved toward day and night shift call coverage for faculty to improve continuity during the week. The faculty are now tasked with closing the communication loop with patients and debriefing with them after any acute change. Expansion of our team improved operational situational awareness of the entire team. Patient throughput was better anticipated, and discharge planning to account for any social barriers is proactively managed to avoid delays. Our unit has also been developing new management protocols that now explicitly include expectations of each team member and communication recommendations.

One barrier to efficient teaming on our labor and delivery suite is the persistence of outdated communication technologies. We currently use a combination of Spectra-link phones, cell phone texting, and overhead calls to notify active emergencies. Every additional step necessary to engage a team of eight or more members adds opportunities for miscommunication at the expense of critical time.

40.4 Leadership Training of House Staff

According to the ACGME Common Program Requirements [3], residents must demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients and their families and health professionals. Residents must also care for patients in an environment that maximizes communication. This needs to include the opportunity to work as a

member of effective interprofessional teams that are appropriate to the delivery of care in the specialty and larger health system.

Workforce competence in the twenty-first century will require more than expertise in quality improvement and patient safety. Future physicians will need to possess leadership skills to assemble interprofessional teams and articulate their value to executive leaders. Healthcare systems need future leaders who understand the joy of practicing medicine and the challenges faced by clinical educators and can interlace these with the organizational success of a health system [8]. Finally, the SI2025 Task Force set forth as one of their four major recommendations the need to align the clinical and educational arenas, so we could more effectively prepare our learners to contribute to the future healthcare system.

Each of our programs has identified senior residents to serve as administrative chiefs. While the departmental focus tends to be on creating academic schedules (call, rotational, and vacation), we decided to create a chief resident workshop focusing on leadership skills. The group met every other month to listen to local guest speakers talk about the areas the residents identified as leadership gaps. They included change management, building productive teams, administrative career mentorship, and establishing a beneficial work climate. We concluded the year with a C-suite panel discussion. As anticipated, there was high engagement for the first few sessions with 95% attendance. However, only 32% of chief residents attended every session. The feedback was very positive, with the highest values being placed on the topics of administrative mentorship and sharing of solutions to similar problems across specialties. Our biggest barrier was lack of protected time to attend the meetings, and the surgical specialties were disproportionately impacted. Virtual meeting platforms did help, but the participants really valued face-to-face interactions. Our hope for the future is to create a version of the Ochsner Leadership Institute program (which is designed to foster leader development for health system administrative, clinical, and physician leaders) where participation would earn additional recognition for trainees at their graduation.

40.5 Conclusion

Ensuring our house staff are workforce competent is getting more complex. While the ACGME has articulated some of the expectations for the next generation of clinical learning environments and the sponsoring intuitions, it is important for the GME community to understand that it will take more than medical knowledge to be a successful physician of the twenty-first century. Engaging learners early in their career to quality improvement and patient safety initiatives will emphasize the importance of this lifelong learning activity. And finally, programs should provide future white coat leaders with dedicated leadership tools to allow them to be effective advocates for both physician and system priorities.

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Grassroots Culture: Patient Safety Approach to a Quality Curriculum for House Staff

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Instruction based on traditional didactics does not lend itself optimally to teaching quality improvement or patient safety [1]. It is commonly accepted that one of the best ways to learn is by doing. This is especially true for a hospital's house staff. As such, the Ochsner quality curriculum focuses on teaching quality improvement as a part of our standard approach to care, not just as an afterthought. To incorporate quality improvement into routine care processes successfully, our curriculum is built around a combination of didactics targeted at teaching the language of performance improvement in the healthcare setting, long-term resident-driven projects, and a strong focus on a change of culture. This general approach has been described elsewhere [2]. Other ways to engage house staff in learning about patient safety and quality entail the assessment of learner-identified gaps to fashion an effective curriculum [3].

A strong framework of didactics is needed for a successful quality curriculum [4]. Our specific didactics continue to evolve year to year but consist of several key components that are constant. They are anchored by leadership engagement seminars with the chief quality officer (CQO) of Ochsner Health. These seminars emphasize the opportunities and responsibility residents have to promote a culture of continuous quality improvement and patient safety. Concepts such as psychological safety, the value of reporting near misses and safety issues, and the commitment to zero harm for patients are presented in an interactive and conversational format. Residents take the Institute for Healthcare Improvement open course that provides

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a baseline understanding of the principles and language of patient safety and performance improvement, while also emphasizing tenets of cultural improvement. Emphasis is also focused on documentation training founded on the conviction that timely and accurate documentation drives care effectiveness, patient safety, and quality metrics. Creation of a safety and quality culture is key to engaging house staff [2]. Despite the ability of didactic curricula to increase knowledge confidence in project skills, attitudes toward safety and an associated culture change are more difficult to achieve [5]. Our approach to building a culture of quality and patient safety has provided one of the greatest perceived educational benefits to our house staff and represents a defining characteristic of care delivered in our teaching facilities.

Changing an organization's culture is challenging. It requires a road map, continual communication, and a commitment to a bedrock of principles. The approach that has been successfull at Ochsner utilizes the Joint Commission's trust, report, and improve cycle (Fig. 41.1). Using this cycle, one can create a learning system that, when nurtured appropriately, becomes self-sustaining. With respect to Ochsner house staff, this started with viewing residents' "complaints" (usually heard in the context of feedback about clinical teaching and training activity) as a form of safety event reporting. These reports led to early wins with improvement projects that provided a tangible impact on daily aspects of patient care. In turn,

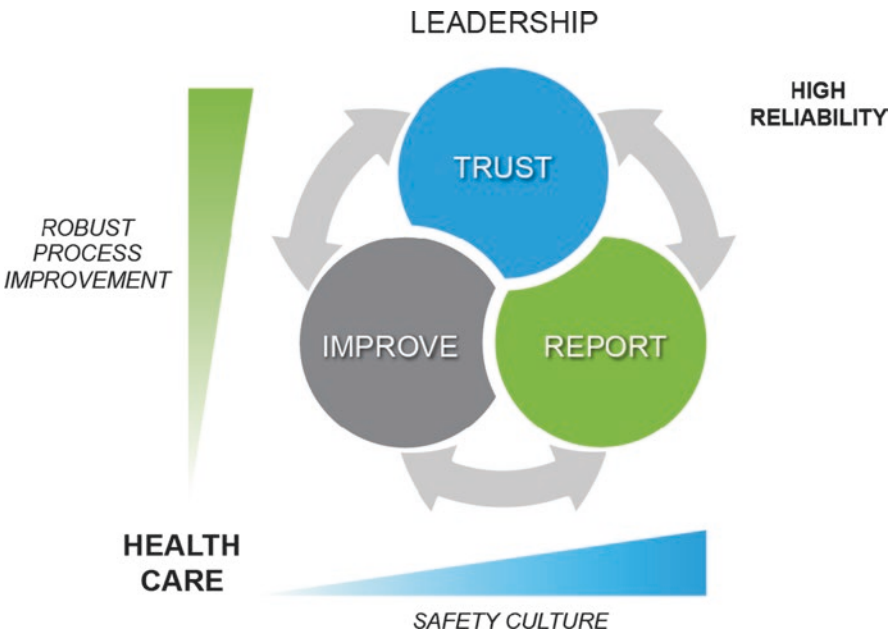

Fig. 41.1 The Joint Commission Healthcare's trust, report, and improve cycle

seeing their concerns translated into action inspired residents' trust in our organization's approach to patient quality. Once this trust had been established, it is further reinforced by monthly multidisciplinary mortality, morbidity, and improvement (MM & I) conferences that act as a microcosm of the trust, report, and improve cycle.

41.1 Let Them Complain: Translating House Staff Language and Reasoning into a System of Reporting

Residents are typically in a unique place among most organizations. In our organization, for example, the internal medicine residency (IMR) program is seen as both representative of Ochsner Health and as a separate academic entity with its own organizational hierarchy. This organizational arrangement facilitates and empowers residents to voice concerns more freely in the context of the educational setting, without being exposed to a perceived typical organizational response, that is, one that may be perceived as unresponsive, slow, defensive, and therefore ultimately ineffective. While many residency programs may brush off residents' complaints as the grumblings and growing pains of newer physicians as they gain experience, the wise program will view them as a form of reporting for the benefit of improving patient safety. The primary reason is that residents often bring up very valid system safety and process flaws in the form of complaints during feedback sessions required by their training programs. When viewed as a form of safety event reporting, this type of feedback provides valuable insights for recognizing otherwise hidden care system and process flaws.

Low-Hanging Fruit
Harnessing feedback about care system opportunities from the hospital's houses staff requires a culture of psychological safety as well as a system of reporting that is effective at integrating residents' observation into the hospital's performance improvement structure. When this is done well, substantive benefits arise for both patients and the organization.

Incorporating house staff feedback into hospital performance improvement processes is easier said than done. While house staff participation was high in meetings organized by Ochsner IMR program, it lacked the ability to connect to the hospital's formal structure for performance improvement. Understandable frustration ensued over the effectiveness of escalation of house staff concerns regarding care processes.

When reports relating to care system opportunities first surfaced in educational forums for IMR house staff, we realized the potentially unique value that could be created by establishing a separate forum for resident feedback in the context of patient safety and quality improvement. Ultimately, the venue we arrived at would

also afford privileged status with a direct connection to the hospitals' peer review-protected formal performance improvement activities.

