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Abstract

In this chapter, healthcare today is characterized by innovation and organizational change. The implementation of innovations is mainly directed toward improvement of quality, patient safety, or patient satisfaction, taking the financial and human resources of healthcare organizations into consideration. Healthcare systems have to change their focus from cost-efficiency to a more value-based approach. In this approach, value for patients is calculated by dividing cost by quality. To increase value for patients, we have to implement innovations that improve the quality and reduce the costs of services. This chapter explores how two specific strategies, project management (PM) and plan-do-study-act (PDSA) or plan-do-check-act (PDCA) cycles, can promote the implementation of innovations and thus improve the value of care.

Keywords

Quality improvement • Project management • PDSA-cycles • PDCA-cycles • Lean • A3 reporting method • Productive ward • Value of care

8.1 Introduction

Healthcare today is characterized by innovation and organizational change (Aubry et al. 2011). The implementation of innovations is mainly directed toward improvement of quality, patient safety, or patient satisfaction, taking the financial and human

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resources of healthcare organizations into consideration. The Institute for Healthcare Improvement (IHI) stated that healthcare systems have to change their focus from cost-efficiency to a more value-based approach (Institute for Healthcare Improvement 2017). In this approach, value for patients is calculated by dividing cost by quality. To increase value for patients, we have to implement innovations that improve the quality and reduce the costs of services. The previous chapter explained the relationships between (team) learning, innovative work behavior, implementation of innovations, and improved patient outcomes. This chapter will explain how two specific strategies, project management (PM) and plan-do-study (PDSA) or plan-do-check-act (PDCA) cycles, can promote the implementation of innovations and thus improve the value of care.

Project management (PM) methodology is for the most part relatively new in healthcare and tends not to be formally taught in nursing education programs (Aubry et al. 2015; Overgaard 2015). However, nurses have many reference points they can use in learning to think about and manage projects in daily practice. For instance, like project management, the nursing process, familiar to nurses and managers alike, is a systematic approach based on assessment, diagnosis, planning, implementation, and evaluation and offers many parallels.

PM includes the following steps: initiation, planning, monitoring and controlling, and closing. The initiation phase parallels the assessment and diagnosis steps in the nursing process where those working on a unit project need to define the goals and objectives for the improvement by clarifying the desired outcome. Next, the underlying problems/challenges need to be identified and solutions to address them need to be identified in the planning phase. A project plan should identify the human resources, materials, and education needed. Third is the execution phase, where the plan is put into motion (which is the implementation phase in the nursing process). The fourth phase, monitoring or evaluation is found in PM as well as in nursing. Optimal project results are seen when teams constantly evaluate and adapt their approaches until desired results are obtained. The final step is the closing of the project where the results are completed and sustained (Overgaard 2015).

Quality improvement (QI) methods have been introduced in healthcare settings to enhance quality, patient safety, satisfaction, and efficiency. Achieving improvements in healthcare requires its application within complex social systems. Local contexts have great impacts on the success of an intervention. It is also clear that “single-bullet” approaches (involving only one set of actions and communications) do not tend to deliver consistent improvements. Improvement projects need to have complex and multifaceted interventions that are developed iteratively in response to obstacles and unintended effects (Taylor et al. 2014).

The PDSA (PDCA) cycle and the concept of iterative tests are methods central to many QI approaches like Lean, Six Sigma, and Total Quality Management (Reed and Card 2015; Taylor et al. 2014). PDSA represents a practical method for testing changes in complex systems in a manner based on the scientific method (Taylor et al. 2014). The PDSA cycle is focused on making changes that translate ideas into action. Rapid learning cycles allow for quick feedback so that the effectiveness of interventions is clear. Sustainable change is said to have been achieved when results

suggest that no further adjustments are needed. Another important benefit of PDSA cycles lies in learning opportunities for healthcare workers and teams (Reed and Card 2015; Taylor et al. 2014). The method gives healthcare workers skills to learn from their experiences and to act to improve patient safety and conditions in their organizations. PDSA forces teams to predict likely outcomes of their interventions and measure the outcome of the improvement to assess their actual impact (Taylor et al. 2014). The chance to make and document meaningful change, connect multiple stakeholders to the intervention, and increase confidence in the intervention are also important benefits of PDSA. In Lean management, the PDSA cycle is operationalized with A3 problem solving.

A systematic review by Taylor et al. (2014) described the application of the PDSA method in healthcare. A theoretical framework to assess the use of PDCA in peer-reviewed publications was developed based on literature that assessed the use of iterative cycles, prediction of the outcome, small-scale testing (mini-experiments), the use of longitudinal data, and documentation. Of the 73 publications included in the review, only 2 demonstrated all 5 principles. However, the lack of standardized reporting in the publications rendered the assessment difficult. This paper found that the use of iterative change cycles and longitudinal data were described in 20% and 14% of the publications, respectively. Among the publications describing iterative change cycles, only 15% ($N = 2$) appeared to use small-scale tests. These data suggest that PDSA cycles are not being used optimally, leaving much room for greater consistency and attention to the use of the method as originally described that would likely yield benefits in terms of improved outcomes.

Reed and Card (2015) examined opportunities, complexities, and challenges in the use of PDSA cycles in healthcare. Many consider PDSA cycles to be an approach easily applied to QI purposes but while a certain simplicity in the methodology is a great strength, users need to be aware that tackling different problems often requires need more extensive knowledge and skills. The exploration and framing of problems is a very important aspect of PDSA and is one where staff often need the support of experts. Unfortunately, the planning and reflection stage of the method is sometimes considered a luxury time instead of a necessity. Following the structure of the cycle also forces healthcare workers to avoid the pitfalls of rushing to interventions prematurely. There are opportunities for inductive and double-loop learning of frontline staff when the application of the scientific principles is rigor in the “do” phase. Methodological expertise and sustained effort is necessary to maximize the benefits of PDSA.

8.2 Background of PM, Lean Management, and UZA Journey to Magnet Excellence

In Belgium, acute hospitals exist in a system with an increasing level of competitive pressure. This competition is increasing even more steadily given the movement toward limiting the volume of services provided in hospitals based on quantitative and qualitative criteria. Designating specific hospitals as the providers of care

programs was initiated by the government to increase the quality and efficiency of care (Policy Cell Ministry of Social Affairs and Public Health Belgium 2017). Furthermore, there is increasing competition between Belgian hospitals, like healthcare organizations internationally, for highly educated physicians, nurses, and other healthcare workers. All of this evolution in the external environment has had tremendous impacts on internal operations. Increasing quality standards, higher expectations of patients, financial challenges, and multiple impacts of the competitive environment made the need for a transformation of practices at the Antwerp University Hospital (abbreviated UZA in Dutch) obvious.

