

Chapter 4

Graduate Medical Education and Patient Safety

Jeanne M. Farnan and Vineet M. Arora

“The study of error is not only in the highest degree prophylactic, but it serves as a stimulating introduction to the study of truth.”

Walter Lippmann

Introduction

Graduate medical education (GME) and the training of resident physicians is an integral part of healthcare systems around the world. In the USA alone, there are more than 100,000 residents in approximately 8,500 training programs providing care to over 17 million patients [1]. Teaching hospitals must fulfill and balance two, at times competing, objectives: producing competent independent physicians after the period of training is over and delivering safe care to patients. The former requires that trainees be provided greater opportunities for independent and autonomous decision making, while the latter requires greater supervision and oversight by faculty. Occasional public concerns about being cared for by “student doctors” notwithstanding, literature shows that teaching hospitals overall fulfill these objectives well and have better patient care outcomes [2].

The issue of potential hazardous impact of resident education on patient safety gained national attention in 1984 with the death of Libby Zion, an 18-year-old woman who died in a New York hospital of what was determined to be an adverse drug reaction. The grand jury investigation highlighted risks to patient safety caused by resident fatigue and inadequate clinical supervision [3]. As a result, in 1989, New York State established a limit on resident duty hours to 80 hour per week to

J.M. Farnan, M.D., M.H.P.E. (✉) • V.M. Arora, M.D., M.A.P.P.
Department of Medicine, University of Chicago, 5841 South Maryland, AMB W216,
Chicago, IL, 60637, USA
e-mail: jfarnan@medicine.bsd.uchicago.edu; varora@medicine.bsd.uchicago.edu

address the issue of resident fatigue. This became the basis of national duty hour restriction to 80 hour per week by the Accreditation Council on Graduate Medical Education (ACGME) in 2003 [4]. The primary goal of the ACGME policy was to reduce fatigue and improve the safety of care while improving resident well-being and education [5]. In 2004, in the European Union the Working Time Directive was applied to the training of junior doctors, limiting trainees to 56 work hours per week, with other stipulations for consecutive hours worked [6]. Several years later, the US Congress chartered the Institute of Medicine (IOM) to further investigate the issues around the interface of resident training and patient safety. In 2008, the IOM published a follow up report titled “Resident duty hours: enhancing sleep, supervision, and safety” that proposed further reduction in resident work hours [7].

The rationale for this significant policy change has been that the reduced number of duty hours should lead to less fatigue, improved performance, and therefore safer care and published reports do demonstrate improved clinical outcomes [8] and improved resident satisfaction [9] with a reduction in duty hours. However, the most striking and concerning unintended consequence of duty hour restrictions is the discontinuity of care and increase number of handoffs during shift change—both of which have serious implications for patient safety [10]. Since the IOM report also proposed further reduction in *consecutive* work hours, the resulting changes in team structure to accommodate these new proposals may further exacerbate the issues related to handoff and communication. Fortunately, there has been much discussion lately around the impact of handoff communication on patient safety, with the Joint commission incorporating handoff as a National Patient Safety Goal [11] and numerous societies convening to create a “Transitions of Care” consensus policy statement [12, 13]. The topic of handoff and communication and related improvement strategies are also discussed in detail in Chap. 3.

It is concerning that the primary focus of attention of regulation and policy change has been the reduction of resident fatigue through duty hour restriction and relatively little attention has been paid to the quality and quantity of clinical supervision of trainees. Since the traditional approach to resident education remains based on an “apprenticeship” model, i.e., learning while delivering care under the guidance of experienced faculty physicians, clinical supervision plays a critical role in both ensuring the education of the trainees as well as the quality and safety of care. The IOM committee in its deliberations argued that “supervision is the single most important element upon which this education model depends” [7]. The original grand jury indictment in the Libby Zion case had concluded that “the most serious deficiencies can be traced to the practice of permitting...interns and junior residents to practice medicine without supervision” [3]. Residents themselves also identify inadequate supervision as one of the most common causes of medical errors [14].

Clinical supervision has been defined as “the provision of guidance and feedback on matters of personal, professional, and educational development in the context of a trainee’s experience of providing safe and appropriate patient care” [15]. The issue of clinical supervision has yet to be examined with respect to the nature of the attending–resident supervision relationship and the identification of factors which encourage or discourage residents from seeking attending physician input into clinical decisions, impact on resident education, and patient outcomes. Most attending

physicians have received no training in being a clinical supervisor and increasing workload on attending physicians (partly as a result of the duty hour restrictions) may also inhibit their ability to function as an effective clinical supervisor.

This chapter discusses various patient safety issues pertinent to resident supervision through the lens of two case studies. The chapter also presents practical solutions to improve supervision and communication that can be used by any teaching hospital with a clinical training program. We believe that the key lessons will also be helpful to healthcare organizations in designing strategies for safe supervision in other types of teaching programs such as supervision of mid-level providers and nursing and pharmacy student trainees.