The forum for resident feedback underwent multiple changes before it was successful. We first invited house staff to the table. The CQO and hospital quality leadership personally asked house staff for help and input as representatives of patien-facing care team members and "boots on the ground." We encouraged bringing concerns via the hospital's existing incident reporting system. We established a resident quality council that was attended and managed by quality leaders. In addition, an escalation highway was established through daily escalating safety huddles that always reached the highest levels of health system leadership. In addition, house staff continue to have access to the CQU and other quality leaders through regularly scheduled meetings. These improvements to open lines of communication led the way to a flourishing and active participation of house staff on hospital quality committees, work groups (including for focused review and root cause analysis), and performance improvement driven teams.

41.2 Building Trust with Early Wins: Immersing Residents in Quality of Care Improvement

In the following, we describe examples showing how house staff's concerns gleaned from the new quality reporting venues led to definitive improvements in care. A common theme reported was the placement of transferred patients into the appropriate level of care, such as critical care or step-down floors. Another opportunity identified was the adequacy of patient health status information for patients transferred overnight.

Acknowledging house staff's and others' input, a concerted organizational effort ensued to improve the flow of patients into and among our health system hospitals. This process was further accelerated by data review of incident reports and transfer patient outcome trends. After thorough planning and stakeholder engagement, the organization had instituted material changes known as the Physician In Lead Of Transfer (PILOT) program not even a year later. This program was announced at the IMR program's first reengineered case discussion format, the MM & I conference (see below). The PILOT program provides for a dedicated hospitalist to coordinate and appropriately triage health system-wide transfers to a hospital floor or intensive care unit while communicating a detailed and periodically updated patient summary to facilitate the safe transition of care. These patient summaries significantly cut down on the time it took for a resident to complete an admission, in addition to increasing their confidence that their patients were triaged to an appropriate level of care. This process contributed to a reduction in risk-adjusted mortality for transfer patients. The PILOT program solution is just one of the early examples of the trust, report, and improve cycle specific to Ochsner. In our view, it can be applied more broadly to across a variety of improvement opportunities regardless of theme or institution.

While the PILOT program was seen as an early win that fostered resident trust in a working quality improvement system, getting it started was not without challenges, especially considering that it was only a component of a much larger project, the creation of a comprehensive Patient Flow Center (see Chap. 29). Large-scale solutions to any system-wide problem take time and significant resources at any large organization. This is one of the issues that the residency program still grapples with. House staff need to be aware of the complexity of current health care systems when proposing and discussing their required quality projects with teaching faculty and quality coaches. One way this issue is successfully managed at Ochsner is by providing residents with consistent and realistic projections of progress regarding quality projects and the associated process changes, often within the venue of our incident reporting system. As mentioned, today, residents can leverage our escalation highways, such as the incident reporting system, the daily safety huddle, and the easy access to quality leadership to best harness the organizational resources available for performance improvement.

Teaching about the importance of accurate medical record documentation These early wins built trust in the organization which in turn changed the expectations for the residency's core faculty during medicine rounds. Quality considerations are now brought to the forefront of discussions rather than as an afterthought. One example is the role that accurate medical record documentation plays in assuring efficient and timely care. Documentation shortcomings are discussed in light of their potential contribution to communication gaps among the care teams. Teaching about documentation accuracy also emphasizes the benefit of reflecting patients' acuity and severity of illness appropriately so that the right resources can be directed where there is the greatest need. We also explain how accuracy in documentation affects expected rates in risk-adjusted quality models.

Modeling situational humility In addition, core faculty build on the environment of trust by modeling situational humility. They promote communication openness and psychological safety by openly acknowledging gaps in medical knowledge and learning, as well as destigmatizing failure with personal stories of mistakes. Residents are thus encouraged to feel safe in opening up about what they may perceive as their mistakes and share their experiences as teaching points for their peers. An excellent forum for this activity is the MM & I conference [1], an activity with bidirectional information flow connected to the umbrella of the hospital's performance improvement department. Cases identified through the organization's event reporting system or the hospital quality review process are brought to MM & I for multidisciplinary discussion, learning, and action identification, aided by a standardized format (Fig. 41.2) inspired by the Institute of Medicine and the Joint Commission [6]. In turn, summaries of the discussion from conferences such as the MM & I are reviewed by the performance improvement department.

Healthcare Matrix: Care of Patient(s) with....						
IOM Aims / ACGME Competencies	SAFE[1]	TIMELY[2]	EFFECTIVE[3]	EFFICIENT[4]	EQUITABLE[5]	PATIENT-CENTERED[6]
Assessmet of Care						
Patient Care[7] (Overall assessment) Yes/No						
Medical Knowledge & Skills[8] (What must we know?)						
Interpersonal & Communication Skills[9] (What must we say?)						
Professionalism[10] (How must we behave?)						
System-Based Practice[11] (What is the process? On whom do we depend? Who depends on us?)						
Improvement						
Practice-Based Learning & Improvement[12] (What have we learned? What will we improve?)						
Information Technology						
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Fig. 41.2 Template for discussion and identifying improvement at MM & I conferences

41.3 Putting It All Together, the MM & I Conference: A Microcosm of the Trust, Report, and Improve Cycle

The case conference format is a well-established tradition at many facilities and is often seen as a safe place in which to report concerns. While having such a conference in place was a good starting point for us, opportunities for improvement existed. Poorly attended by residents, the conference frequently focused only on what went wrong with medical management. Residents would typically walk away from this conference with a list of what not to do and with little discussion of the safety net processes that could have prevented a mistake in the first place. As our approach to teaching patient safety and quality evolved, this conference changed its format and name; it is now known as the MM & I conference. MM & I conferences now include proposed improvements to system processes to help prevent a similar event in the future. Asking house staff members to offer suggestions for improvement empowers them to share their professional concerns not only about patient care and management, but also about organizational structures and processes. In addition, they are exposed to multiple facets of quality improvement by researching

a potential solution on their own before presenting their ideas to quality leaders for their input. To help foster a psychologically safe space, resident conference attendance is heavily encouraged to create a true house staff forum for quality, supported by hospital quality improvement staff. With all this in mind, the MM & I conference has become a unique representation of all three components in our organizational learning system: the creation of trust, reporting of concerns, and bringing about improvement.

Key Concept
An environment of trust improves effective reporting of safety events by residents and other trainees. Trust is built by acknowledging house staff input, bringing about meaningful improvement in the care system, while communicating the status and outcome of this work.

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Quality Improvement Partnership Between Nursing and the Medical Staff

42

D. Ford, L. Norman, and A. Schubert

Unit-based interventions to improve quality have been key to efforts addressing various clinical quality indicators at our 500-bed tertiary medical center, located in the southeastern region of the United States. Others have examined the effect of a unit-based approach to quality programs for hospitalized medical patients and have found that only about one-third or fewer hospitals had unit co-leadership with nursing and medical staff; they recommended exploring this collaborative management model further [1]. The hallmarks of such a nursing-physician dyad leadership model are (1) a structural attribute framework, (2) promotion of quality and patient safety, and (3) performance improvement through joint projects. Aligning projects with the American Nurses Credentialing Center (ANCC) Magnet designation model creates a framework for safety and improved outcomes while creating a learning environment for clinical teams in a co-led nursing and medical model.

42.1 Structural Attribute Framework Promoting Quality and Performance Improvement

Hospital unit directors face competing priority overload. Admitting physicians may feel disconnected from hospital priorities, potentially misaligning expectations for patient care. More organizations embrace a dyad leadership model where healthcare clinical leaders and administrators collaborate toward a shared vision [2]. Dyad

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physician and nursing unit leaders can bridge this gap with collaborative problem-solving and process management, which also powerfully build trust [3, 4]. While the dyad model has been described before, little had been known about its effect on sustained quality and safety outcomes. The authors (DF, AS) have recently illustrated the development of a unit-based leadership model focused on prioritizing organization goals in an academic medical center [5].

Key Concept
A well-constructed dyad physician and nursing unit leadership model can bridge the engagement gap caused by siloed nursing and medical staff priorities. Focus on collaborative problem-solving, process management, cross-unit learning, and mutual accountability can powerfully build the trust needed to advance patient safety and care quality.

The structure, rhythm of contact with executive leadership, and accountability mechanisms were designed to enhance dyad leader engagement. Activities emphasizing coaching, building trust, and valuing transparency were created to commit these leaders to priority goals and drive performance.

At Ochsner's main academic medical center, the dyad leader model has now spread campus wide. The model consists of a partnership between the unit medical director and the unit nursing director who work together closely to address the pertinent quality issues that are specific to and addressable on their units. Their work is tightly aligned with the health system's and hospital's overall strategic plans to win for quality and patient safety. The unit nursing director (UD) reports to the chief nursing officer (CNO), while the unit-based medical director (UBMD) has a matrix reporting relationship with the vice president of medical affairs (VPMA). Both the VPMA and the CNO have a dyad relationship with the primary focus of leading the organization's quality initiatives. The individual units consist of varying bed sizes from 28 patients to 45 patients. Each unit provides care in the following five categories: (1) intensive care units, (2) medical-surgical units, (3) stepdown or intermediate care, (4) progressive care, and (5) specialty care.

