The safety of operating rooms is dependent in large measure on the professional and regulatory requirements that mandate skill levels, documentation standards, appropriate monitoring, and well-maintained equipment. Prescriptive and detailed protocols exist for almost every procedure performed, and although variation based on surgical and anesthesia preference is allowed, overall there is excellent management of the technical aspects. Experienced operating room physicians, nurses, and technicians come to rely on these operating room characteristics to support the delivery of safe care. Most practitioners, however, at some time—and some much of the time—have had the experience of working in suboptimal operating room conditions because the level of procedural complexity in even the simplest of operative procedures is not matched by the necessary team coordination, leadership engagement, or departmental perspective that encompasses all the prerequisites for reliable delivery of care. There are many causes for this current state that include, depending on country, the mechanisms for reimbursement that impede alignment of interests between physicians and hospitals;1 the limited interdisciplinary training of the various disciplines—surgery, anesthesia, nursing, and technician—that promote hierarchy and undervalue core team characteristics; and historical perceptions about the roles of physicians, nurses, and ancillary personnel that have not kept pace with the changing nature of care delivery.2

As far back as 1909, Ernest Avery Codman, a Boston orthopedic surgeon, openly challenged the then current orthodoxy and proposed that Boston hospitals and physicians publicly share their clinical outcomes, complications, and harm. Wisely, he resigned his hospital position shortly before going public with this request, so he could not be thrown off the staff. Despite that, criticisms of him were severe. One hundred years later, his wishes are being realized across the United States at a rapidly accelerating pace.3 The 1991 Harvard Medical Practice Study that evaluated errors in 30 hospitals in New York State and that ultimately led to the now highly quoted number of 98,000 unnecessary deaths per year—accruing from health care error—has forced the industry to reflect on the apparent contradiction that the edifices built to care for patients are harming many of them.4,5 From these reflections a science of comprehensive patient safety has been woven from the threads of disciplines such as engineering, cognitive psychology, and sociology. Combined with the quickening pace of electronic health record deployment, the movement toward demonstrable quality and value in medical care is happening quickly.

THE CASE FOR SAFE AND RELIABLE HEALTH CARE

The 1991 Harvard Medical Practice Study was the seminal article leading to the 1999 Institute of Medicine (IOM) report, To Err is Human,6 and that report has led to great public and business
awareness of quality and safety problems in the health care industry. The media have fueled the public’s interest and businesses have formed advocacy groups, such as Leapfrog,7 to focus attention on this critical topic. The American government program, Medicare, with approximately $600 billion in annual spending, recently announced it would not pay for care resulting from medical errors.8 Large private insurers are quickly following suit. Aetna just announced it will not pay for care related to the “28 never events” defined by the National Quality Forum.9

Rapidly developing transparency in the market about safety and quality will be a major driver. Beth Israel Deaconess Hospital in Boston now posts its quality measures on their Web site, including their recent Joint Commission accreditation survey.10 New York City Health and Hospitals Corporation, the largest public care system in the United States, has committed to following suit. The State of Minnesota publicly posts on the Internet all their hospital’s reported never events, such as wrong site surgeries and retained foreign objects during surgery.11 Several other states are quickly following suit. Geisinger Clinic in Pennsylvania now offers a warranty on heart surgery,12 in which specified complications are cared for without charge. Given the impressive care processes they have developed, this is a logical way to message their superior care and compete in the market. The successful hospitals and health systems in this new rapidly transparent market will be the ones that apply systematic solutions to enhance patient safety. Other bright spots in the systematic approaches taken by large care systems include Kaiser Permanente and Ascension Health in the areas of surgical and obstetric safety, and through the Institute for Healthcare Improvement (IHI) initiatives, such as the 100,000 Lives Campaign and the 5 Million Lives Campaign.13

There has been a great deal of activity to improve the safety and quality of care since the IOM report. Currently there are pockets of excellence, but broadly there is much more work to do and fundamental gaps in the quality and safety of health care as it exists today. Well-intentioned projects and efforts to improve patient safety have met with variable results. Overall, however, in the absence of systematic, solutions-based approaches, health care organizations are unlikely to achieve sustained excellence in clinical safety and quality. This article describes the authors’ current thinking as to the necessary elements for a comprehensive program to help insure safe and reliable care for every patient every day. The surgical environment is an obvious one to which these programs should be applied and surgical nursing will play a huge role in shaping the efforts. They also will shape, in turn, nursing.