Case Studies

Case 1: Poor Outcome Due to Suboptimal Supervision and Failure to Call for Help

Clinical Summary

With the monthly service change, Dr. A is assuming care for a new panel of patients on a housestaff-covered Internal Medicine service. She reaches out to her colleague Dr. R to learn about the patients she will be covering and the trainees that she will be supervising. After discussing the specific clinical scenarios for each patient, Dr. R informs Dr. A that her resident Judy is an outstanding trainee, early in her second year, and on her first inpatient rotation as the senior resident. Judy is currently being considered for a chief residency position, one of high honors in the residency program, and has two intern physicians working with her who are competent and effective. Dr. A is reassured by this information and arranges a time to meet Judy on the team's first on-call day together. During their meeting, Dr. A informs Judy to "Call me if you need me" and then also states that she will be out at a personal function that evening and closes the conversation with "I am sure you are going to do great!"

As Judy begins her evening, she is called by the Emergency Department (ED) for an admission of a patient who is hypoxic and tachypneic. Flustered by the many pages and calls she is receiving, Judy informs the ED she will be sending her intern down shortly. Uncertain about the best management for this patient, Judy quickly performs an Internet search to try to come up with a management plan. Her pager continues to alarm, and the ED becomes more insistent as the patient continues to further decompensate. Judy turns to her resident colleagues who are on-call with her, polling them for their advice. Time continues to pass and Judy frantically searches for a pulmonary fellow as the ED informs her that the patient is rapidly declining. She sends her intern to the ED again to obtain laboratory and radiographic studies.

Dr. A arrives early next morning to round on the new panel of patients admitted overnight. She congratulates Judy on a good night stating, "I didn't hear from you, so things must have gone well!" Judy informs her that they will need to see only nine

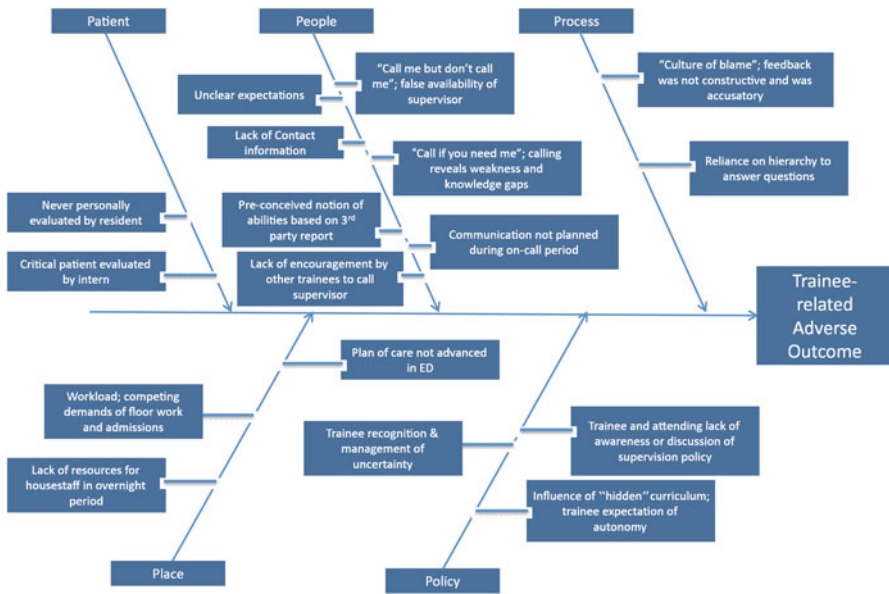


Fig. 4.1 Case 1: Fishbone diagram depicting contributory factors in the trainee-related adverse outcome

new patients, one less than the full panel of ten. When questioned, Judy informs that they had admitted a tenth patient; however that patient went into respiratory failure requiring intubation and admission to the medical ICU. Surprised, Dr. A demands to know why she wasn't notified about this development and Judy sheepishly explains her behaviors of the past evening. Visibly disappointed, Dr. A informs Judy that her behavior is negligent and reflects poor judgment. Judy collects herself as rounds begin, with Dr. A informing her "I will certainly expect better next time."

Analysis and Discussion

This clinical case scenario is drawn from interviews of resident physicians describing their struggles during training, specifically in the context of describing effective and ineffective supervisory experience on a teaching rotation on an Internal Medicine service. Contributing factors to the trainee-related adverse outcome and associated strategies for improvement are discussed below and in Fig. 4.1.

Clinical Supervision

The case above underscores that suboptimal supervision and failure to call for help combined with heavy individual workload can lead to adverse patient outcomes.

Adequate clinical supervision is fundamental to both ensuring safe care to patients and providing appropriate training to residents. In addition, in the event of a trainee-related adverse outcome, the attending physicians in supervisory capacity may be held accountable for patient outcomes as an on-call duty may be sufficient to establish a patient–physician relationship and duty to supervise [16]. Also, since the sponsoring hospitals employ the physicians-in-training for clinical care, they may be held vicariously liable for adverse outcomes caused by residents acting in accordance with their job description [16].