The UBMD and UD undergo an extensive interview process to attain their position and role designation. While the organization may first hire the physician or the nurse, interviews for the role of UBMD and UD are conducted collaboratively by the hospital's nursing and medical leadership. This process is designed to screen for organizational values such as team orientation, patient centeredness, and commitment to a journey of excellence. It allows for mutual input and collaboration in identifying the best overall fit for the dyad role. Hospital unit dyad partners are trained in basic performance improvement concepts such as Institute for Healthcare Improvement (IHI) tools to include an aim statement [6], driver diagrams, and process charts. The IHI Model for Improvement represents the basis for teaching. For example, they learn to use the aim statement to respond to the first question in the IHI Model for Improvement, i.e., outlining what is to be accomplished (Fig. 42.1).

Fig. 42.1 Unit-defined AIM statement example. CLABSI central line-associated bloodstream infection, SICU surgical intensive care unit. (© Ochsner Health)

The dyad model leverages physician engagement through role formalization and shared decision-making. The dyad partners work together to lead the clinical team to improve the process metrics and clinical indicators on their unit. They identify and improve many complex processes to boost outcomes for a quaternary-level care patient population. Using a unit-specific quality dashboard that is updated continuously (at least weekly for many metrics), they assess the overall unit performance. Analyzing unit dashboard performance for process metrics and clinical indicators periodically, they determine which project or projects the unit will take on. This is done as a team, with the necessary stakeholders included to improve the outcome of the chosen indicator(s). The team thoroughly examines potential drivers of the quality outcome desired and identifies where process changes should be applied. Process and outcomes goals are established; plans for process change are developed and set down in aim statements that outline actions, timelines, and targeted outcomes. Preintervention and postintervention data are tracked and displayed on the unit using run charts. Examples include process metrics associated with prevention of hospital-acquired conditions (HACs) such as falls, hospital-acquired traumatic injury, and pressure ulcers. Other process metrics are related to hospital-acquired infections (HAIs) such as catheter-associated urinary tract infections (CAUTIs), methicillin-resistant *Staphylococcus aureus* bloodstream infections, *Clostridioides difficile* (*C. diff*) infections, and central line-associated bloodstream infections (CLABSIs). Their work may also include *never event* management, such as process improvement for avoidance of wrong side/wrong site surgeries, retained foreign objects, and medication errors with serious harm. Other examples include process improvement to reduce hospital-acquired pressure injuries and to decrease risk-adjusted mortality through actions relating to early recognition of clinical deterioration from conditions such as sepsis.

Unit-based improvement projects are monitored in a peer atmosphere at a regularly scheduled twice monthly council. Here, the nursing and medical staff dyad partners together present their units' projects, goals, and progress. Questions may be posed; actions may be challenged, explored, and adopted by various dyad partners and other council invitees. Each unit is a microsystem where processes are tested, examined, and changed. Sharing the choice of projects and insights gained results in organizational learning, as dyad teams are highly encouraged to share ideas and learn from each other's experiences to drive improvement in patient care more quickly across the organization. Sharing is valued independently of the outcome of the project. Partners feel that great value accrues when learning not only what works but also what may require alternative approaches. In the following section, we highlight examples of such process changes that our dyad teams have implemented in the past year.

42.2 Promoting Quality, Patient Safety, and Performance Improvement Through Joint Projects

Our unit dyad leader teams have undertaken many projects to improve quality, patient safety, patient experience, and safety culture. They work in tandem with their clinically based team on each unit to promote improvement. Each year, more than 20 dyad leader teams collaborate on 2–4 IHI Model for Improvement projects and share results that may funnel across units, which is our organization's expectation.

Improvement in Clinical Deterioration Awareness on a Cardiovascular Stepdown Unit Unit-based leader teams track and trend actions relating to the drivers of a particular quality outcome using a driver diagram (Fig. 42.2). For example, our cardiac stepdown unit concentrated on the reduction of codes (cardiopulmonary resuscitations) outside the intensive care unit. Through the use of innovative technology [7], the patient is monitored continuously. This is in marked contrast to the traditional practice of taking vital signs every shift or even every 4 hours. With continuous noninvasive vital signs monitoring, key physiological indicators, such as blood pressure, temperature, and pulse, are displayed and set off an alarm if values move outside preset safety parameters. The nursing teams monitor these alarms for early recognition of potential clinical deterioration and the need to initiate rescue protocols. Drivers of floor codes that were identified by our teams included Visi™ utilization (use of mobile continuous vital signs monitoring technology), percentage of i-Rounds™ (an innovative rounding tool primarily designed to improve patient experience), and bedside handoff adherence [8].

This unit-based project realized an increase in the Visi™ utilization over the 3 months (Fig. 42.3). At the same time, code blue resuscitation events decreased month over month (Fig. 42.4).

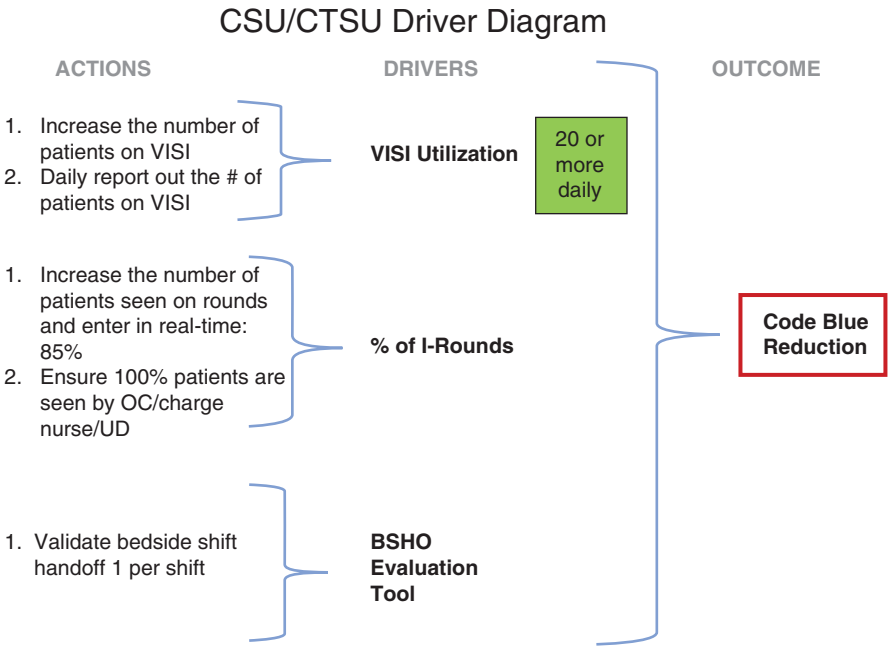

Fig. 42.2 Driver diagram example – one unit's view of drivers of code blue events. VISI continuous vital signs monitoring system, BSHO bedside handoff. (© Ochsner Health)

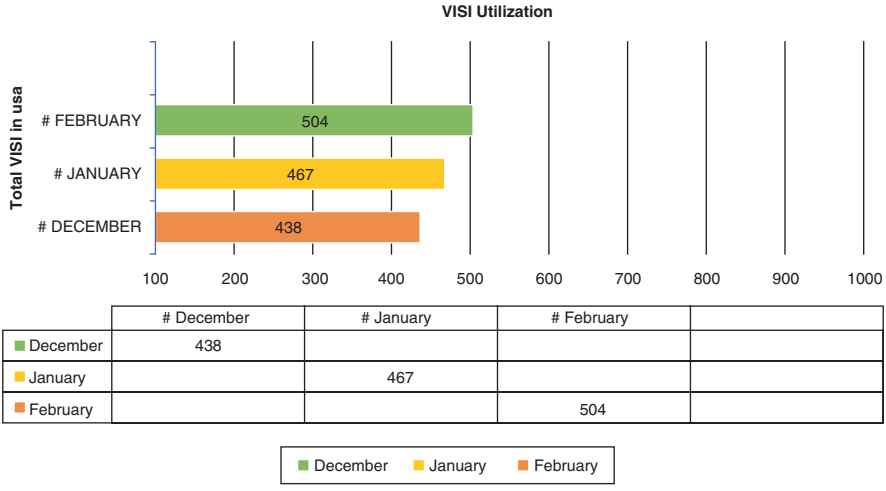

Fig. 42.3 VISI utilization on the CSU/CTSU . CSU cardiovascular stepdown unit, CTSU cardiothoracic stepdown unit. (© Ochsner Health)

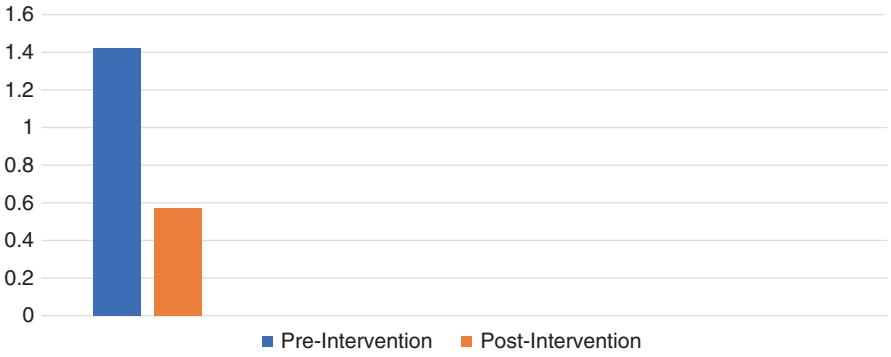

Fig. 42.4 CSU/CTSU floor code blue outcomes pre- and postintervention. (© Ochsner Health)