**THE OPERATING ROOM AS A SYSTEM**

To begin, think of safety from an engineering perspective, which considers how safe a system is based on how reliably it produces its product or, restated, based on the frequency of its defects. Engineers think about

- The reliability of achieving the desired outcome not just once but repeatedly
- Evaluating the processes leading to the desired outcome
- Analyzing in detail the indivisible steps that, together, make up the process

In operating rooms, the process has dozens and in some cases hundreds of sequential steps. The reliability of each of the steps—that is, whether or not each step occurs as it should—determines whether or not the desired outcome will be achieved.

Ultimately, system safety and reliability are determined by the rate of defects in each step. When defect rates are multiplied, it becomes increasingly likely that they lead to an undesired outcome. The result could, but not always, be of clinical harm to patients. Patients may be fine, but the process nevertheless may have significant flaws that predispose patients to a greater than reasonable risk of harm. This is an indication that although a current patient did not suffer an adverse event, the next patient might not be so lucky.

If the clinical perspective is combined with the engineer’s, a reliable operative procedure will see patients safely through because all of the steps in the processes have reliably small and known defect rates.

**PROCESS STEPS**

Taking this theoretic construct and making it real, consider that each step in the process is an individual and indivisible action, as when, for example, an operating room gets a patient’s chart. The simple act of holding the chart in one’s hands is a step in the process of evaluating a patient before beginning a surgical procedure.

Once a chart is in hand, there are a series of other steps that might include checking the hematocrit box in the laboratory section, checking the consent box in the front of the chart, and perusing the blood pressure and heart rate trends in the clinical section. These three steps (or four if blood pressure and heart rate are on different pages of the clinical section) depend on several
processes of their own, such as a secretary or assistant placing the chart in a convenient location and checking the correct information in the correct place in the chart. The process steps undertaken each have failure rates of their own and determine whether or not the information is present in the chart when it reaches the nurse.

Suffice it to say that any operative procedure performed in any location, viewed from this perspective, is made up of dozens to hundreds or thousands of steps, and every one of them has an intrinsic defect rate; some might be single steps but many also will have associated processes that determine their defect rate.

To the degree that each step’s defect rates can be quantified, the safety of a system is measurable, and the measure is not only whether or not the outcome is achieved but also whether or not the processes may be replicated over and over again. To a large extent, safety is a system property determined by a system’s reliability.

ACHIEVING RELIABILITY IN SYSTEMS

Operating rooms have done a remarkably good job of making themselves reliable and safe, albeit in a health care industry that has been slow to incorporate many key features of reliable systems. The Harvard anesthesia practice standards generated in the 1980s and adopted across the United States are a shining example of standardization of anesthesia care that has helped improve the safety of the specialty. These standards identified minimum monitoring expectations now commonly used in every surgical procedure. They affect all of surgical nursing and influenced the broad adoption of pulse oximetry and capnography.

Another rich source of reliability in operating rooms has in the past derived from promoting the interoperability of its practitioners. Although one anesthesia provider or nurse may begin a procedure, it has been likely that many other members in a department would be capable of replacing them and might be called on to do so. This continues to be likely in many departments in which transfers of care occur daily; however, the limitations in interoperability are growing as equipment and surgical specialties become more specialized and require increasingly sophisticated knowledge of technique and machinery. The implications of increased specialization and technical complexity inevitably will influence decisions about caseload and case type regarding timing of cases, after-hours procedures, and, in all likelihood, credentialing of all operating room practitioners.