Therefore, teaching hospitals are required to have appropriate policies and procedures in place to provide adequate clinical supervision. Often these institutional policies are informed by the general program requirements of the Residency Review Committee (RRC) of ACGME which address issues such as certification, training, and availability of clinical supervisors. The 2008 IOM report recommended that trainees have immediate access to an on-site residency-approved supervisor at all times, including nights and weekends [7]. The most recent ACGME guidelines also recommend tailoring the amount of supervision based on the needs of trainees as well as encourage evaluation and development of a trainee’s ability to supervise junior colleagues such as interns and medical students [17]. Voluntary oversight organizations of residency training, such as the Association of American Medical Colleges (AAMC) have recommended that programs must balance appropriate faculty supervision with graded resident responsibility.

Clinical supervision, or lack thereof, has been tied to adverse patient outcomes and near misses, with a recent case review of five malpractice firms revealing nearly 54 % of suits filed secondary to inadequate supervision [16]. Problems arise when residents are faced with situations of decision-making uncertainty requiring escalation in care, transitions such as discharge or transfer, and ethical dilemmas such as end of life issues [18]. As seen in the case above, residents tend to utilize a hierarchy of assistance, deferring to peers and more senior trainees before contacting their supervising attending physician because of perceived barriers which may result in delays in the delivery of indicated care and patient harm [18]. This deference to the existing hierarchy, while potentially a source of peer-learning, can also act as a barrier to discussion of errors and a true team-based approach to care [19]. Table 4.1 describes various barriers and facilitators to seeking supervision by trainee physicians.

Measuring Clinical Supervision

So, if appropriate clinical supervision is vital to patient safety as well as trainee education, how does one measure the adequacy of supervision? It is somewhat easier to measure supervision in procedural care such as surgical training by assessing attending physician’s physical presence and direct involvement in procedures. For nonprocedural care, typically, supervision is measured by chart review indicating attending physician involvement which is subjective and non-reliable. Factors which have shown promise in quantifying the supervision include the physical presence of

Table 4.1 Barriers and facilitators to seeking supervision

Domain	Major categories	Representative resident comments
Barriers to seeking attending advice	Conflict with decision-making autonomy	<i>"it was a pain to kind of run by things with [the attending] because it would influence things too much and then you wouldn't get a chance to make up your own mind and figure it out"</i>
	Fund of knowledge expectations	<i>"I wouldn't turn to [the attending] for advice unless it's... just something that I didn't know the answer to..something I should know"</i>
	Existence of defined hierarchy	<i>"...between the ICU resident or the other residents, I usually talk to them before I would make a decision to go up the chain"</i>
	Fear of repercussion	<i>"I mean [the attending] said I could call him in the middle of the night if I needed anything but I am not going to do that. I am not going to wake him up..."</i>
Facilitators to seeking attending advice	Need for escalation of care	<i>"it wasn't anything that critical that needed to be addressed that night, if it had been I would have been totally comfortable calling my attending because she made it a point to know that it was fine in calling"</i>
	Options in decision-making	<i>"I feel I can call the attendings if I have questions above my head or especially if there are a couple of options of what to do"</i>
	Clinical experience	<i>"...but if it were more a clinical judgment thing and I hadn't had that situation I would ask [the attending]"</i>

the supervisor, overall contribution of the supervisor to the patient's care and to the resident's understanding of the case, and the amount of time spent in supervision [20]. These factors have been compiled into an instrument, the Resident Supervision Index, in a study published by the Department of Veterans Affairs, and initial testing has shown promise with respect to feasibility and reliability of the instrument as a valid measure of resident supervision [20].

Various studies have demonstrated that increased supervision can change clinical assessments, diagnoses, and treatment decisions and possibly improve patient outcomes. Increasing the intensity of supervision in already supervised activities has been found to have an equivocal or a positive impact on the trainee's educational experience and patient outcomes [21, 22]. Further research is needed to examine how augmenting supervision during previously unsupervised rotations, for example, during the overnight period, impacts trainee satisfaction and the delivery of patient care. In addition, given the recent ACGME requirements of ensuring adequate supervisory abilities of peer supervisors, ongoing work continues to create validated instruments to measure the quality of a trainee's ability to supervise more junior colleagues [17].

Best Practices in Clinical Supervision

There is increasing interest in learning the best practices for clinical supervision that balance the dual role of trainee autonomy and good clinical outcomes. Depending upon the situation, clinical oversight may range from monitoring routine activities to intervening to provide direct patient care [23]. Research suggests that trainees prefer a collaborative approach to supervision so that they are treated as adult learner and are provided specific and focused constructive feedback [24].