Over a decade ago, to increase the performance of the hospital at every level and to prepare the hospital for the future, the UZA's board proposed a new strategy built around a vision to provide more value for the patient through the empowerment of frontline staff. To operationalize this new strategy, many different change programs were initiated over a 10-year period. In 2007 a strong need to support the different improvement projects with a project management structure was identified. Under the title PM@UZA, a nurse staff member and a manager of the HR department were assigned to evaluate the state of the science in project management (PM). After a review of different PM methods, the hospital decided to adopt and translate the *Project Management Body of Knowledge* (PMBOK®) for its organizational context.

The organizational PM structure is described in the literature as both a facilitator and as a barrier to harnessing the potential of project management. The impact of the PM structure is determined by its place within the organizational structure. In most organizations, PM is supported by a PM office or PMO that develops organizational PM capacity for achieving strategic goals. Unfortunately, it is challenging, if not impossible, to directly measure return on investment of a PMO. What is clear is that a good fit of the organization's PM structure has very significant effects and can add value to an organization (Aubry et al. 2011). Hurt and Thomas (2009) mentioned that PMOs must continually change and reinvent themselves to keep adding value to their organizations. PMOs generally typically start out addressing specific identified problems in PM within the institution. Later on, effective PMOs set new goals or objectives such as ensuring adherence to processes. New structures and/or processes can be necessary, but as long as a carefully PM vision and focus can be maintained, more value can be added to the organization. Finally, building PM capabilities is not a one-time effort but requires an ongoing, continuous investment that must be managed by qualified, visionary effective leaders (Hurt and Thomas 2009).

Aubry et al. (2011) present a case study where a PMO was assigned to guide a relocation and reorganization of six hospital sites into three in the McGill University Health Centre (MUHC) located in Montreal, Quebec. This case provides insights into the potential power of a PMO as well as into the facilitators of project management in healthcare settings. Because of the massive change the hospitals were undergoing, the PMO was called a Transition Support Office, which nonetheless met the definition of a PMO because this department managed a wide range of projects and offered services to different project managers and

other stakeholders (Aubry et al. 2011). The TSO was launched in 2008 and was assigned to help key players coordinate the organization transition, support improvement in care processes, and create a culture of learning and innovation (Biron et al. 2012; Aubry et al. 2011). The TSO included staff members from a variety of backgrounds, such as nursing, management, and engineering, as well as students, and was led by a nurse (Lavoie-Tremblay et al. 2012). The TSO was under supervision of the CEO and a steering committee composed of by senior managers (Aubry et al. 2011).

An important task for the TSO was introducing performance management with not only a focus on productivity but also on measuring the impact of their efforts and various projects on quality and patient safety outcomes. For this purpose, the hospital designed an evaluation framework where structure, process, and patient and provider outcomes elements were specified. The overall goals of the activities were clinical effectiveness, patient centeredness, and patient safety, which were aligned with the hospital's strategic direction. By using performance management, the hospital could select outcomes aligned with the vision, determine opportunities for improvement, and follow up the effectiveness of the action plans. The TSO supported the project teams in optimizing and sustaining clinical and work processes within this framework (Biron et al. 2012).

Beyond the use of performance management, the TSO was also responsible for dissemination and implementation of evidence-based processes. Therefore, the project charter, based on the PMBOK, helped the project manager to coordinate, identify the stakeholders, and determine the aim and objectives of the projects. Important facilitators of change created by the TSO included their credibility as internal coaches for project management within the organization; their expertise in and advocacy for evidence, change management, direction and facilitation of projects; and, last but not least, their support for driving organizational culture change (Aubry et al. 2011; Lavoie-Tremblay et al. 2012).

The innovative role of the TSO as described here lies in its facilitation of organizational change, where mostly PMOs are traditionally oriented to monitoring and controlling narrower areas of operations (Lavoie-Tremblay et al. 2012). In addition, in healthcare, PMOs are often mandated to guide projects around implementation of technology, while the TSO at MUHC was extensively involved in guiding evidence-based improvement projects.

At UZA, our PMO consists of enthusiastic employees from different departments of the hospital, such as medicine, nursing, allied health disciplines, and others, primarily managers and middle managers. In our vision of project management structure, the PMO offers coaching to project managers. Because of the limited time that the PMO members can spend on initiatives outside their daily work, responsibility over the different projects falls to local project managers. Members of the PMO were asked to join a steering committee responsible for project management development, training, and follow-up. It is of note that no specific personnel resources were assigned to the PMO. Nevertheless, our PMO has trained internal project managers, mostly physicians, (nurse) managers, and staff members; to date, more than 300 colleagues have been certified in the local PM methodology.

Research shows that on-the-job training for project management capabilities in healthcare has positive results. Professionals reported high satisfaction and perceive the usefulness of the training, especially in terms of fulfilling otherwise unaddressed needs for skills and knowledge about PM. In pre-post assessment, professionals also reported gains in self-efficacy in carrying out project tasks, teamwork behaviors, goal clarity, and coordination. Together, these study findings suggested that improvement of knowledge and performance of new behaviors targeted by the program was reached (Chiocchio et al. 2015).

At the beginning of the PM@UZA program, various templates were designed using Microsoft Office applications. These templates were based on the PMBOK project management processes (see below). After an internal review, the lack of oversight of the different ongoing projects was identified as an area for improvement in the PMO. At the beginning of 2017, an Enterprise Project Server was installed to gather and analyze data to allow prioritization of resource allocation to different projects based on strategic, financial, and operational criteria. Now, the PMO can also follow the progress of every project and thereby coach project managers confronted with various barriers, issues, and problems.

After expanding the organization's performance to achieve process changes through project management, Lean management was chosen as an organization-wide strategy for operational excellence. The focus of the Lean approach on value creation for clients (patients, units, departments, and/or colleagues) is an excellent fit for the institutional needs to make efficient use of limited resources and continuously improve the quality of care processes to add value for patients.

Our Lean journey began 6 years ago in Birmingham, UK, after we visited two English hospitals that were implementing the Productive Ward: Releasing Time to Care™ program. Productive Ward (PW) is a modular program focusing on improvements at ward level. Nurses are very familiar with the patient care cycle or nursing process, which is comparable with the generic PDSA cycle. In this model, such a scheme is used to structure improvement projects. During the debriefing that followed on the visits, our HR and CNO convinced the CEO that hospital needed Lean thinking to stay on top of future trends and challenges and hold ourselves to the standard of the hospitals we visited.