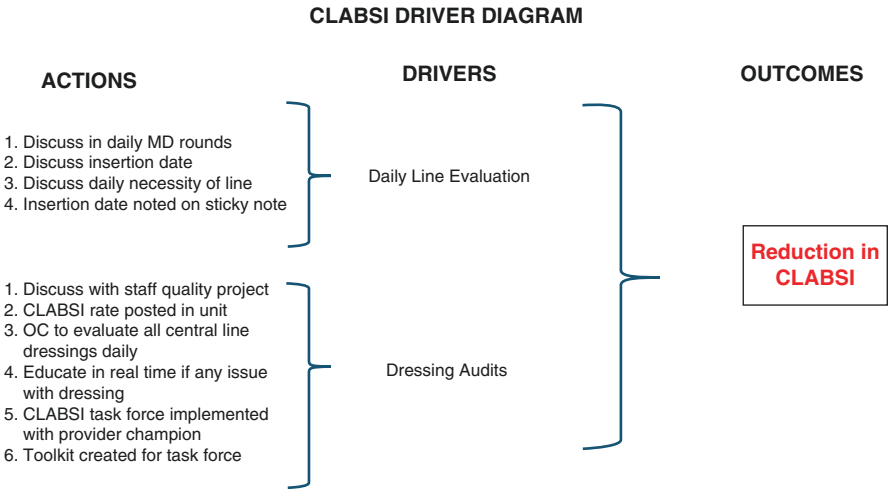

Fig. 42.5 Unit-based CLABSI reduction driver diagram. CLABSI central line-associated bloodstream infection, MD physician. (© Ochsner Health)

Improvement in CLABSI on a Surgical Intensive Care Unit The dyad leaders of our 34-bed surgical intensive care unit recognized that an opportunity existed to decrease CLABSI. They developed the AIM statement shown in Fig. 42.1. The team reviewed and updated its actions via a driver diagram that depicts the actions and drivers to achieve the outcomes. The key drivers were daily line evaluation and dressing audits. The audits included noting insertion date, dates of dressing changes, and appearance of the dressing. The teams conducted rounding weekly to discuss the process and answer any questions of the team members (Fig. 42.5).

The dyad leader partners communicated to the nursing teams and providers regularly. These communications included updates on findings and data, reminders to attend to key processes, celebrating early wins for encouragement, providing feedback on performance, and welcoming questions from the team regarding the

Table 42.1 Examples of unit-based quality improvement projects undertaken in a recent 12-month period

Unit	Project
MTSU	Improved early recognition of sepsis
CSU	Reduction of code blue resuscitation outside of the ICU
IMTA	Improvement in patient experience
Oncology/ BMT	C-diff improvement
SICU	Reduction of CLABSI
OBS unit	Decreased length of stay
TSU	Reduction of line days
PICU	Maintaining quality and safety initiatives during pandemic times
NSCCU	Maintaining quality in NSCCU during COVID
SICU	C-diff improvement
GISSU	Improvements in pressure injury
PICU/CVICU	Use of Children's hospitals' solutions for patient safety for quality improvement
NPU	Reduction in falls
TSU	CLABSI reduction plan

OBS observation, *TSU* transplant stepdown unit, *PICI* pediatric intensive care unit, *CVICU* cardiovascular intensive care unit, *GISSU* gastrointestinal surgical stepdown unit, *SICU* surgical intensive care unit, *NSCCU* neuroscience critical care unit, *MTSU* medical telemetry stepdown unit, *IMTA* internal medicine telemetry area, *BMT* bone marrow transplant, *NPU* neuroscience progression unit

process. The outcome has been a continuous decline in CLABSI occurrences. The team achieved zero CLABSI occurrences during the first quarter of 2021 compared to the three events during the same period the year before.

While these examples focus on just two dimensions of unit performance, our records show that more than 100 such projects have been undertaken and presented during the past 5 years. A listing of such projects that unit teams took on even during pandemic conditions gives testimony to the sustainability of our unit-based dyad leadership and improvement model (Table 42.1). Consistent use of the performance improvement tools in the context of a unit dyad partnership management model has been a key success factor in organizational quality improvement while also engaging the entire team and cementing interpersonal relationships.

42.3 Quality Synergies with the American Nurses Credentialing Center Magnet Designation Model for Safety

The dyad model embodies quality synergies with the ANCC Magnet designation, the highest and most prestigious credential a healthcare organization can achieve for nursing excellence and quality patient care. Its hallmarks are improved patient outcomes, nurse satisfaction and retention, and reduced costs [9]. As a four-time recipient of the Magnet designation, our organization uses the dyad physician-nurse model to promote quality synergies with respect to performance improvement.

Although physician perceptions of Magnet-accredited nurses and organizations have not been studied extensively, Vila (2016) demonstrated that physicians perceive Magnet nurses as knowledgeable, confident, change agents who carry the ability to tackle challenging issues [10]. This qualitative evidence demonstrates the strong link between Magnet accreditation and the importance of a dyadic approach to organizational leadership.

The Forces of Magnetism identified more than 30 years ago have remained steadfast, while the program has evolved in response to changes in the healthcare environment. In 2007, the Commission on Magnet collapsed the former 14 Forces of Magnetism into 4 domains. The focus shifted to achieving superior performance as evidenced by outcomes. The domains for sources of evidence are structural empowerment, transformational leadership, exemplary professional practice, and new knowledge, innovations, and improvements. Components may be demonstrated and are supported and embedded in the dyad model. Excellence is determined through the evaluation of examples demonstrating the infrastructure for excellence. The examples provided in the dyad partnership model demonstrate the structure and process used to achieve improved outcomes.

42.4 Organizational Learning for Quality Improvement

While occurring at the unit-based level, the dyad partnership allows for continued learning across the organization. The dyad partners come together twice monthly at the Unit Director/Unit-Based Medical Director Council. In addition to sharing project experience, unit leaders review overall and unit-level organizational performance on quality measures with members of the hospital executive team. The council is jointly hosted by the VPMA and CNO. Organizational action planning is supplemented by unit-based improvement projects. Although organizational action planning is discussed in these forums, unit-based projects are always given priority on the agenda to respect the teams' work. Organizational learning is facilitated through a collaborative learning environment for all unit dyad leader members. Dyad teams present their projects, and all are invited to offer suggestions for improvement and encouraged to bring back the successes to their units to address clinical indicators they may have an opportunity to improve. In this way, learning is continuous and purposeful. Leader safety rounding is conducted monthly on each unit by the VPMA. These rounds with the unit dyad leaders and other key stakeholders lend themselves to insight at the bedside with the frontline nurses and providers. Much is learned about the way actions are being operationalized in the patient care setting. Patients and families are included to verify their understanding of care plans and our goals for an optimal care experience.

In summary, the Ochsner academic medical center's dyad leadership model has created a framework for organizational success in quality, patient safety, and leader communication. Through the unit-level physician and nurse leader partnership, meaningful collaboration toward a shared vision has enhanced communication and collaboration effectively. Additionally, in the context of being a Magnet-accredited

institution, it is recognized that the enhanced competencies and confidence of the nursing teams helped launch the model more expeditiously with the end goal to create excellence as an ongoing journey.

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From Data Review to Sustained Improvement in Quality Performance

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K. Gilkey LeBlanc, T. M. Truxillo, and A. Schubert

Sustainability of improvement is of interest to stakeholders across health-care settings. Performance improvement efforts frequently are challenged with reversion to a less improved state. How do insights from concurrent review and quality dashboards drive quality improvement? How does the quality leader inspire confidence in the ability to achieve true quality performance improvement with lasting positive outcomes? These questions can be answered by learning how to meld general principles of quality improvement with application of process improvement methods. Such a collaborative, data-driven, and transparent approach has recently been described to yield improved surgical complications and mortality [1].

We describe real-life examples from our practices highlighting successful performance improvement that resulted in durable wins for our patients, their care teams and our organization. What is unique here is that each was kindled from sparks of insight gleaned through concurrent case review or constant surveillance of hospital- or unit-based quality metrics. While we could fill many pages with examples illustrating the opportunities that come from such concurrent review, we will focus on just a few. They are the sustained successes our teams were able to achieve in reducing complications, Agency for Healthcare Quality and Research (AHRQ) patient safety indicators (PSI), hospital-acquired infections (HAIs), and cardiac arrest on hospital floors.

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Key Concept
Sustainability of improvement is of interest to stakeholders across health-care settings. Sustainability of performance improvement depends on concurrent review, constant surveillance of measure dashboards, team engagement, capacity for process improvement, and competent leadership.