One study based on qualitative analysis of the resident interview transcripts revealed that often two extreme models of supervision are practised. In the first model, residents described the attending physician as “micro-manager” dictating the plan of care and allowing few autonomous decisions. In the opposite model, residents described the “absentee” attending physician who is distanced from patient care and allows the residents almost exclusive decision-making power [25]. The micromanaging attendings prevent residents from fully developing their own clinical skills and may generate a sense of resident apathy. On the other hand, the absentee attendings can generate a sense of abandonment and exacerbate decision-making uncertainty and may have detrimental effects on patient care.

Therefore, it is of paramount importance that effective strategies for providing clinical supervision are established. The basic principles for effective supervision are based on a relationship between the supervisor and the trainee in which uncertainty is recognized and addressed early, autonomy is preserved, and communication is planned and easily available. The communication practices should highlight the importance of supervision at times that are critical to patient safety such as transitions between levels of care or clinical deterioration in the condition of the patient.

We recommend the following as a general approach to best practices in supervision. First, encourage the role of the supervisor as an active participant. Instead of passively waiting to be contacted by their trainee, the supervisor should actively reach out to housestaff to assess their level of need. Second, since trainees often initiate the contact, it is critical that they are able to recognize their own clinical uncertainty and decision-making limitations. Third, recognize that there may be cultural and institutional barriers which prevent trainees from seeking the involvement of the attending-level supervisor, especially at an earlier juncture in the patient’s care (Table 4.1). This concept is referred to as the “hidden curriculum” and is defined as the set of influences that function at the level of organizational structure and culture, including implicit rules to survive, customs, and rituals [26, 27]. For example, a third-year resident who is about to graduate from the residency programs may be perceived as “weak” by herself and by her peers if there is a recurrent need to communicate with attending physicians regarding patient management issues. The leadership of the training program as well as the sponsoring hospital must provide a cultural environment where trainees and attending physicians can engage in optimal supervision without the fear of retribution. Fourth, a blanket approach to the supervisory process should be discouraged as adequate supervision depends upon the trainee’s knowledge and skills, clinical specialty as well as specific context of the clinical situation [28]. Whereas some subspecialties

have more explicit supervisory guidelines, for example, anesthesiology, obstetrics and gynecology, and emergency medicine, others, such as internal medicine, pediatrics, and others, do not as explicitly outline the requirements for attending presence or even define who is a qualified supervisor. Finally, resident trainees should also be learning skills in supervising their junior residents and medical student.

SUPERB/SAFETY Model

The SUPERB/SAFETY model, developed on the basis of a qualitative analysis of the interviews of Internal Medicine residents, is a good bidirectional frame work for clinical supervision (Table 4.2). It allows both supervisors and trainees to identify explicit ways to engage in the supervisory discussion [29]. Effective strategies for attending physician provision of supervision are summarized with the acronym SUPERB: **S**et expectations for when to be notified, **U**ncertainty is a time to contact, **P**lanned communication, **E**asily available, **R**eassure fears, and **B**alance supervision and autonomy. Effective strategies for residents to solicit faculty supervision are summarized with the acronym SAFETY: **S**eek attending physician input early, **A**ctive clinical decisions, **F**eeling uncertain about clinical decisions, **E**nd-of-life care or family/legal issues, **T**ransitions of care, and **Y**ou need help with the system/hierarchy.

We also strongly recommend that institutions establish explicit parameters for residents to contact attending physicians, specifically the “must-contact” clinical scenarios. These scenarios should recognize that clinical uncertainty should be a stimulus for seeking attending input.

Case 2: Adverse Outcome Related to Duty Hour Restrictions and Poor Handoff

Clinical Summary

Jill, a second-year Internal Medicine resident, is frantically trying to sign-out all of her patients at the end of a post-call day. During a rough on-call night, Jill spent a significant amount of her time in a meeting with the family of Mrs. H. After an extensive discussion, Mrs. H’s family decided to make her DNR/DNI given her chronic, debilitating respiratory condition. Jill made sure that her interns had completed their work and rushed them out the door as their ACGME-mandated shift was quickly coming to an end. With an eye on the clock, Jill rushes to print out her team’s written sign-out in order handoff to Megan, the resident on-call for the coming evening. Jill realizes that there isn’t any computer paper to print the new updates she made to the electronic sign-out form. Watching the clock to be sure to sign-out on time, Jill scribbles quick updates on the most recent copy she had in her