We realized that adopting PW would be an advantage for UZA: frontline staff could begin incorporating Lean principles in a form already adapted for a healthcare environment. As reported in the literature on Lean, this bottom-up approach was expected to support empowerment and engagement of frontline staff as well as their leadership (Grabau 2012). Other elements of the PW program that were appealing include the focus on data-driven, systematic improvements and process stability.

The human resources (HR) saw in Lean methodology a way to boost healthcare workers' engagement in a manner anticipated to support quality and safety of patient care. Lean empowers frontline staff to improve their work and helps every UZA healthcare worker and staff make continuous improvement both a routine and one of the highest priorities in the hospital. At the same time, the nursing department was seeking to achieve Magnet status or designation for the hospital. The Magnet journey has a strong focus on patient outcomes, continuous improvement

of patient care, and nurse's work environment improvement with an untimely goal to attract and retain professional nurses. PW was seen as one way to operationalize the Magnet philosophy. The lean transformation of Antwerp University Hospital started in 2011.

At the end of each project that has been translated into the hospital's PM methodology (called PM@UZA), normally implementation of PW considerations follows. PW is a program and thus cannot be compared with a project, but programs are tackled as a series of projects. The project team decided to divide the implementation of PW in two phases. Firstly, the implementation of PW on two nursing wards was launched on a pilot basis. Later, with the experiences and knowledge of this pilot, the project team planned a hospital-wide implementation plan.

8.3 Introduction to Project Management Methods

We will now briefly explain the PMBOK® methodology as described in the PMBOK® guide (Project Management Institute 2004). A project is a temporary endeavor to create a unique product, service, or result. The descriptor "temporary" is temporary because each project has a defined start- and endpoint. A project has reached its end when predefined objectives have been (or cannot be) achieved. This does not mean that every project is a short-term operation or that the delivered service, result, or product is impermanent, but it is always important to clarify project run time when considering the use of resources. Most projects begin with an intention to create a unique result that can be sustainably implemented in the operations of the organization (Project Management Institute 2004) (Box 8.1).

Box 8.1 Project Criteria

1. Temporary endeavor
2. Unique result
3. Realizing predefined objectives
4. Interaction between the triple constraint
 - (a) Time
 - (b) Scope
 - (c) Resources

Projects have existed since the beginning of time. In the 1950s, most of the modern project manager's concepts and tools were initially described by military organizations. In the mid-1970s, the Project Management Institute began exploring project management as a profession. In 1987, the first *Project Management Book of Knowledge (PMBOK)* was formally published with eight knowledge areas (scope, time, cost, quality, human resources, communication, risk, and contracts/procurement). In 1996 a revision of PMBOK changed the manual to *A Guide to the Project Management Book of Knowledge* and added integration as a knowledge area. In the

1990s, different industries and organizations have adopted project management tools and techniques. Project management theories use knowledge, skills, methods, and techniques to realize project requirements. In the late 1990s and early 2000s, other organizations established other project management methods such as the Japanese Project Management Book of Knowledge, Agile software management, and PRINCE2. The latter became very influential particularly in the United Kingdom (Morris 2013). Project activities can be divided in the following project management processes: initiating, planning, executing, monitoring and controlling, and closing (Project Management Institute 2004).

The so-called triple constraint must be borne in mind across the entire life cycle of a project. The triple constraint is the concept of intrinsic connections between time, scope, and resources. This triangle is fundamental in the initiation and planning phase but is also crucial when changes in execution are necessary. When one aspect of the triangle has to be adjusted, it has an impact on the other two. For example, when the original plan for a project cannot be carried out, time, scope, or resource use have to be reevaluated in order to achieve the project goals. Project managers must constantly balance three components to achieve project objectives within a predefined budget (Project Management Institute 2004).

8.3.1 Initiation Phase

The initiation phase of the process includes every process that leads to formal authorization of the new project. This phase will in most cases be performed outside of project scope. According to the PMBOK guide, this phase consists of a product description, project mandate, and initial scope document. The initiator or sponsor, who can be a person, team, or department and can be an internal or an external partner, must clearly describe the project. The description has to be adapted to the environmental factors and hospital organizational policies and procedures. A feasibility study may be necessary to explore the different solutions to achieve the initial request as described. In this way, alternative options are explored, and the project team can determine the most ideal solution.

After choosing the best solution to address the request in the description, the approach for the project and the project objectives are defined. A summary of the approach consists of a defined scope and product or services to be delivered, throughput time, and an estimation of necessary resources. Another point of interest in the initiation phase is ensuring that there is a link between the project and the strategic plan of the organization. A number of other structural elements of the project are decided upon: management responsibilities within the project can be clarified and large and complex projects can be divided in different phases.

The initial project scope document describes the tentative, global definition of the project and includes product or service requirements for delivery, boundaries,

acceptation method, and the way the scope will be managed. In situations where projects need to be divided into separate projects, it is important to repeat the initiation phase to clarify the goals, necessary resources, and the new starting point for each subproject.

The aim of the initiation phase is received authorizing for the objectives of the project and developing a clear understanding of the link between the product or service to be developed and the operations of the organization. Authorization should be made by the management of the department or if necessary (because of the project scope) by the hospital board (Box 8.2 See further).

Box 8.2 Project Charter Components

- Business case
 - Background
 - Objectives
- Possible solutions and the one being advocated
- Project structure
 - Steering committee
 - Project team
- Classification project size
- Risks
- Acceptance criteria
- One-minute summary

First, in our hospital, when a suggestion is made for a project or a need emerges that needs to be addressed, the request has to be approved by the nurse manager and/or nurse leader. When the proposal matches with the hospital or department objectives, the initiation phase can begin. The initiation phase is then established, guided by a project charter and a structure cost–benefit analysis derived from the PMBOK guide.

The project manager (PM) is normally the manager of the department where the project is being conducted or another individual designated by the head of the department. The project manager drafts the program charter in consultation with all relevant stakeholders. The project charter consists of a business case for the project, possible solutions/approaches, and a presentation of the project structure. The business case contains the background for the project (the need that it would address) in addition to the project's SMART goals (an acronym for goals written in a way that clarifies that they are specific, measurable, achievable, realistic, and time-related). The project objectives need to link clearly with the overall goals and objectives of the organization (Overgaard 2010). The project manager must describe different possible solutions that could meet the project requirements and has to specify which one they believe is the optimal solution that should be funded. A project structure includes a steering committee, and a project team is also defined at this time. In the case of large projects, a liaison within the board of directors is often appointed.