Reliability is feasible only when a group of interdependent factors are effectively woven together to produce a whole cloth. The threads are the key; their individual quality determines the appearance, and potentially the beauty, of the final tapestry. There are six types of threads in the weave. They are:

- An environment of continuous learning
- A just and fair culture
- An environment of enthusiasm for teamwork
- Leaders engaged in safety and reliability through the use of data
- Effective flow of information
- Intelligent engagement of patients in their own care

Weaving occurs only through concerted effort at multiple levels, starting with a goal, that takes precedence over all others, to achieve reliability. Organizations and departments that do embark on the road to greater reliability find that the end result positively influences patient care and employee satisfaction; it is obvious even to outside observers. To some extent this applies to all operating room practitioners as they arrive in a location to participate in a procedure. The initial reaction, that gut feeling about the quality of relationships, and the safety of the environment should be taken seriously, for it is likely to be a good barometer of the risk inherent in the environment.

AN ENVIRONMENT OF CONTINUOUS LEARNING

The paradigm of a learning environment is Toyota Industries. They lead the auto industry in size and sales, and the enthusiasm of their car owners is well known. Toyota employees make suggestions for improving the work they do an average of 46 times per year and do so with the knowledge that a significant number of their suggestions will be tested and, if found worthy, adopted and spread. This process of applying the insights of the frontline workers to change and improvement applies not only to the production of their cars but also to the fundamental work of improvement itself. Toyota strives not only to continuously improve their car production but also to improve the way they “do improvement.” In other words, if a change in a procedure takes 1 month today, Toyota would be seeking ideas so that a year from now it could perform that change in 3 weeks. If Toyota daily receives 10 useful suggestions from a department, then 1 year from now their goal would be to receive 12 or 15. Their perspective is that improvement is always feasible and there is always waste to be removed from their processes.
The fact that in a prior quarter wasted effort and materials decreased as a result of focused improvement efforts is immaterial. There is, unrelentingly, always more to be achieved.\textsuperscript{23,24}

Where is health care in this picture and how does the example of Toyota apply to anesthesiologists when they arrive in a remote location to give an anesthetic? Physicians and hospitals have, for decades, had a guild relationship in which single physicians plied their trade within the walls of a hospital but with singularly insular perspectives. In the past 20 years a different health care industry has begun to emerge, built on a flood of hard evidence from randomized controlled clinical trials. Groups of clinicians are now providing service-line delivery across the spectrum of care-associated specific diseases.\textsuperscript{12}

An environment of continuous learning in health care requires the presence of certain structural elements and the ability to execute ideas. The most basic of structural elements is the meeting of the clinical, unit-based leadership to consider information about unreliable events and decide on actions to remedy them.\textsuperscript{25} Surgical procedures will take place safely only in those clinical units whose leaders are able to orchestrate this process, and nursing must, to repeat, be an integral part of the leadership discussions in that unit. Multidisciplinary staff should meet on a regular basis to examine the straightforward operational issues in units, from items as specific as getting drugs to the right places in each room to the flow of patients through the entire suite.

The information collected at such meetings should be collated and evaluated so that remedies to any problems, potential problems, or concerns may be pursued. As in Toyota and other industries with reputations for high reliability,\textsuperscript{26} listening to the front line and acting on their concerns is a key to ensuring a safe process. This requires an environment or culture that makes it easy to bring problems to light and a teamwork structure that supports this process. Both of these can be evaluated.

A JUST AND FAIR CULTURE

A just and fair culture in health care is one in which individuals fully appreciate that although they are accountable for their actions, they will not be held accountable for system flaws.\textsuperscript{17,27} This culture provides a framework for looking at errors and adverse events to quickly and consistently determine whether or not an individual nurse or physician involved in the event is problematic at a behavioral or technical skill level or whether or not he or she was set to fail by system flaw. This means evaluating the culpability of an individual after an error, accident, or adverse event by using a simple algorithm that asks (1) Did the individual mean to cause harm? (2) Did the individual come to work impaired (by drugs, alcohol, and so forth)? (3) Did the individual follow reasonable rules that others who have similar knowledge and skills would have followed? and (4) Did the individual have a history of participating in or causing unsafe acts?\textsuperscript{27} If the answers are, respectively, no, no, yes, and no, then there is no personal blame accrued. The full appreciation of this means the organization believes, and that belief is corroborated by the actions of the organization, that there exists a reasonable mechanism to evaluate untoward events, regardless of the outcome of the event. Implicit in this, and an extension of it, is that actions are evaluated based on what is best for patients and not on who is supporting the actions. Hierarchy, formal or informal, is not material in discussions of this sort.