Table 4.2 SUPERB/SAFETY model

SUPERB: Guide for Attending Supervision	
Set expectations for when to be notified	<i>I want you to contact me if a patient is being discharged, transferred, dies, or leaves AMA</i>
Uncertainty is a time to contact	<i>It is normal to feel uncertain about clinical decisions. Please contact me if you feel uncertain about a specific decision</i>
Planned communication	<i>Let's plan on talking ~10 p.m. on your call night and before you leave the each day. If you get busy or forget, I will contact you</i>
Easily available	<i>I am easy to reach by page, or you can use my cell phone or my home phone</i>
Reassure resident not to be afraid to call	<i>Don't worry about waking me up, or that I will think your question is silly. I would rather know what is going on</i>
Balance supervision & autonomy for resident	<i>I want you to be able to make decisions about our patients, but I also know this is your first month as a resident so I will follow closely (Tailor to experience level)</i>
SAFETY: Resident Guide for Attending Input	
Seek attending input early	<i>Involving your attending early can often prevent delays in appropriate care. They are also legally responsible for the patients you care for</i>
Active clinical decisions	<i>Contact your attending if an active clinical decision is being made (surgery, invasive procedure, etc.)</i>
Feel uncertain about clinical decisions	<i>It is normal to feel uncertain about clinical decisions. You should contact your attending if you feel uncertain about a specific decision</i>
End-of-life care or family/legal discussions	<i>These complex discussions can change the course of care. Families and patients should know that the attending is aware</i>
Transitions of care	<i>Transitions are risky for patients. Seek attending input for discharge or transfer</i>
You need help with the system/hierarchy	<i>System difficulties and hierarchy may hinder care. Attendings can help expedite care</i>

pocket and heads to find Megan after Megan fails to respond to her pages. After a few minutes, Jill finds Megan, gowned and gloved and prepared to place a central line in one of her newly admitted patients. Jill rushes into the room and says, “Hey, can I sign out? I really need to run. It’s already after 1 p.m. and I am post-call. Plus, I have dinner reservations at 6 p.m. and I need a quick nap beforehand!” Megan, preparing for her line, asks Jill to tie her gown as she begins to inject Lidocaine and doesn’t appear to acknowledge Jill’s haste. “You look really busy; there is really nothing to do on our patients. Mrs. H, she’s the sickest one, but there’s nothing to do. I am going to leave a copy of the sign-out over here. My cell number is on there if you have any questions!” Jill shouts as she hurries out the door.

Later that evening, Megan and her team are both admitting and cross-covering when multiple nursing pages punctuate the team’s work. Megan calls back and talks with the nurse covering Mrs. H. “She doesn’t look well” the nurse informs Megan. “She’s breathing really heavy and fast.” Megan sends her intern to quickly evaluate

Mrs. H as she works up the next admission. The night progresses, and Mrs. H's respiratory status continues to decline, with the nurses directly paging Megan numerous times. "She's not my patient, so I don't know what she looked like earlier" Megan states. "I'll be up shortly to evaluate her." Finally, as she leaves the room after evaluating Mrs. H. Megan requests that the nurse call anesthesia as the patient will require intubation and transfer to the ICU. After the patient is stabilized and transferred, Megan and her team retreat to the call room for some much needed rest.

Early the next morning, Jill arrives to receive sign-out from Megan and finds her resting in the call room. "So, how was your night?" Jill asks. Megan rolls over and grabs a crumpled copy of the sign-out and hands it to Jill. "It wasn't awful. Mrs. H. was intubated and went to the ICU, but your other patients did well." Jill gasps, "What? Mrs. H! We made her DNR/DNI! It is right here on the sign-out!" Jill looks down at the crumpled paper and quickly realizes that she gave Megan the older version of the sign-out. "Oh no!", Jill cries, "I am going to get in so much trouble!"

Analysis and Discussion

This case is also drawn from prior qualitative interviews of resident physicians, specifically in the context of critical incidents occurring secondary to ineffective handoff communication. This scenario demonstrates the conflict generated by the duty hour regulations and tension to complete tasks while the clock is ticking. Contributing factors and associated strategies for improvement are discussed below and in Fig. 4.2.

Impact of Duty Hours on Resident Education and Well-Being

The initial implementation of the resident duty hour regulations in 2003, which limited consecutive hours worked and shift duration, were met with skepticism and an anticipation of negative clinical care consequences. However, data obtained post-2003 have revealed that patient outcomes did not worsen and in some circumstances improved after the limitations were put in place [8, 30, 31]. Literature also shows positive changes in resident's perception of well-being and stress [32]. However, concerns remain that shorter shifts may change the intensity of work and potentially adversely impact resident's educational experience. Further, since the most recent regulation specifically limits PGY-1 shift duration, this may result in increased night work amongst senior residents affecting their well-being and subsequent care delivery [33].

Decreasing work hours without also a reduction in workload [34, 35] may improve errors attributed to fatigue but may increase those secondary to overwork. Several recent studies have evaluated the impact of workload during training and found that, for each additional patient that residents admit during a call cycle, subsequent sleep time decreases and there is decreased ability to participate in required educational activities [34]. In light of the new limitations, without subsequent



Fig. 4.2 Case 2: Fishbone diagram depicting contributory factors in the trainee-related adverse outcome

decrease in workload anticipated, these problems may persist, compounding concerns regarding educational quality and opportunity during residency training. Lessons from manufacturing industry and other shift-based specialties warn of the dangers of shift-based work, including resulting errors secondary to attention and impact on personal health and well-being [36, 37]. Aside from workload, other factors to consider include the timing of the performance of complex tasks, the interval between night and day work, and ensuring effective education on sleep hygiene and fitness for duty.