Every project will also be categorized according to complexity and size of the project. Large projects and their necessary resources have to be confirmed by the board of directors (Box 8.2).

Box 8.3 PW Implementation Characteristics

- Project teams internal to nursing units
- Human resources and project management coaching
- Objectives linked to the nursing department and hospital strategic plans
- Selection criteria pilot wards
 - Strong leadership
 - High nurse satisfaction
 - No restructuringDevelopment of internal knowledge with respect to PW without consultancy support
- Project rollout schedule based on experiences in the pilot phase
- Module-based program
- Sustainable result by follow-up coaching

For small rather straightforward specific projects with limited stakeholders and a lead time of 3–6 months, the PMO suggests the use of the A3 method based on PDSA or PDCA cycles (see below) (Jimmerson 2007). This is a method for tackling specific, well-defined problems. Large projects can subsume multiple A3 projects.

Projects involving optimization of a complex process or a range of different linked processes and/or different bottlenecks are preferably tackled using multiple PDSA improvement projects. However, recently reports have appeared of failures of the PDSA method when tackling complex and multicomponent problems (Reed and Card 2015). Reed and Card argue that the four stages of PDSA are nonetheless useful for bigger projects because of the scientific, iterative, and experimental principles they incorporate. Thus when using PDSA in the context of larger projects, the method needs to be applied in a sophisticated and thoughtful way, in concert with a broader methodological approach like Lean management (such as the PW program), and with appropriate organizational support.

Finally, the risks, influencing factors and criteria required for stakeholder acceptance of this project results are identified in the initiation phase and allow project managers to discover barriers to or facilitators of execution. A one-minute summary is also prepared that is discussed at a board of directors meeting to secure official authorization to go ahead when necessary.

After the decision was made to implement the PW program, a project team was assigned, with a base of a nurse manager and a clinical nurse selected internally for the entire project. This project team received coaching and support from a HR coordinator and internal PM expert. The business case for PW was explained in terms of the significant improvement in quality of patient care and benefits for clinical nurses and the nurse's work environment anticipated, without commitments of additional

resources on an ongoing basis. The program also operationalizes a business strategy that aims to achieve nursing excellence and progress in the journey to Magnet recognition (Box 8.3).

The PW program provides selection criteria for selecting appropriate pilot wards, such as evidence of stable and transformational leadership, high nurse satisfaction, and a lack of recent restructuring (NHS Institute for Innovation and Improvement 2008). After extensive discussion within the nursing department, these criteria were used to select the wards most ready pilot to adopt the first PW program modules. The implementation of the three foundation modules and two process modules on the pilot wards over a 9-month period was decided upon, alongside the development of a communication plan for the entire hospital, a plan for data gathering needed for hospital-wide implementation and considerations around sustainability of the program. The further rollout of the program at the ward level and follow-up by the project team was deemed beyond the scope of this initial project.

Choices were narrowed down to two approaches to guide implementation. To achieve and maintain the full capacity of the program, the steering committee decided to develop internal knowledge and not to rely on external consultant expertise. To develop internal knowledge, a steering committee of key stakeholders led by the CEO was established at the hospital board level, and a working group of nurse managers led by the CNO was formed. Criteria for acceptability of the project to the staff were identified, based on an analysis of project scope and risks such as difficulties engaging nurses to devote special efforts needed for the first phase of the project and a possible return to top-down approaches to treat and solve problems.

8.3.2 Planning Phase

After a project receives authorization based on the product description, project mandate, and initial scope document, the project team can start to successfully plan and manage the project. The planning phase begins with the collection of complete and valid information required to block out the necessary work. The initial scope document is the starting point for the project plan, but when the scope, costs, or timeline are not very detailed, the project team has to make appropriate clarifications in line with the triple constraint. The project team must identify and resolve roadblocks, requirements, risks, opportunities, and prerequisite conditions that may emerge from any new information obtained. At this stage of the project, the triple constraint is a major area of concern. The predetermined scope and budget will affect the timeline and thus the project plan.

The project plan consists of work breakdown structure or WBS. A WBS is a hierarchical separation of the types or phases work that needs to be formalized to make the project objectives succeed (Project Management Institute 2004). The WBS organizes and defines the work packages in smaller and manageable parts with necessary milestones. These milestones are important deadlines for which parts of the project have to be completed next to decide make “go” or “no-go” decision on forward movement. Most of the time, project teams need to adjust project

plans when new information emerges. Detailing the plan in advance is called rolling wave planning. Involving every stakeholder group in the project leads to all relevant knowledge and skills being brought to bear to the development of the project plan and facilitates and accelerates the work to be done.

In our hospital, the planning phase was translated to a specific Microsoft® Excel template. The PMO designed a tool for developing a project plan. Important design aspects of the project plan include the scope, costs, manpower, quality, communication, and a plan for possible risks. The first step in the template is creating the work breakdown structure. The project is divided in work packages with an owner and the estimated workload. The predefined milestones are the initiation for the project, project charter, project plan, execution, and closing of the project. Within the project plan, a Gantt chart is used to specify project scheduling elements and resources needed. Beyond the WBS, an organizational breakdown structure or OBS is also constructed, consisting of a steering committee and at least one working committee. Other stakeholders will be identified and a communication plan for the life of the project will be designed. The entire project plan is validated and approved by the steering committee before execution begins.

Support for project plans was optimized with the installation of the Enterprise Project Server in 2017. Within this web-based application, WBSs and OBSs can easily be set up and adjusted based on the initial template. In addition, with the Enterprise Project Server and with frequent updates from various project teams on actual timing and budget variances, the PMO can evaluate the progress of different projects and follow up with coaching as needed in situations of non-compliance with the project plan.

In the case of the PW program, the steering committee made a positive evaluation after implementation on the pilot wards, and a “go” was given for the further implementation relying on internal expertise. The project team expanded its original scope to the other nursing wards. Based on the experiences with the implementation of PW on the pilot wards, the initial scope was maintained and the roll-out pace was increased to 6 months per nursing ward (time to shortened from 9 months).