When evaluating medication errors, the majority of the time the algorithm identifies capable conscientious individuals working in an unsafe system and on whom no blame should be directed. James Reason, who first articulated the algorithm (described previously), is clear when describing his model that blaming individuals for events beyond their control, although it might be a salve to patient angst or satisfy the legal issues about accountability, does not fix a problem or make a system safer. This is a model of accountability which says we can look patients, regulators, purchasers, and each other in the face and say, “the people delivering care here are capable, conscientious and working hard to do the right thing.”\textsuperscript{28} This model allows quickly separating individual issues from system ones. What is critical is creating a safe environment that allows good nurses, doctors, and others to tell us when they make mistakes or have near misses.

Tragic examples highlight the need for this objective and clear evaluation mechanism as evidenced by the overdoses in Indianapolis in 2006 of the blood thinner, heparin. After the wrong concentration of heparin, 100 times too concentrated, was put in the automated pharmacy dispensing machine, nine very skilled individuals—six newborn intensive care unit nurses and three neonatologists—mistakenly took the wrong concentration of drug and administered it to very small infants. Three fatalities resulted.\textsuperscript{29}

A similar episode occurred in 2007 involving the actor, Dennis Quaid, and his family in Los Angeles.\textsuperscript{30} The media coverage of the Quaid’s cases has highlighted their trauma as patients and the outrage that occurs when patients feel
they are not being told the truth. Missing, as often is the case in general media stories, are the processes required to identify the underlying causes and fixes of these errors. They require an engineering and systematic approach that begins with an objective view of the events and from which flow insights about systematic flaws and individual culpability.

Thought leaders on both sides of the Atlantic have developed schema to address this topic. James Reason, in the early 1990s, described his incident analysis tree. In the past decade David Marx developed his Just Culture Algorithm for evaluating the choices made by frontline providers, which incorporates and expands on Reason’s work. In both cases, the goal is to ensure appropriate accountability and an environment where every decision made by senior leadership and middle management passes a “sniff test” of integrity and ethics.

Regarding levels of culpability in some serious patient injuries, there are contributing factors for which agreement is universal. There are other individual actions or events that require careful analysis, teasing away bias or misconception, to arrive at a conclusion that the majority find fair and just. These are the gray areas in the analysis, lacking the discrete black and white forms and shapes that, if always present, would make this process much more straightforward.

The advantage of promoting, nurturing, and supporting a climate perceived as fair is that it opens the doors for discussion about problems and makes it acceptable to explore opportunities for improvement and to disagree and find resolution through testing and the quest for continuous improvement. In truth, a culture of fairness is a fundamental to the implementation of a safe system. And although not necessarily foremost on an operating room nurse’s mind as he or she brings a patient into an operating room, a fair and just culture is omnipresent every time this occurs, and in part determines the degree to which the environment supports the safety of each procedure.

Debriefing is the simple practice of convening a team immediately after finishing a procedure (or a series of procedures) to ask and answer three simple questions:

- What did we do well?
- What could we have done better?
- Did we learn anything that we should take into account for the next procedure?

If performed well, the debriefing, with experience and an agreed-on protocol, can generate essential information in under 120 seconds, all of 2 minutes. Once a debriefing discussion has occurred, the next set of steps, those that support the debriefing act, ultimately are more important than the debriefing itself; this is the phase in which the information is funneled to the unit so that an improvement process can be considered and its findings acted on.