There is the potential that resident education and the subsequent impact on ability to deliver safe and effective clinical care are actually hampered by further duty hour reductions. Inherent in the apprenticeship model of residency training is learning by doing and if in fact residents are doing less, are they learning less? Limiting the training hours may decrease a trainees' exposure to clinical cases, thereby decreasing the overall quality of their clinical education [38]. Prior work done after the implementation of the 80-h work week showed weaker performance of neurosurgical trainees on validated measures of performance [39] and similar findings in other surgical literature notes decrease in operative time and experience after duty hours implementation [40]. Findings in the nonsurgical literature are equivocal, although as discussed above the likely increase in workload or work intensity with shorter shift duration may result in negative educational outcomes for trainees [22, 41]. While the new regulations do include clauses for trainees to violate the

restrictions in the setting of a unique case opportunity (e.g., an infrequently performed surgery or evolving/unstable patient), these findings certainly support the assertion that the duty hour solution may not be a one-size-fits-all and will require modification across specialties.

The “July Effect”

Regardless of the work hour restrictions, concerns remain regarding the transition from undergraduate to graduate medical education, specifically the ability of new interns to rapidly learn new systems, adopt their new professional roles, and simultaneously care for critical and complex patients. The “July effect” or perception that care in teaching hospitals is more dangerous for patients in July secondary to the arrival of a fresh batch of trainees is generally considered to be a one of the most storied medical education urban “legends” [42]. Little literature supports the existence of the “July effect,” although many acknowledge that the significant transition from student to practicing intern requires more thoughtful orientation and preparation specifically regarding tasks such as handoff communication and managing uncertainty [42]. Ensuring learner-centered experience-focused orientations coupled with ample availability of more senior and seasoned housestaff are the two strategies suggested to offset any potential impact of the summer season [43].

Duty Hours and Handoffs

Handoff communication failures clearly contributed to the adverse event in the second case. We can anticipate another increase in the number of care transitions after the implementation of the new regulations and, as such, the ACGME has included explicit language in training and assessment of trainee handoffs. Patients can suffer a multitude of untoward effects secondary to a poor handoff, including readmission, medication errors, or missed tests, and follow-up appointments [44, 45]. Poor transitions occurring even within the hospital, such as transfer to or from a more intensive level of care, may result in medication errors, delay in the delivery of therapies or diagnostic tests, or prolonged length of stay [46]. Handoff education occurs infrequently in the undergraduate medical education environment [47] and, therefore residency-training program must be prepared to provide trainees with content on the importance of effective verbal and written handoff communication. Given that new duty hour limitations will impact service structures and care delivery in residency training, with an increase in the amount of night work and shift-based coverage, programs must ensure the transfer of effective clinical content *and* professional responsibility for patients [12]. Implementing a standardized handoff process, establishing metrics by which to evaluate handoff quality, and involving supervising physicians in the handoff exchange are the best next steps to ensure adequate transfers of care.

Conclusion and Key Lessons

Residency training is an extremely important and sensitive area in the context of patient safety. First, patients, public-at-large, as well as regulatory and accreditation bodies need to be reassured that the safety and quality of care in a teaching hospital will match or exceed that in the nonteaching hospitals. Second, teaching hospitals are training physicians of the future and the quality of their education will impact their practice for a lifetime and therefore all patient safety efforts of the future. Finally, for attending physicians as well as trainees, hands-on residency training remains the most important conduit providing continuity across generation of physicians—not only of clinical knowledge but also of values of humane and compassionate care.

The following is a summary of the key take home points to be considered by GME training programs and teaching hospitals to ensure both the safety and quality of patient care and education of residents.

- Factors determined to impact adequacy of supervision include the physical presence of the supervisor, the contribution of the supervisor to the patient case, the resident understanding of the clinical scenario, and the overall time spent with the trainee.
- Trainees wish to approach clinical care in a collaborative fashion, and to be treated as adult learners, with constructive and specific focused feedback.
- Paramount to the discussion of supervision is the identification of explicit parameters for contact, specifically the “must-contact” clinical scenarios, and also the easy availability of the supervisor.
- Encourage the role of the supervisor as an active participant; instead of passively waiting to be contacted by their trainee, the attending physician should actively reach out to their housestaff to assess their level of supervisory need.
- Decrements in shift duration, without coincident decrease in workload, may further serve to negatively impact resident well-being and educational quality of residency experience. Resident education, and ability to participate in educational activities, must be considered when implementing strategies to comply with policy.
- Factors to consider in designing effective systems include the timing of complex tasks performed, the interval between night and day work, and ensuring effective education on sleep hygiene and fitness for duty.
- Ensuring learner-centered and experience-focused orientations coupled with ample availability of more senior and seasoned housestaff are two strategies suggested to offset any potential impact of the summer season.
- A standardized handoff process should be utilized which stresses transfer of clinical content and of professional responsibility. Systems should be designed to include protected or overlap time ensure that priority is placed on effective handoff communication.
- Team-based approach to patient ownership should be encouraged to avoid the “not my patient” problem.