The PW program suggests several different types of rollout. One possibility is to start on a limited basis on two pilot wards and expand spread in cohorts with a growing number of wards in order to focus on development of the project team and (nurse) managers. This approach has the advantage that knowledge builds with experience of the initiative’s implementation, but the quality of the implementation and self-management of the project on different wards can pose threats to the project goals. A linear rollout with the same cohort size is another approach with the advantage of starting with more pilot wards, but more resources will be needed to lead this approach. The follow-up tends to be more manageable, but the project still spreads quickly within the hospital ((NHS Institute for Innovation and Improvement 2008). The steering committee decided to combine these two approaches so a limited pilot phase can create knowledge and experience and a manageable rollout in cohorts of 4–5 nursing wards to expand the program in the hospital within 2.5 years

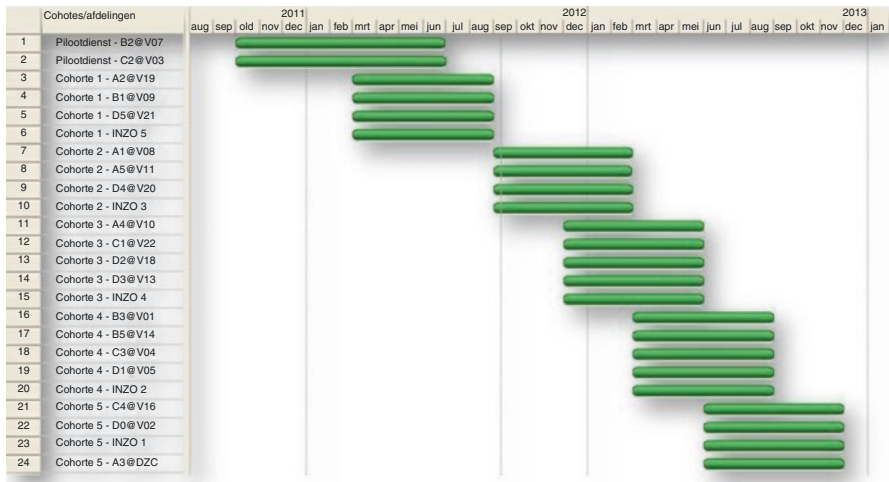


Fig. 8.1 Project rollout schedule

(see Fig. 8.1). The chosen approach made it possible to start a hospital-wide program in a short period with a limited effort of nursing department resources.

8.3.3 Execution, Monitoring and Controlling, and Closing Phases

The project team must steer the processes necessary for executing the project including the coordination of manpower and resources and the integration and execution of activities described in the project plan. If a project team was not already assigned, the project coordinator now has to set up and develop the team before proceeding. Ensuring the quality of the service, product or result of the project is the most important aspect of managing the project and requires close follow-up of all communication from both technical and organizational sides. Throughout the execution phase, the project team needs to gather information in the form of progress reports about the work packages that in turn can be used to provide feedback to management and stakeholders regarding achievement of the different milestones and completion of the project.

The scope and the project objectives specified in the original scope document will drive monitoring and control to identify potential bottlenecks or deviations from the plan so that corrective adjustments can be made in a timely manner. Deviations from the original project plan will lead to necessary rescheduling and can affect throughput time, productivity, and availability of resources and will uncover unrecognized risks. These deviations may or may not affect the project plan; an analysis is required to find out. PDSA cycles using relevant data or results may help here. This analysis may signal conditions that can result in a change of

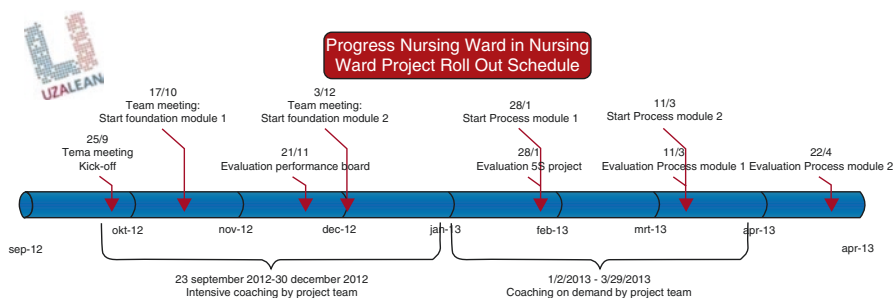


Fig. 8.2 Project rollout schedule at ward level

project plan after approval by project manager or steering committee. When the project is finished, the project team can formally close down all project processes.

In PM@UZA methodology, the first step in the execution phase is a kickoff meeting. The objective of the formal kickoff of the project is to provide a general overview of the project and the planned approach for the stakeholders. The attendees of this official launch will primarily be the steering committee, working group, and important stakeholders. Next, the project team executes the work packages defined in the project plan, follows timing of activities, and provides status updates to all the stakeholders. Feedbacks about progress, scope changes, use of resources, and potential risk are provided to the steering committee. This committee is in place to make strategic decisions; otherwise, the working group provides operational input to the project team. At the end of the project, a final report and presentation of project deliverables is provided to the management of the hospital (or the relevant department, depending on the scope of the project). The project ends when results have met acceptability criteria. Reviewing the lessons learned from the project can be a meaningful exercise for both the project team and stakeholders.

In the execution of the implementation of PW at UZA involving rollout of the three foundation modules and two process modules, the project team educated and coached the nurse managers in briefing meetings. The introduction of the structure and tools of PW to the nursing teams was provided in a stepwise manner in relation to the introduction of modules. Within 6 and 9 months, nurses and nurse managers of the pilot wards were sufficiently prepared to continue the program as a team. The project team provided structured coaching sessions and feedback for the steering committee to facilitate monitoring and controlling. The working group of nurse managers provided operational and practical support (Fig. 8.2).

8.4 Introduction of PDSA Thinking and A3 Method

A problem-solving methodology that is receiving a lot of attention and has been adopted by many healthcare organizations is “A3” (Graban 2012; Graban and Swartz 2012). A3 problem solving has links to both the nursing process and PDSA cycles (Jimmerson 2007).

8.4.1 A3 Reporting Method

The A3 reporting method is a systematic approach to address bottlenecks or problems based on teamwork. The method is heavily based on Deming's improvement cycle or PDSA cycles. The improvement steps are displayed in an A3 report, originally designed by the Toyota company—the founders of Lean thinking (Graban 2012; Jimmerson 2007). The name of the method comes from the size of the paper that was originally chosen because it is “faxable”—Toyota employees could share their work with colleagues around the world by printing their reports on A3 paper and sending them along with a facsimile machine.

The outstanding features of the Toyota Production System, as it was originally developed by Toyota, or the Lean management system as those who followed it came to call their method, are reflected in the successes of Toyota as a company. Toyota achieved a level of quality, safety, satisfaction, and financial results whereby the company is now a world-class organization. Other companies followed the Toyota example of problem solving, and they also accelerated and sustain exemplary quality (Jimmerson 2007). The need for Lean in the healthcare sector is very clear, where issues with quality, patient safety, costs, waiting times, and staff morale are widespread (Graban 2012).