43.1 Analysis and Performance Improvement in Risk-Adjusted Complications

After health system-wide adoption of priority quality goals, our facility teams were determined to improve the risk-adjusted complication metric on our quality dashboard. Our goal was to create a sustainable team collaboration and process flows to achieve top-decile performance in avoidance of complications. Based on stakeholder input, quality leaders identified a framework for organizational improvement. Key components of a sustainable improvement initiative included team champion engagement, driver analysis and sharing, hardwiring of new processes, transparency, and a distributed interactive work plan for concurrent case review. Based on data review, we identified opportunities for course correction, using iterative cycling (Plan-Do-Study-Act [PDSA] cycles), run chart and outlier analysis, and collaborative process change.

While process change and PDSA cycles included concurrent review, we also acted on data from incident reporting that identified opportunities to improve clinical processes. Examples were (1) improving central line-related complications with the institution of a simulation-based provider certification program, (2) reducing iatrogenic pneumothorax from feeding tube placement by changing equipment and placement process, (3) reducing hemodialysis complications by revising anticoagulation algorithms, (4) reducing periprocedural respiratory failure by adopting the National Surgical Quality Improvement Program ICOUGH program, (5) building a robust system of order sets for surgical and medical patients that standardized and promoted the implementation of mechanical and pharmacological deep vein thrombosis (DVT) prophylaxis, and (6) reducing thrombotic, hemorrhagic, and renal complications in orthopedic patients through clinical pathways.

This multipronged improvement effort led to a five-year sustained decrease in risk-adjusted complications at our 500-bed tertiary/quaternary referral center and academic medical center (see also Chap. 1). Risk-adjusted complication index improved sustainably to a point where our medical center reported sustained complication performance at a level 30–35% less than the expected rate.

43.2 Analysis of AHRQ Patient Safety Indicator Performance and Improvement

As our organization increasingly focused on external benchmarking for patient safety and quality during the past decades, AHRQ PSIs were considered useful indicators of patient safety and performance. Their trends and distribution by geographical location (including some by unit) have been included into organizational performance dashboards. While several PSIs were addressed by performance improvement efforts described in the prior section, such as PSI-6 (iatrogenic pneumothorax), PSI-7 (CLABSI), PSI-11 (postoperative respiratory failure), and PSI-12 (postoperative DVT), we saw the most challenging and rewarding opportunity in improving our performance in PSI-3, the development of severe hospital-acquired pressure injuries. As a result, improvement in this quality measure was prioritized in annual organizational goal setting.

During the period of 2017–2019, Agency for Healthcare Research and Quality (AHRQ) methodology changed from version 6 to version 7. In addition, during this time and before, wound care professionals increasingly used the terms deep tissue injury (DTI) and deep tissue pressure injury (DTPI). Quality dashboard review indicated that our organization and our lead academic hospital experienced a substantial increase in PSI-3 events. While greater attention to DTI may be helpful to increase team awareness of early skin changes that may later develop into pressure ulcers, substantial pitfalls are associated with using the DTI designation freely in the medical record. In our experience, approximately 50–60% of DTIs do not develop into clinically significant lesions; unfortunately, this becomes evident only gradually during the hospital course and is generally not well documented. Yet at the time, coding guidelines required that lesions documented as DTI in provider notes were to be coded as unstageable pressure ulcers. Only more recently, CMS created additional codes for such lesions (codes for unspecified deep tissue pressure injury or pressure injuries of unspecified stage). Before this, DTI documentation often resulted in codes that automatically triggered reporting of a severe hospital-acquired pressure injury event (PSI-3) unless specifically ruled out by the provider.

This combination of circumstances contributed to the overall rise in PSI-3 nationally. At the same time, we found the PSI-3 performance of our hospital to be of special concern (Fig. 43.1). Almost 75% of our PSI-3 s during this time were due to this documentation and coding of DTIs and unstageable pressure ulcers. Vizient data indicated that this experience, as well as our rate of PSI-3s, was very different from top performance at peer hospitals. Through site visits and teleconferences with peer organizations, we learned that they had evolved systems of care that more tightly focus medical attention to the natural course of DTI lesions. This was generally a comprehensive approach encompassing staff education, clinical practice protocols, clinical championship, medical record documentation, and review procedures. We began to realize that knowledge of our medical staff, existing nursing documentation practices, and the influx of increasingly ill and debilitated patients from an exponentially growing hospital transfer program (see Chap. 29) had created a perfect storm.

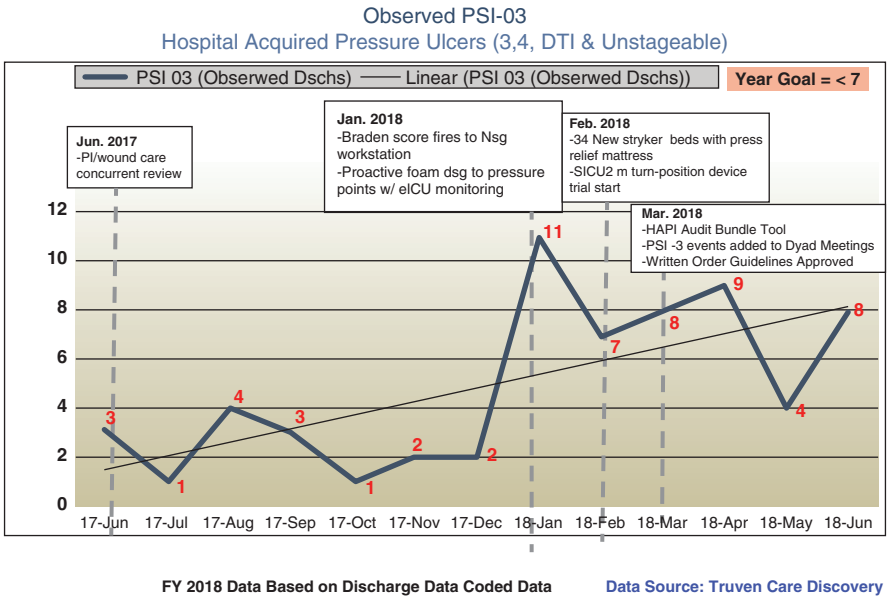

Fig. 43.1 Increase in reporting of severe hospital-acquired pressure injury (HAPI). (© Ochsner Health)

Based on these insights, we initiated an improvement initiative supported at both the executive and unit levels of the hospital. At the executive level, we initiated a hospital-wide pressure ulcer collaborative drive team that directs the activities of and supports several working groups (Fig. 43.2).

Action outcomes from the collaborative drive team included (1) a medical staff support program for skin integrity, (2) assigned wound care nurse for specified high-risk units, (3) revamped education programs for hospital unit staff, (4) recruitment and training of internal unit nursing champions who also developed a shift handoff procedure, (5) medical record template revision, (6) comprehensive improvement in unit practices, (7) audits and feedback of the new processes introduced, and (8) solutions for device-related and positioning injuries.

We focused on medical staff support for several reasons. Stakeholder analysis indicated that the medical staff had become very dependent on our wound care professionals for care and even diagnosis of most wounds. We needed our medical staff first and foremost to provide an accurate diagnosis of our patients' skin lesions, because we knew that pressure injury coding (and therefore the risk of PSI-3) could ensue despite improvements in clinical care, for example if nonpressure skin lesions were always identified as DTI or DTPI in the medical record. Evidence exists indicating that hospitals that invest in performance improvement infrastructure and skilled specialists have better pressure ulcer outcomes [2]. Accordingly, our approach involved recruiting a medical director of wound care, an assigned nursing dyad leader partner, and a group of advanced practice providers (APPs) on our medical staff. These APPs were trained in wound diagnosis and management; they