References

1. HCUPNet. Agency for Healthcare Research and Quality (AHRQ). [cited 13 May 2012]. Available from <http://hcupnet.ahrq.gov/>
2. Kupersmith J. Quality of care in teaching hospitals: a literature review. *Acad Med.* 2005;80(5):458–66.
3. Bell BM. Resident duty hour reform and mortality in hospitalized patients. *JAMA.* 2007;298(24):2865–6. author reply 6-7.
4. Duty Hours Language. ACGME. [cited 13 May 2012]. Available from http://www.acgme.org/acWebsite/dutyHours/dh_Lang703.pdf
5. Philibert I, Friedmann P, Williams WT. New requirements for resident duty hours. *JAMA.* 2002;288(9):1112–4.
6. Hope J. EU ban limiting junior doctors to 48-hour working week lifted over public health concerns. *Daily Mail.* 16 Oct 2009. Available at <http://www.dailymail.co.uk/health/article-1220698/EU-ban-limiting-junior-doctors-48-hour-working-week-lifted-public-health-concerns-hospital-EU-Working-Time-Directive-Trusts.html#ixzz1xt1iOQRm>. Accessed 15 Jun 2012.
7. Ulmer C, Wolman DM, Johns MME. Resident duty hours: enhancing sleep, supervision, and safety (Committee on Optimizing Graduate Medical Trainee (Resident) Hours and Work Schedules to Improve Patient Safety). Washington, DC: Institute of Medicine (U.S.), National Academies Press; 2009.
8. Volpp KG, Rosen AK, Rosenbaum PR, Romano PS, Even-Shoshan O, Canamucio A, et al. Mortality among patients in VA hospitals in the first 2 years following ACGME resident duty hour reform. *JAMA.* 2007;298(9):984–92.
9. Barden CB, Specht MC, McCarter MD, Daly JM, Fahey III TJ. Effects of limited work hours on surgical training. *J Am Coll Surg.* 2002;195(4):531–8.
10. Vidyarthi AR, Arora V, Schnipper JL, Wall SD, Wachter RM. Managing discontinuity in academic medical centers: strategies for a safe and effective resident sign-out. *J Hosp Med.* 2006;1(4):257–66.
11. The Joint Commission. 2012 Hospital National Patient Safety Goals. [cited 13 May 2012]. Available from http://www.jointcommission.org/assets/1/6/2012_NPSG_HAP.pdf
12. Arora V, Johnson J. A model for building a standardized hand-off protocol. *Jt Comm J Qual Patient Saf.* 2006;32(11):646–55.
13. Snow V, Beck D, Budnitz T, Miller DC, Potter J, Wears RL, et al. Transitions of Care Consensus Policy Statement American College of Physicians-Society of General Internal Medicine-Society of Hospital Medicine-American Geriatrics Society-American College of Emergency Physicians-Society of Academic Emergency Medicine. *J Gen Intern Med.* 2009;24(8):971–6.
14. Singh H, Thomas EJ, Petersen LA, Studdert DM. Medical errors involving trainees: a study of closed malpractice claims from 5 insurers. *Arch Intern Med.* 2007;167(19):2030–6.
15. Kilminster S, Cottrell D, Grant J, Jolly B. AMEE Guide No. 27: effective educational and clinical supervision. *Med Teach.* 2007;29(1):2–19.
16. Kachalia A, Studdert DM. Professional liability issues in graduate medical education. *JAMA.* 2004;292(9):1051–6.
17. Nasca T, Day S, Amis S. The new recommendations on duty hours from the ACGME task force. *N Engl J Med.* 2010;363:e3.
18. Farnan JM, Johnson JK, Meltzer DO, Humphrey HJ, Arora VM. Resident uncertainty in clinical-decision making: a qualitative analysis. *Qual Saf Health Care.* 2008;17:122–6.
19. Sexton JB, Thomas EJ, Helmreich RL. Error, stress and teamwork in medicine and aviation: cross-sectional surveys. *BMJ.* 2000;320:745–9.
20. Byrne JM, Kashner M, Gilman S, Aron D, Canno G, Chang B, et al. Measuring the intensity of resident supervision in the department of veterans affairs: the resident supervision index. *Acad Med.* 2010;85:1171–81.