The A3 reporting method embodies the concept and strategy of Lean thinking through a transformation from a command and control culture to one where thinking organizations are created, and bottom-up initiatives are supported from the top. The method is focused on adaptive change. An A3 report is characterized by a brief presentation of the analysis of the problem, the improvement process, and has a visual aspect to keep all team members informed about the problem-solving process. In addition, A3 reports are always data-driven (Jimmerson 2007).

More important than the size of paper is the structured manner of problem analysis and PDSA thinking that is the foundation of the methodology (Graban 2012). The A3 method is a step-by-step plan to uncover root causes of a well-identified problem. The aim is to avoid both delayed and/or repeated inadequate responses to relevant issues and problems and jumping to conclusions based on incorrect assumptions without involving staff and stakeholders. The solutions for underlying causes are presented visually and are expected to be guided by data and facts rather than assumptions. The left side of the document describes current practices and focuses on the planning. The right side however contains the improvement. Thus, the do, study, and adjust phases of a PDSA cycle are addressed (Graban 2012; Jimmerson 2007). The report is a living document that can be used as a report of the group's thought process during a meeting and can be used as a communication medium (Jimmerson 2007). While this method may slow down the process of taking actions to solve a problem, if consensus regarding root causes and solutions can be achieved, the resulting plan has much more support and commitment from the group; this improves the likelihood of successful implementation and sustainable outcomes of a project.

An A3 report contains a very brief presentation of the improvement cycle through text and especially through visual tools such as graphs, figures, fishbone diagrams,

and process maps. Different templates are used around the world, but the PDSA cycle is the basis for all of them. In our hospital, a 7-step template is used (Box 8.4).

Box 8.4 7-step A3 Improvement Project

1. Background
2. Current situation and problem statement
3. Ideal situation and objectives
4. Root cause analysis
5. Identified countermeasures and action plan
6. Evaluation of the improvement results
7. Consideration of sustainability, expansion of scope, and communication plan

1. The team describes the background of the improvement idea. The first step in improving current practice is the clear understanding of the problem, risks, or bottlenecks (Jimmerson 2007). The problem needs to be specific with a clear defined scope and a sense of urgency or link to organizational goals and priorities. When other stakeholders are involved, the team needs to contact them and discuss the problem. The patient is the most important “customer” or stakeholder in healthcare, so improvement projects are preferably patient-centric and/or person-centered. Stating the central objective to improve the outcomes for the patient enables all healthcare workers to be involved in problem solving (Jimmerson 2007).

2. Current practices are analyzed, preferably using graphics, tables, or some other visual presentation. The results of this phase serve provide baseline measurements for evaluating the improvement. Moreover, an observation of daily practice processes and circumstances can improve understanding of the real context so the team can “grasp the situation” (Grabau 2012). Establishing baseline data is essential to check the results of the improvement in the study phase, but it also avoids healthcare workers engaging in speculation, jumping to conclusions, or blaming coworkers. The feedback and validation of frontline staff is essential. Group consensus ensures accuracy and clarity of the formulation of the problem and buy-in for the improvement (Jimmerson 2007). Within our hospital, we focus on patient outcomes such as falls, infection prevention and control, patient safety, as well as patient experiences and satisfaction, but compliance or process indicators can also be used. The description and insights of current practices need to be validated within the team and with other stakeholders. Beside current practices, the A3 report asks for a description of desirable practices and tangible goals. Therefore, the gap between current and desirable or ideal practices as well as the aims of the project becomes clear (Jimmerson 2007). Goals are described using the SMART method (see the Initiation phase above).

4. The fourth and most essential and important step is a root cause analysis or RCA. Solving a problem should start with the question *why*? The focus must be on

eliminating barriers to preventing problems or risks, so these barriers need to be uncovered (Grabán 2012). It is preferable to use “real” data in an RCA, but a team can also gather relevant data by brainstorming. These (root) causes identify gaps between current and ideal practices. Links between problems and causes need to be clear by a detailed and in-depth investigation of bottlenecks. It is hoped that after a successful implementation of a proper intervention, root causes will all be addressed, and the problems will no longer occur.

In the fourth step, different tools can be used. There are a number of these, the most common of which are fishbone or Ishikawa diagrams, 5-Why analysis and the problem analysis tree. The 5-Why analysis is a framework: sometimes only three questions can reveal the root cause but sometimes the list is longer and more complex. The intention of all of these tools is to drill into the problem and understand its root causes (Grabán and Swartz 2012; Jimmerson 2007). These tools steer the team to investigate the nature of errors systematically rather than blame the healthcare worker at the point of care (Grabán and Swartz 2012). Because it is rare that a problem is caused by a single cause, a fishbone diagram or problem analysis tree can visualize the connection between the (root) causes and the problem or risk (Grabán 2012; Grabán and Swartz 2012).

5. After the RCA is completed, the team can start to find and implement countermeasures. The term “countermeasure” is used to underline that these actions are made within the journey of continuous improvement (Grabán 2012). The countermeasures need to have a clear link with the RCA and every root cause needs an identified countermeasure (Jimmerson 2007). In situations where there are many different causes, the contributors may need to be prioritized (Grabán and Swartz 2012). The team only needs to address only the most relevant causes, identified and selected based on a principle—for example, the Pareto principle. This principle states that 80% of the problems can be tracked to 20% of the possible root causes. Finally, a sufficiently detailed action plan that also describes in addition accountabilities and deadlines is developed and can be supported by a time and resource schedule such as a Gantt chart. This plan sets accountability for the tasks that need to occur for countermeasures to be implemented. Short pilot tests with a limited scope can be performed to evaluate feasibility of countermeasures (Jimmerson 2007). The ideal practices, the countermeasures, and the action plan comprises the “do” phase of the PDSA cycle (Grabán 2012; Jimmerson 2007).

6. After implementation of the countermeasures, the study or check phase is performed by collecting results to verify whether the project aims have been achieved. The effectiveness of the action plan will be evaluated with the same method as those used to describe deviations from best practices (Grabán 2012; Jimmerson 2007). Improvements need to be established and be sustainable to consider a program a success. In our hospital, the sustainability of the improvements is tracked with measures at three points post-intervention in our hospital. Benefits of successfully implemented changes in practice based on active participation and involvement of team members are of special value; such successes can motivate staff and provide sustainable solutions for key problems on units. Performing a

check on the effectiveness of the action plan by a post-measurement and acting by redoing the RCA or taking more countermeasures ensures that the study and act phase are performed (Grabau 2012). In cases where the project aims have not been met (in part or in whole) and additional measures are necessary, a continuous process of improvement can be set up.