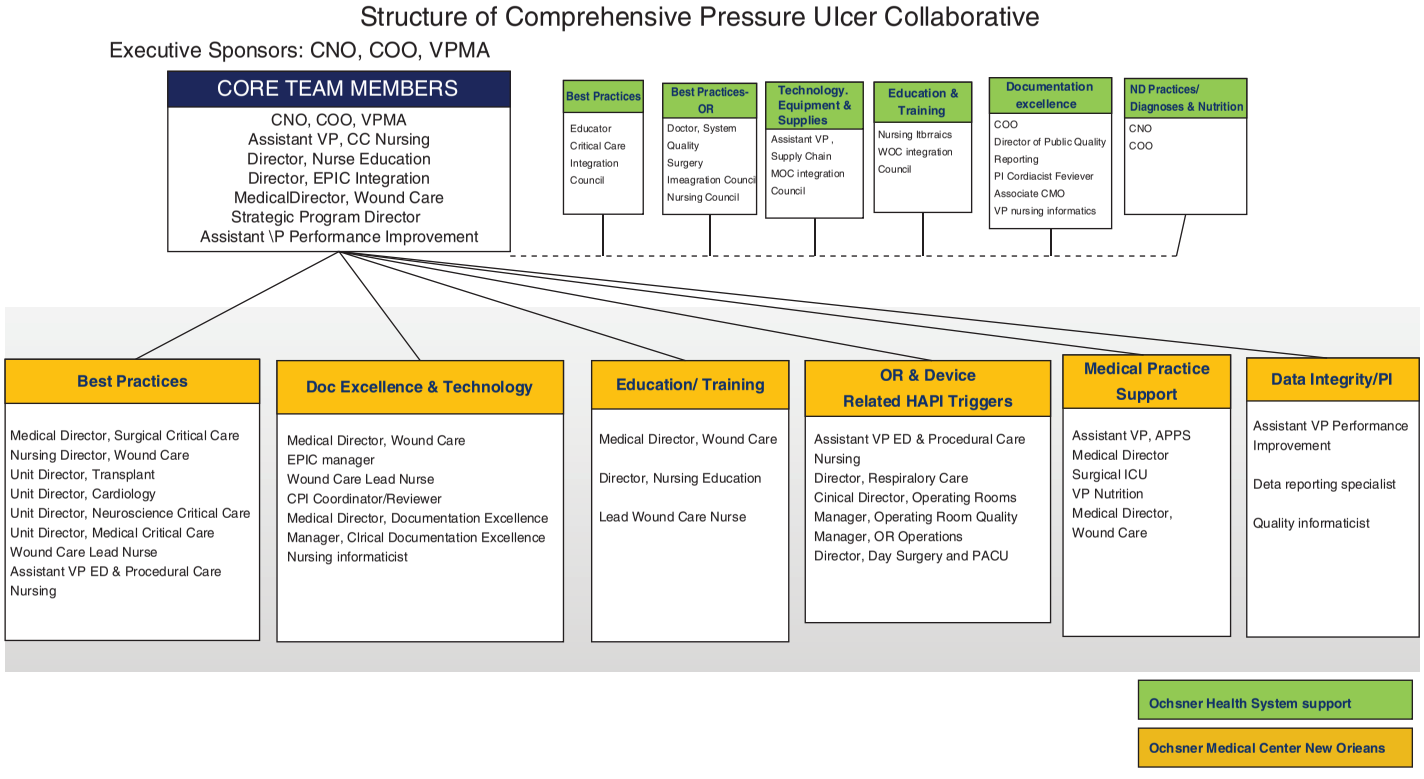

Fig. 43.2 Structure of hospital-wide comprehensive pressure ulcer performance improvement. (© Ochsner Health)

Table 43.1 Role and workflow description for unit-assigned advanced practice providers

1. *Work closely with* unit wound care nurse and medical director, becoming a member of the patient's care team.
2. *Identify patients* of focus via epic pressure injury daily reports.
3. *Round 2–3 times a week* on these and other high-risk patients (e.g., hospital transfers, nursing home origin, recent re-readmits, bed-bound status) from a rounding list.
4. *Medically determine* the likelihood of presence of the lesion on admission and the diagnosis of pressure injury vs. nonpressure injury (e.g., trauma, moisture, vascular, intertrigo, shear, etc.); rule in/rule out any documented DTI or DTPI, tracking the lesion's progression (or lack thereof) longitudinally during hospitalization.
5. *Document* medical decision-making and treatment plans for pressure injuries in the medical record.
6. R*eceive and answer directed clinical documentation queries*, confirming or ruling out the suspected diagnoses (e.g., DTI, DTPI, or unstageable).
7. *Direct clinical care*, including such measures as debridement, to optimize healing and recovery and to accurately stage injuries, especially during prolonged hospital stays.
8. *Participate in weekly collaborative team meetings* with quality improvement, nursing, and wound care professionals to review progress and identify opportunities for iterative (PDSA cycle) improvement.

supported skin integrity for our hospitalized patients on a limited part-time basis. One provider was designated for each hospital intermediate and critical care unit, with collaboration and medical oversight by the medical director and reporting accountability to the executive quality group. The identified goal was to reduce the PSI-3 by 50% within a 6-month time span. This intervention included a specific role description and workflow for the unit-assigned APP (see Table 43.1). Approximately, 6 months into the intervention, hospital performance for PSI-3 rate improved by 34%; it improved by 45% in the targeted units. Ongoing PDSA cycles included process improvements in the areas of specialty bed utilization for high-risk procedures, proactive rounding, and device-related injury.

Further improvements were made subsequently. A twice weekly list of patients with pressure injury was published for each of our bedded hospital units, with assigned accountability for daily actions. Instead of relying on part-time APPs whose primary role was not skin integrity, a dedicated skin integrity APP was recruited, onboarded, and fully trained in wound documentation and management. Workflow for this dedicated skin integrity APP was to conduct daily surveillance of newly reported wounds on admission or during hospitalization. The APP professional initially rounds on these patients within 24–48 hours and at least twice weekly. The outcome from the sum total of these interventions has been a marked further improvement despite the challenges encountered during an active COVID pandemic year (see Fig. 43.3).

43.3 Analysis of Hospital-Acquired Infection Performance Drives Improvement

Several years ago, from a review of our quality performance dashboards, we identified opportunities for performance improvement with regard to HAIs. Our organization's performance under the Centers for Medicare & Medicaid Services (CMS)

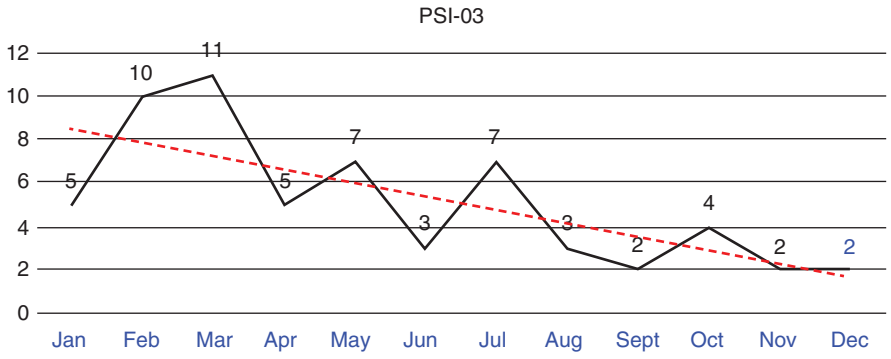

Fig. 43.3 Hospital-wide improvement in PSI-3 events during 2021. (© Ochsner Health)

Hospital-Acquired Condition Reduction Program (HACRP) was heavily dependent on being able to control hospital-acquired methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* infections, as well as to further reduce surgical site infections (SSIs). A collaborative team of leaders, infection control specialists, infectious disease specialists, and unit-based leaders developed a roadmap for active management of HAIs to reduce harm events for our patients while optimizing organizational performance in publicly reported metrics.

National Healthcare Safety Network (NHSN) and CMS reports relating to the HACRP for our hospital were scrutinized. The impact of the component metrics was estimated based on the then current performance. Inpatient goal metrics were chosen to help drive action and accountability at the campus level. Goal performance was set to promote performance likely to result in HACRP penalty avoidance, specifically for organization-wide hospital-acquired MRSA bloodstream and *C. difficile* infections, as well as central line-associated bloodstream infection and catheter-associated urinary tract infection. These hospital-wide targets were then translated to goal metrics (expressed as number of occurrences) for each bedded hospital unit. Each unit had specific goals, which ranged from 19% to 43% improvement depending on the HAI metric. Interventions included (1) a concerted effort to improve hand hygiene adherence, (2) a mini root cause analysis process for each HAI event completed within 2 weeks of occurrence, and (3) a strengthened collaborative concurrent review process specifically focusing on SSIs.

To encourage commitment and action, hospital leaders round at least monthly with each of more than 20 hospital unit leader dyads comprised of nursing and unit-based medical directors. Unit-embedded infection preventionists and performance improvement coordinators attend these rounds. During rounds, we share unit wins such as "ZERO HAI performance" or "good catches," device utilization, as well as hand hygiene, isolation, and HAI bundle adherence data. Unit leaders are coached in unit performance improvement efforts, and resources are identified if needed. Each unit dyad leadership team receives a weekly update of their unit's HAI performance. Widescreen computer monitors prominently display the number of days since the last HAI event on every hospital inpatient unit, as well as the unit's hand hygiene adherence.

Performance showed positive trends in most HAI metric components (Figs. 43.4, 43.5, and 43.6). At year-end, we had made substantial progress in the prioritized organizational quality metrics (affectionately dubbed "the magnificent seven" or "M-7"), achieving a 17% reduction in hospital-acquired *C. difficile* infections (86

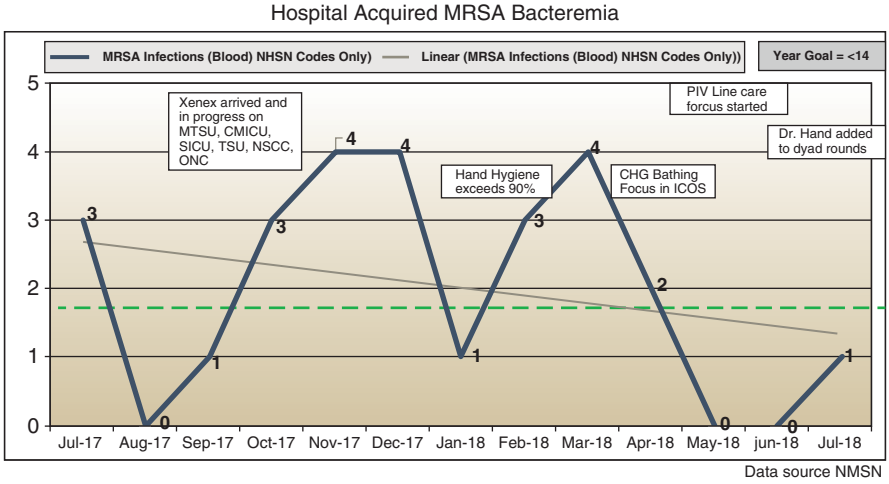

Fig. 43.4 Trend in hospital-acquired MRSA bloodstream infections. (© Ochsner Health)