21. Claridge JA, Carter JW, McCoy AM, Malangoni MA. In-house direct supervision by an attending is associated with differences in the care of patients with a blunt splenic injury. *Surgery*. 2011;150(4):718–26.
22. Farnan JM, Petty LA, Georgitis E, Martin S, Chiu E, Prochaska M, et al. A systematic review: the effect of clinical supervision on patient and residency education outcomes. *Acad Med*. 2012;87(4):428–42.
23. Kennedy TJ, Regehr G, Baker GR, Lingard LA. Progressive independence in clinical training: a tradition worth defending? *Acad Med*. 2005;80(10 Suppl):S106–11.
24. Busari JO, Weggelaar NM, Knottnerus AC, Greidanus PM, Scherpbier AJ. How medical residents perceive the quality of supervision provided by attending doctors in the clinical setting. *Med Educ*. 2005;39:696–703.
25. Farnan JM, Johnson J, Humphrey H, Meltzer D, Arora VM. The tension between on-call supervision and resident autonomy: from the micromanager to the absentee attending. *Am J Med*. 2009;122(8):784–8.
26. Hafferty FW, Franks R. The hidden curriculum, ethics teaching, and the structure of medical education. *Acad Med*. 1994;69(11):861–71.
27. Hundert EM, Hafferty F, Christakis D. Characteristics of the informal curriculum and trainees' ethical choices. *Acad Med*. 1996;71(6):624–42.
28. Sterkenburg A, Barach P, Kalkman C, Gielen M, ten Cate O. When do supervising physicians decide to entrust residents with unsupervised tasks? *Acad Med*. 2010;85:1408–17.
29. Farnan JM, Johnson JK, Meltzer DO, Harris I, Humphrey HJ, Schwartz A, et al. Strategies for effective on-call supervision for internal medicine residents: the SUPERB/SAFETY model. *J Grad Med Educ*. 2010;2(1):46–52.
30. Rosen AK, Loveland SA, Romano PS, Itani KM, Silber JH, Even-Shoshan OO, et al. Effects of resident duty hour reform on surgical and procedural patient safety indicators among hospitalized veterans health administration and medicare patients. *Med Care*. 2009;47(7):723–31.
31. Fletcher KE, Davis SQ, Underwood W, Mangrulkar RS, McMahon Jr LF, Saint Jr S. Systematic review: effects of resident work hours on patient safety. *Ann Intern Med*. 2004;141:851–85.
32. Myers JS, Bellini LM, Morris JB, Graham D, Katz J, Potts JR, et al. Internal medicine and general surgery residents' attitudes about the ACGME duty hours regulations: a multicenter study. *Acad Med*. 2006;81(12):1052–8.
33. Arora VM, Volpp KGM. Duty hours: time to study? *J Grad Med Educ*. 2011;3(3):281–4.
34. Arora VM, Georgitis E, Siddique J, et al. Association of workload of on-call medical interns with on-call sleep duration, shift duration, and participation in educational activities. *JAMA*. 2008;300(10):1146–53.
35. Reed DA, Fletcher KE, Arora VM. Systematic review: association of shift length, protected sleep time, and night float with patient care, residents' health, and education. *Ann Intern Med*. 2010;153(12):829–42.
36. Berger AM, Hobbs BB. Impact of shift work on the health and safety of nurses and patients. *Clin J Oncol Nurs*. 2006;10(4):465–71.
37. Costa G. The impact of shift and night work on health. *Appl Ergon*. 1996;27(1):9–16.
38. Volpp K, Friedman W, Romano P, Rosen A, Silber J. Residency training at a crossroads: duty-hour standards. *Ann Intern Med*. 2010;153:826–8.
39. Jagannathan J, Vates GE, Pouratian N, Sheehan JP, Patrie J, Grady S, et al. Impact of the accreditation council for graduate medical education work-hour regulations on neurosurgical resident education and productivity. *J Neurosurg*. 2008;110:820–7.
40. Damadi A, Davis AT, Saxe A, Apelgren K. ACGME duty-hour restrictions decrease resident operative volume: a 5-year comparison at an ACGME-accredited university general surgery residency. *J Surg Educ*. 2007;64(5):256–9.
41. Arora VM, Georgitis E, Siddique J, Vekhter B, Woodruff J, Humphrey H, et al. Association of on-call workload of medical interns with sleep duration, shift duration, and participation in educational activities. *J Am Med Assoc*. 2008;300(10):1146–53.
42. Clarence H. Braddock III. A Mid-Summer Fog. Nov 2008. AHRQ WebM&M: case & commentary.

43. Young JQ, Ranji SR, Wachter RM, Lee CM, Niehaus B, Auerbach AD. "July Effect": impact of the academic year-end changeover on patient outcomes: a systematic review. *Ann Intern Med.* 2011;155(5):309–15.
44. Arora VM, Prochaska M, Farnan J, et al. Problems after discharge and understanding of communication with their primary care physicians (PCPs) among hospitalized seniors: a mixed methods study. *J Hosp Med.* 2010;5(7):385–91.
45. Arora V, Johnson J, Lovinger D, et al. Communication failures in patient signout and suggestions for improvement: a critical incident analysis. *Qual Saf Health Care.* 2005;14(6):401–7.
46. Hinami K, Farnan JM, Meltzer DO, et al. Understanding communication during hospitalist service changes: a mixed methods study. *J Hosp Med.* 2009;4(9):535–40.
47. Horwitz LI, Krumholz HM, Green ML, Huot SJ. Transfers of patient care between house staff on internal medicine wards: a national survey. *Arch Intern Med.* 2006;166:1173–7.