7. Once project aims are met, new practices can be standardized and systematized. A follow-up or recurring review of the action plan or results may be needed and must occur (Jimmerson 2007).

An A3 problem-solving project is a team learning exercise rather than a solitary pursuit. Writing the A3 report needs to be an iterative process; continuously refining and adjusting can improve the outcome of the PDSA cycle. The feedback of frontline staff will provide in-depth understanding of the actual current practices (Grabau 2012). The role of leaders within A3 problem solving is crucial. Shifting from top-down decision delegation to coaching and approving changes is essential. Leaders can have oversight of the A3 report so that appropriate verification around the improvements and outcomes can be conducted (Jimmerson 2007). When coaching is provided, the expert can ask challenging questions and provide constructive feedback. The outcome of the improvement will also be based on consensus and agreement of the entire team so sustainability can be maximized (Grabau 2012).

8.4.2 Implementing A3 Problem Solving in Nursing Practice

In our hospital, the management of the nursing department created a strategic plan that is updated every 2 years. This strategic plan is aligned with the hospital mission, vision, and strategy—which is illustrated in a model named K2 (see Fig. 8.3). K2 stands for quality and knowledge (both words *Kennis en Kwaliteit* begin with a K in Dutch): the central organizational aims of a university hospital. In this model, short-term objectives grouped by the categories quality and patient safety, employees, and knowledge are presented alongside the mission, vision, and core values. The foundations for implementing this strategy are evidence-based practice, Lean mindset, leadership, and research.

The organizational objectives are translated into specific goals for nurses and nursing services. Every nursing ward needs to pursue six goals annually based on the nurse strategic plan.

Four further hospital-wide goals are mandatory for all units and involve reduction of hospital-acquired pressure ulcers, falls with injury, catheter-associated urinary tract infection rates, and central line-associated bloodstream infection rates. These goals are measured by outcome indicators. These indicators are nurse sensitive so nurses have a great impact on the results but other healthcare workers like physicians have also responsibilities in achieving great patient outcomes. The results are benchmarked against the National Database of Nursing Quality Indicators or NDNQI. More than 2000 US hospitals and 95% of Magnet®-recognized facilities

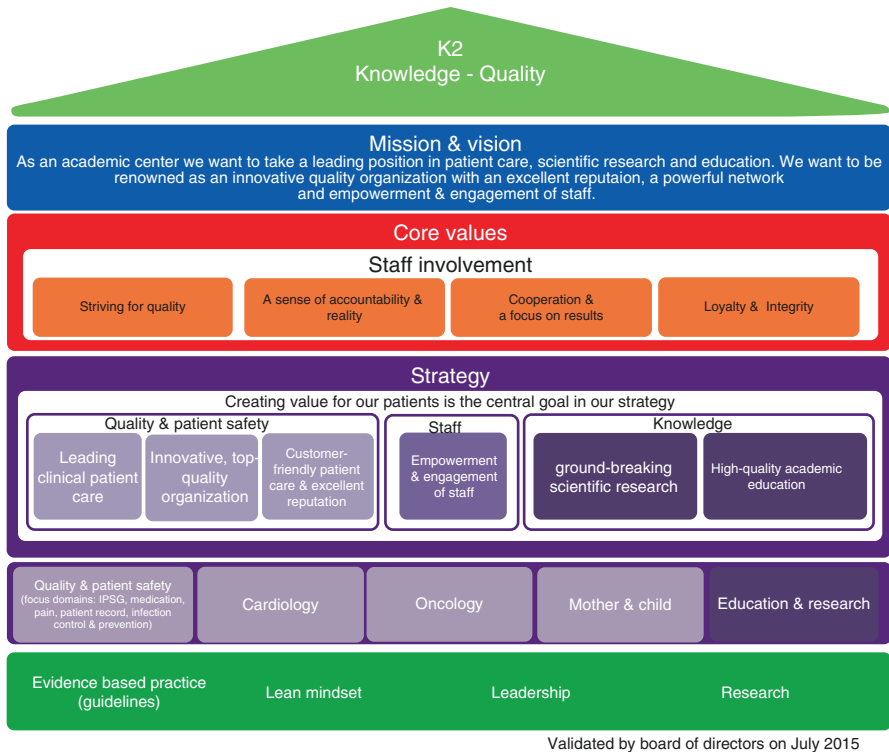


Fig. 8.3 K2 Strategic plan

participate (Press Ganey Associates, Inc 2017). With these benchmarks, our hospital can compare its performance on the nurse-sensitive indicators with hospitals having the same characteristics.

Each unit chooses further two goals from a departmental picklist. The picklist contains goals within four categories: patient care, quality and patient safety, nurse’s work environment, and cost-efficiency.

To reach the objectives, nursing teams employ A3 problem-solving methodology. Some principles were determined to achieve an excellent and sustainable outcome. The frontline nurses are the most important driver of these improvement projects so structural empowerment is a basic. The nurse manager serves as the coach for the project, equipped with transformational leadership skills and support and coaching by the Lean program project leaders. Baseline and post-intervention measurements need to involve patient outcomes that bookend an intervention period where the RCA and evidence-based action plan is implemented. The team also must describe how they plan to share improvements and their evaluation with other departments or externally. These improvement projects are the operationalization of our “journey to nursing excellence.”

8.4.3 Practical Examples of PDSA Improvements

In our hospital, an expert team has been given responsibility for setting and improving policies and procedures to address fall risks. The team also analyzes reports of fall incidents. After a hospital-wide analysis of trends, a decision was made to do an aggregated root cause analysis of all the fall incidents occurring on two nursing wards where there were significantly more reported falls. First the background around the problem of falls and data on current and ideal practices related to the NDNQI benchmark were discussed with the teams. The causes of patient falls reported in the incidents were merged and categorized in a problem analysis tree by the nurses, nurse manager, nurse leader, and expert team. Afterward the team could include additional causes, and using the 5-Why method, root causes were identified. Out of the root causes at the nursing ward level discovered, the team identified care of disorientated patients, the use of preventive materials, influential medication, and inappropriate footwear as the most important. Next, countermeasures were identified and an action plan was drafted. The most important countermeasures were the use of preventive material, nonskid hospital socks, patient and family education, and communication of the risk within the nursing team. After the intervention, decrease of fall rates was noted. Next steps were decided upon at a team meeting, and the results are now followed up at weekly quality and patient safety huddles.