Debriefings and the supporting structure are simple concepts but often are hard to put into practice. They require engaged and knowledgeable leadership, team buy-in, and the ability to analyze information and formulate process improvement actions. Debriefings and the supporting structure make the difference between a stellar unit and a mediocre one. The process is so important that every unit or clinical department should articulate a core value to describe it and then establish norms of conduct shaped by that value. The value could be stated as simply as endless learning and the norm of conduct an expectation that every team member is expected to participate in the debriefing. The expectations of leadership shine brightest here. If team members do not take on the expected norms of conduct, a series of proscribed steps must be followed that ultimately, and only if necessary, lead to the removal of that team member. This is not for the faint of heart to undertake. For leaders who want to be effective, it is essential.

Worthy of mention is Amy Edmondson’s observations of operating room teams implementing what at the time was an innovative and new procedure—minimally invasive cardiac surgery. The groups most effective were those for whom debriefing was a natural component of the ongoing minute-by-minute team function. This perspective is helpful in that it highlights the need for an environment that promotes continuous learning. It also serves to highlight another facet of learning, which is the infrastructure that captures concerns and insights and takes action to ameliorate problems and concerns.

Determining how to make debriefings a natural part of clinical environments is not part of most AN ENVIRONMENT OF ENTHUSIASM FOR TEAMWORK

Debriefing is a teamwork behavior that marries team practice and improvement.

There are only a few core team behaviors. An unlikely one to start with, but ultimately one of the most important, is debriefing. This one practice alone, if conducted routinely in a unit with the appropriate structural supports as described so far, would make surgical procedures safer.
clinicians’ thinking. Most clinical environments are not configured to undertake debriefings primarily because there is insufficient appreciation of their value, a paucity of understanding about how to do them efficiently, and incomplete knowledge of what to do with the information. Productivity-centered units and departments leave little to no time for even the briefest reflection. In fact, if time is taken to debrief, it usually is in the aftermath of a severe adverse event, and even then, it is conducted in a manner not likely to generate the best results.

Evaluations of severe adverse events should be conducted as closely as possible to the time of the event. After 24 hours, the minds of participants begin to fill in memory’s blank or gray areas, reshaping the events to meet all manner of personal predispositions, to help protect oneself or explain away the uncomfortable. Effective debriefing occurs at the most critical times only if it is practiced in the most mundane of times—in the debriefings that occur after a day’s normal and successful activities. Daily, routine debriefings provide the opportunity to highlight the good work done by a team and group and always create the opportunity to learn something about how to make the work better.

Operating rooms in the United Kingdom, United States, and Canada are experimenting with debriefing as part of team training efforts and through collaboratives run by the IHI. Almost every site is struggling with aspects of the debriefing, beginning with the question of when to do them. Most of those who have been successful have settled, to begin with, on a debriefing process that occurs in general anesthetics between the start of skin closure and patient emergence. There is no ideal time for this activity to occur, and this is true of that period; however, during this time, all the operating room participants tend to be together and usually there is a moment of stability and calm before the patient emerges. Remember that the debriefing discussion, if done well, can be as brief as 120 seconds. If well coordinated and if each member of the team understands its purpose, the debriefing can yield an extraordinary amount of information.

For a moment, consider a culture in which debriefing is fully developed and routinely practiced. In such cases, members of the team might, in real time, notice aspects of the procedure that are worthy of mention and tuck them away until the debriefing takes place. The result is a rapid debriefing discussion about things that went exceptionally well and should be repeated, those that were problematic and need to be fixed, and insights that might be fodder for future improvement tests. In such a setting, because the team members are used to the debriefing drill, they know who gets to speak up first (usually the most junior member or the individual who has the least authority), and they know how to express the issues and in what order. There also is a person assigned the responsibility of collecting the information on a form, which in a well-developed scenario is readily and easily accessible, and that individual—surgeon, nurse, technician, or anesthesia practitioner—knows where to deposit the form. Team members also know that the form serves a useful purpose, that the comments noted on the form are evaluated by departmental leaders, and that the comments are taken seriously. They know this because they see changes take place as a result of the comments and because they receive direct feedback when a specific comment they have made is acted on. For that feedback to occur, the well-designed collection instrument has a place for individual names so that leaders know where the comments originate, which procedures are being commented on, and what time of day the comments are made. This does not mean that every form must have all of this information; if a provider decides to pick up a form and insert an anonymous comment, that is acceptable, too. The culture is one of fairness so that providers are not hesitant about adding their names to the concerns expressed by others.