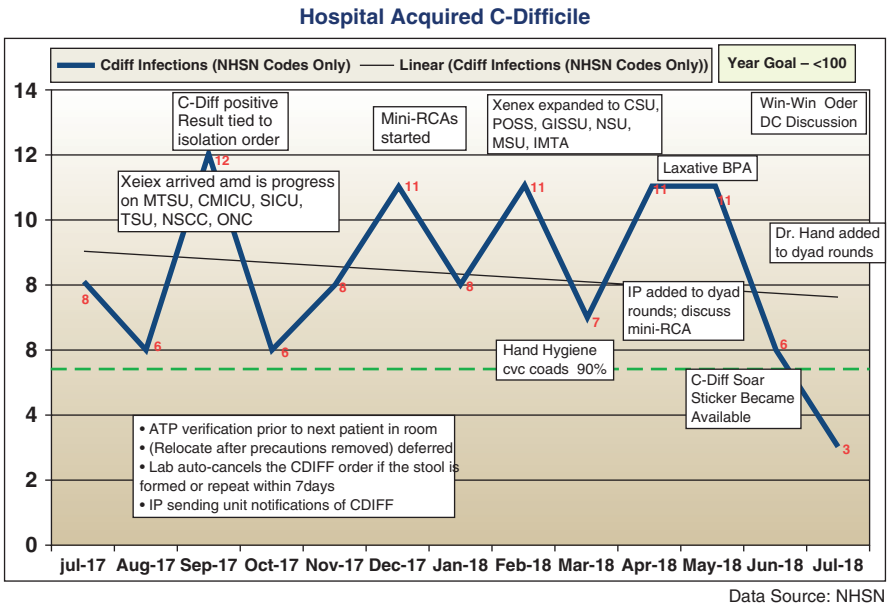

Fig. 43.5 Trend in hospital-acquired *C. difficile* infections. Xenex ultraviolet disinfection technology, MTSU, CMICU, SICU, TSU, NSCCU, and ONC designations for specialty hospital nursing units, IP infection preventionist, ATP testing for protein residue after cleaning, BPA best-practice advisory (electronic medical record), RCA root cause analysis. (© Ochsner Health)

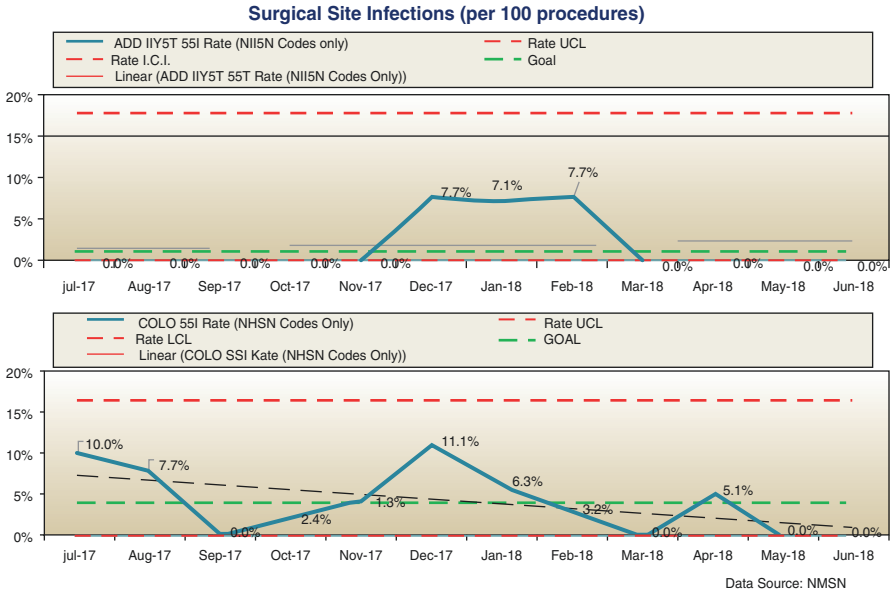

Fig. 43.6 Surgical site infection trend. (© Ochsner Health)

cases vs. 104 prior year cases) and a 15% reduction in hospital-acquired MRSA infections (17 cases vs. 20 prior year cases). Likewise, surgical site infections declined to a level close to zero.

A systematic approach to the data analysis and improvement of HAIs aimed at improving patient care and avoiding CMS penalty payments led to substantial improvements achieved by our teams. While we missed the penalty cutoff by mere hundredths of a point that year, our learnings included the value of aggressive goal setting, data transparency, and targeted improvement programs at the unit level. Further and ongoing efforts reduced hospital-acquired MRSA events to 1–2 per month and C. difficile events to 3–4 per month; the CMS HACRP penalty was avoided during the following years.

Our management strategies for HAI improvement were similar to what has been reported recently [3]. Scheck et al. reported three primary management practices to facilitate HAI prevention: engagement of executive leadership, information sharing, and manager coaching. As was the case for our organization, these investigators perceived that highly visible executive leadership, efficient communication, and relentlessly taking advantage of opportunities to promote learning through feedback were critical to sustaining HAI prevention efforts (Fig. 43.7).

43.4 Analysis of Hospital Mortality and Resuscitation Performance Improvement

During a period of rapid growth, our medical center experienced a steady increase in risk-adjusted mortality. At first, our analytics did not reveal an unequivocally worrisome trend. It soon became obvious, however, that both raw and risk-adjusted

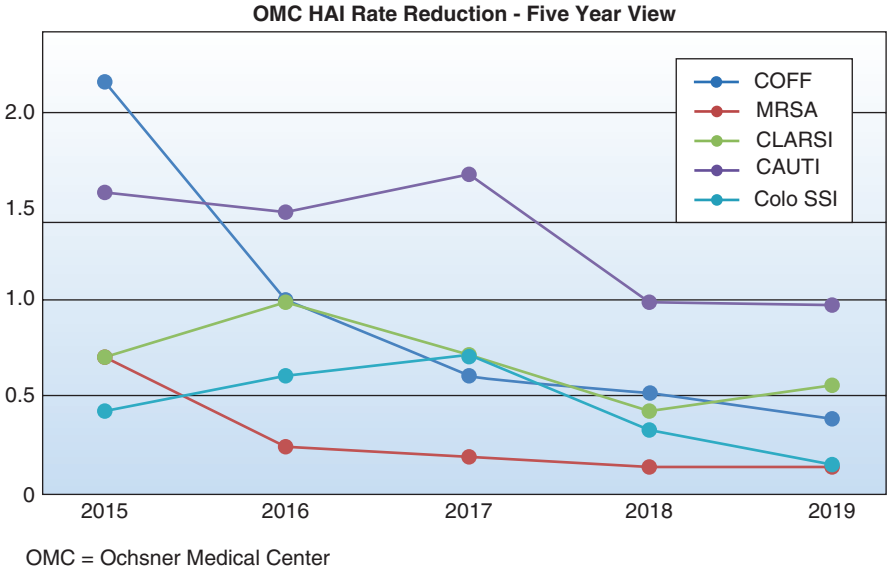

Fig. 43.7 Long-term trend in hospital-acquired infections. OMC Ochsner Medical Center. (© Ochsner Health)

mortalities were on the rise. We approached our strategic options for improvement from several perspectives.

Leadership engagement was deliberate and multilevel. It entailed a concerted effort of our foundation board's quality committee, health system quality leadership, and hospital executive teams. While our board provided overall direction and accountability, the contribution from our health system quality group was the prioritization of mortality as a hospital quality measure. At the same time, the concept of using a driver diagram for the risk-adjusted mortality index (RAMI) was disseminated and taught (see Chap. 25). Knowledge and visualization of the drivers of RAMI allowed hospital leaders to work on the main influencers of RAMI. The principal drivers identified through expert consensus were resuscitation, case selection, transfer center mortality; placement into appropriate level of care, sepsis, documentation, and palliative care.

While many efforts led to a reduction of RAMI, we will illustrate two which stand out. The first was the team's focus on systematically improving resuscitative effort throughout the hospital. Rescue from serious complications is an important determinant of survival of hospitalized medical and surgical [4] patients. The principal goal was to drive hospital floor codes toward zero. Through a combination of rapid response team retraining, proactive nurse rounding, medical record-based and machine learning enabled decision support tools, and upgraded resuscitative technology, floor codes were reduced by 60–70% over a 2-year period (see Fig. 43.8). Proactive rounding by rapid response teams has previously been reported to reduce inpatient cardiac arrests [5].