Central line-associated bloodstream infections or CLABSI increase the cost of hospitalization, in part by increasing length of stay. In intensive care units, the incidence of this complication has been estimated at around 80,000 infections per year worldwide. A decrease in incidence can greatly improve patient outcomes and reduce healthcare costs. CLABSI is the most common nosocomial infection at the intensive care unit (ICU) and thus has a tremendous impact on mortality and morbidity for this patient population (O'Grady et al. 2011). The physician head of the department, the nurse leader, and nurse managers of the various ICUs noticed that the results for the critical care units were worse than the NDNQI benchmark (respectively, 2.38 vs. 1.26 CLABSIs per 1000 catheter days) and decided to start an A3 problem solving (see Fig. 8.4). The team performed an RCA based on literature and observations of practices. Three main causes of infection occur within the care process, namely, (1) the insertion of the catheter, (2) daily care of the catheter, and (3) the catheter remaining in place longer than clinically necessary. These aspects of care were drilled down to identify root causes (see problem analysis tree). The procedures for the insertion, daily care of central line catheters and daily evaluation of necessity for central lines were changed and new procedures adopted. The ICU nurses began using chlorhexidine wash gloves because of the evidence that this technique can reduce the incidence of CLABSI at the ICU by 28% (Climo et al. 2013). The results for the 4th quarter of 2014, 1st quarter of 2014, and 2nd quarter of 2015 improved to 1.94, 0.98, and 1.99 CLABSIs per 1000 catheter days, respectively. The team continues to follow the results on the quality and patient safety dashboard and at team huddles. The improvement in rates has been sustained and even appears to still be decreasing (Fig. 8.5).

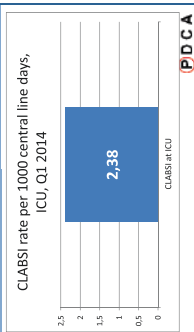
A3-report: CLABSI at Intensive Care

1. Background

Central Line Associated Bloodstream Infections increase the cost of hospitalization and length of stay. On Intensive Care, the incidence of this hospital-acquired infections is estimated to be around 80,000 infections per year worldwide. A decrease in incidence can significantly improve patient outcomes and reduce healthcare costs (CDC, 2011)

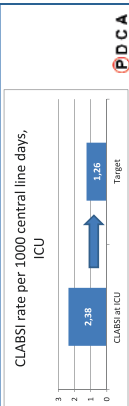
2. Current situation and problem statement

As stated in the background, CLABSI is one of the most common nosocomial infection on ICU. CLABSI has a large impact on morbidity and mortality for this patient population. This nurse sensitive clinical indicator is a key performance indicator for the ICU. The current situation is that the incidence of CLABSI is higher than the benchmark of the National Database of Nursing Quality Indicators or NDNQI compared with similar teaching hospitals.

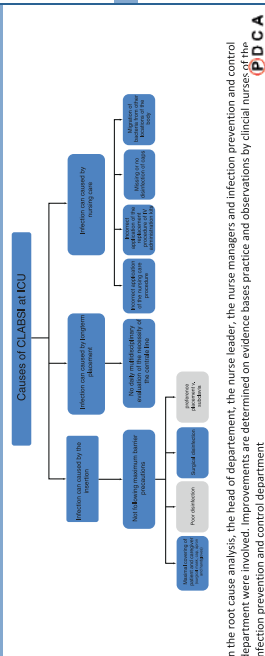


3. Ideal situation and objectives

Objective: To reduce the incidence CLABSI below NDNQI benchmark in a period of 1 year.



4. Search for root cause(s)



In the root cause analysis, the head of department, the nurse leader, the nurse managers and infection prevention and control department were involved. Improvements are determined on evidence bases practice and observations by clinical nurses of the infection prevention and control department.



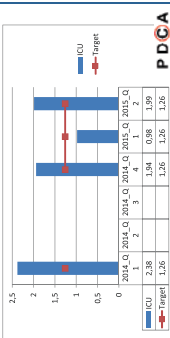
Owner: Prof. Dr. Jansen, Surgical Care & Infection Prevention and Control
Participants: All caregivers at ICU
Department: Intensive Care Unit
Start Date: Q1 2014
End date: Q2 2015

5. Identified countermeasures and action plan

Root cause	Action	Responsible	Deadline	Most critical infection
Patient and caregiver are unaware of (surgical) risk, soap, gown and hand gels)	Changing central venous catheter kit	Infection prevention & control department	June 2014	
	Adapting procedure	Nurse managers	Q2 2015	
	Training	Nurse managers	Q2 2015	
Surgical disinfection	Always available of surgical hand disinfection	Infection prevention & control department	Q2 2014	
Daily multidisciplinary evaluation of the central line	Determine criteria of necessity of the central line	Nurse managers and infection prevention & control department	Q3 2014	X
Increased education of nursing staff	Relating departmental procedure	Nurse managers	Q3 2014	
Standardized procedures	Relating departmental procedure	Nurse managers	Q3 2014	
Missing documentation of direct costs	Relating departmental procedure	Nurse managers	Q3 2014	
Missing documentation of indirect costs	Relating departmental procedure	Nurse managers	Q3 2014	
Migration of bacteria from other locations of the body	Relating departmental procedure Procedures, hygiene, compliance with the procedure, hygiene, use of hand sanitizer, addressing antibiotic resistance management in the use ward-studies	Infection prevention & control department	Continuous	
Recording/tracking of CLABSI	Tracking of CLABSI with feedback procedures of the nursing staff	Infection prevention & control department	Q2 2014	X

6. Evaluation of the improvement results

Follow-up based on the results of the nurse sensitive clinical indicator CLABSI available at the hospital business intelligence center database. Action plan effectiveness is monitored.



7. Consideration of sustainability, expansion of scope and communication plan

Monitored results at the weekly team performance huddle involving the infection prevention and control nurses on a monthly base to evaluate the hospital acquired conditions: catheter associated urinary tract infections, central line associated bloodstream infections and ventilator associated pneumonia.

Fig. 8.5 A3 report CLABSI

Conclusion

This chapter reviewed project management structures and approaches, as well as PDSA cycles as tools for improving the quality and safety of nursing care as well as patient outcomes. These descriptions were amplified with details of the steps involved in the use of these frameworks in practice and many examples of how these principles have been implemented at Antwerp University Hospital. These strategies are intended to be used again and again, and many believe that their successful use changes work environments for the better at the level of clinical teams as well as institution-wide. Given that change and adaptation have been and will always be critical to the survival of healthcare organizations, familiarity with team-based quality improvement initiatives is an essential part of leaders' toolkits for optimizing the delivery of care.

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