The second intervention was to build out and staff a patient flow center with the goal of assigning patients to the correct level of care nearly 100% of the time (see

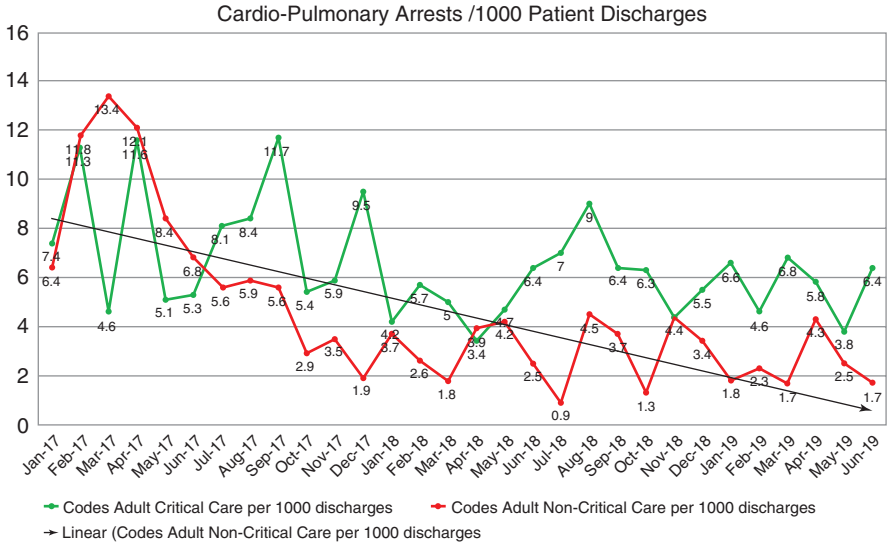

Fig. 43.8 Cardiopulmonary arrests (codes) on hospital floors and critical care units. (© Ochsner Health)

Chap. 29). This effort was inspired by our knowledge that transfer center patients had a higher RAMI than patients who were admitted to the hospital via other portals of entry. Moreover, our internal data showed, not surprisingly, that RAMI increased the longer patients waited in queue for hospital admission. Enabled by sophisticated information technology and video displays, patient flow center personnel have a comprehensive view of health system capacity which enables faster patient placement into the right level of care. This is further guided by a physician in lead of transfers (PILOT) who initiates urgent care early during the transfer process and triages patients based on medical severity. As a result, overall and transfer center RAMI have decreased over time (Fig. 43.9). The RAMI of transferred patients is now equivalent to that of patients admitted from other sources.

A similar comprehensive approach to mortality reduction has recently been described by quality leaders from the Mayo Clinic health system. A sustained six-quarter trend in increasing Vizient mortality ratios prompted a system-wide board-driven improvement initiative. The components of this improvement plan included avoiding inpatient admissions of patients who are unlikely to benefit from hospitalization, having appropriate goals of care, inpatient clinical management, detection of clinical deterioration, continuous practice review, and clinical documentation improvement [6].

43.5 Overview of Sustained Improvements and External Recognition for Quality and Patient Safety

Improvements were sustained year of year (Tables 43.2 and 43.3; Figs. 43.7 and 43.10). Substantial improvements in virtually all metrics on the Hospital Dashboard for Prioritized Quality Metrics were made in the first year; this approach yielded

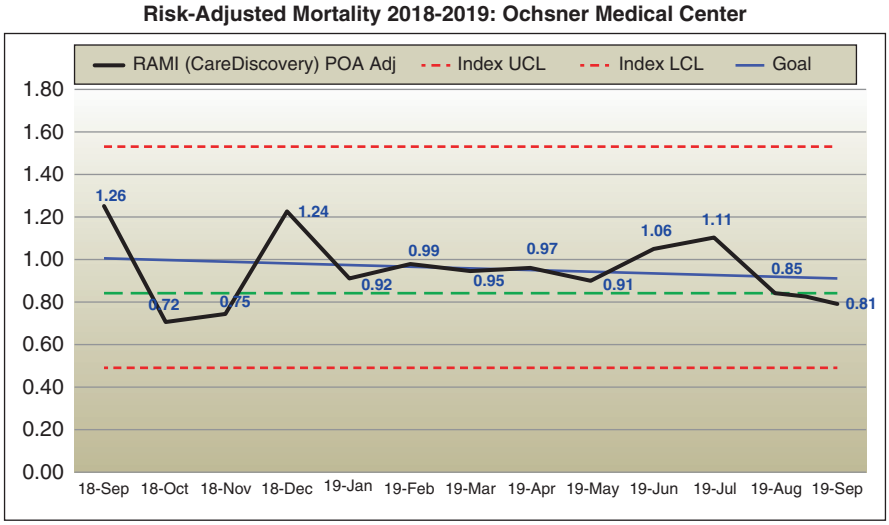

Fig. 43.9 Ochsner Medical Center risk-adjusted mortality over time. (© Ochsner Health)

Table 43.2 Ochsner Medical Center quality dashboard: improvement in prioritized hospital metrics in year one

OMC M-7 quality: 2018 year-end status				
M – 7	2017	2018 goal	2018 year-end	Change in 2018 (vs. 2017 or first half)
NDNQI falls	542	474 12% reduction	471	16% improvement
Fall rate (per 1000 patient days)	3.14	2.75 12% reduction	2.66	
MRSA	20	14 30% reduction	17	15% improvement
C-diff	104	100 5% reduction	85	18% improvement
PSI – 3 (IBM Watson)	26	59	70	45% improvement Vs. first half
PSI – 4 (IBM Watson)	84	89	67	20% improvement
RAMI (IBM Watson)	1.10	0.85	0.94	19% improvement
ECRI (IBM Watson)	0.61	0.65	0.64	18% improvement Vs. first half
CAUTI	52	41 20% reduction	29	44% improvement
CLABSI	37	30 20% reduction	20	46% improvement

NDNQI National Database of Nursing Quality Indicators, *Colo* colectomy, *ECRI* estimated risk complication index

Table 43.3 Improvement in prioritized hospital metrics in the following year

OMC inpatient quality: 2019 vs. 2018					
Metrics 2019	**Final 2018**	**2019 goal**	**2019 Year-end**	**2018 vs. 2019 Performance**	**2020 goal**
NDNQI falls	471	433	380	12% better than goal 20% improvement vs. 2018	Fall with harm rate (15% improvement)
Fall rate	2.66	2.43 8% reduction	2.13		
CAUTI	29	30 Stay course	27	10% better than goal	20 (20% improvement)
MRSA	17	13 23.5% reduction	17	Unchanged	14 (18% improvement)
C – Diff	85	84 2% reduction	60	29% better than goal	50 (17% improvement)
PSI-3	70	42 (2.5/1000) 47% reduction	67	11% improvement vs. 2018 (Vizient)	1.93/1000 (48% improvement)
RAMI	0.94	0.85 5.5% reduction	0.95	Unchanged	0.87 (10% improvement)
ECRI	0.64	0.72 6.5% reduction	0.58	19% better than goal	0.60 (stay course)
SSI-Colo	14	11 20% reduction	5	54% better than goal	5 (stay course)
CLABSI	20	16 20% reduction	29	45% worse than 2018	25 (14% improvement)

NDNQI National Database of Nursing Quality Indicators, Colo colectomy, ECRI estimated risk complication index

further improvements the year after (Tables 43.2 and 43.3). We had also made substantial progress in other metrics achieving a 39% improvement in PSI-12 (perioperative DVT/pulmonary embolism), a 35% improvement in PSI-11 (postoperative respiratory failure), and a 22% improvement in PSI-4 (failure to rescue) over a period of 1 year.

Analysis further indicated that the positive contribution of our PSI performance (PSI-90) offset some of our challenges with the HAI metrics, resulting in an overall negative domain score for the PSI-90 component (in the PSI-90 metric scoring method, lower scores are better). As mentioned above, interventions to standardize best practices and a unit-based performance improvement cycling culture were implemented over a series of 4–5 years. Over the same 5-year period, we saw an overall reduction in total PSI harm events by 29%. Continued improvement (see Fig. 43.10) eventually resulted in our hospital's Leapfrog Safety Grade to improve from "B" to "A," a level that has been sustained since.

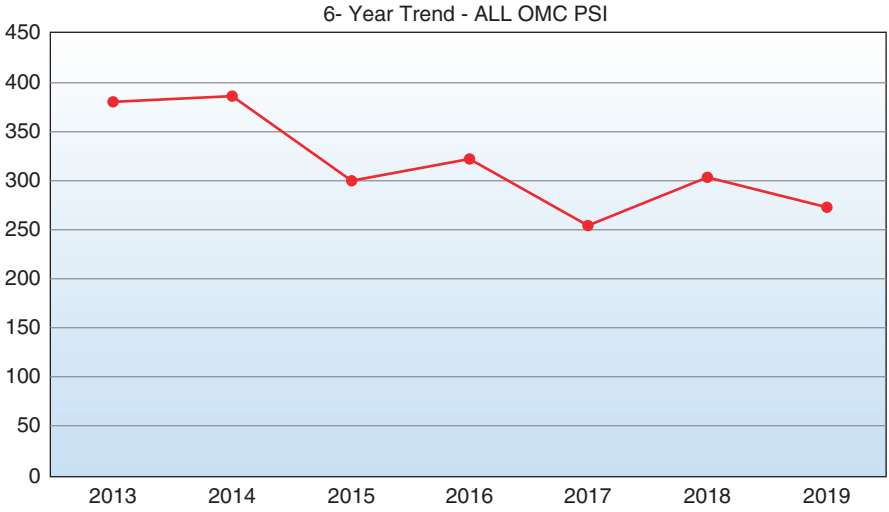

Fig. 43.10 Long-term trends in AHRQ patient safety indicators at the Ochsner Medical Center. (© Ochsner Health)

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