THE GOOD HEALTH CARE TEAM

What is a good health care team? A good team is a group of interdependent individuals who have the following characteristics.

- They have diverse skills and share a common goal.
- Their output through synergy is greater than the sum of the individuals within the group.
- They have an appreciation of the roles played by each team member, including the leaders.
- They know each other’s expertise so well that team members know where to turn to solve a problem.
- They have each agreed, individually, on norms of conduct, one of which is non-negotiable mutual respect.
- They address technical problems directly using the skill mix of the team but face complex problems that require adaptation and flexibility through collaboration and open discussion.
• Individuals may express concerns without fear of retribution and know that their concerns will engender only two possible responses: their concerns will be acted on or knowledge will be respectfully brought to light that mitigates the concern.

Excellent teams have team leaders who clarify, each time the team comes together, the expected norms of conduct. In addition to having agreed-on norms of conduct, outstanding teams have the added support of organizational endorsement.

TEAM LEADERS: THE CRITICAL ROLE OF LEADERSHIP

The active and committed engagement of executive and clinical leaders in systematically improving safety and quality is essential. One of the greatest challenges is aligning the frequently large number of strategic priorities in an organization with a simple, focused message that resonates with front-line clinicians caring for patients. Alignment and clarity of an organization’s patient safety goals and work is critical. Senior leaders need to clearly message the priority of safe and reliable care and model these behaviors on a daily basis. Effective leaders continually reinforce the values and “this is the way we provide care within our organization.” Excellent examples of how to do this well come from the messaging at Ascension Health to everyone working in their 71 hospitals: “Healthcare that works. Healthcare that is safe. Healthcare that leaves no one behind.” or from the longstanding Mayo Clinic motto that goes back to Dr. Mayo himself, “The needs of the patient come first.”

In Ascension’s case, every organizational priority and activity filters through and aligns with those three goals, and providers, through internal activities, internal marketing, and time to reflect, know them. There is real value in every employee knowing and working toward a short list of clear goals every day. That’s what habitually excellent organizations do.

Leaders also are keepers and drivers of the organizational culture. Setting the tone of how the organization values its people and how it treats them and expects them to treat each other is at the core of organizational excellence, or the lack thereof. The presence of overt disrespect is extremely destructive within a culture. Unfortunately, this behavior is pervasive in most health care systems and creates unacceptable risk, as nurses may be hesitant to call certain physicians with patient concerns because of the way they have been treated in the past. Sadly, hesitancy to voice a concern or approach certain individuals is a common factor in serious episodes of avoidable patient harm. Encouragingly, there is now a growing list of leaders and hospitals that are dealing directly with this issue. If they do not, they pay with increased nursing turnover, poorer patient satisfaction, and increased clinical risk.

Team leadership is not an innate skill; it is learned. Physicians, one and all, are by definition most frequently the leaders of their teams, and nowhere is this truer than in the environments where surgery is performed. Equally true, however, is that the best decisions about direction and goals, those decisions that are most likely to support reliability and safety, accrue from a shared leadership between surgeon, anesthesiologist, nursing, and other team members and are feasible only with forethought, discussion about agreed-on norms of behavior, and practice.

One act of good leadership is to take the team through a process called briefing. Unlike terms, such as “pause” or “time-out,” briefing is not a static, one-time event. Briefing is an ongoing process that ensures that all team members have a similar mental model of the team’s game plan and assumes that as the plan changes or requires changing, team members will be informed and engaged in making informed decisions.

Briefings in operating rooms are multistep affairs, ideally beginning with a coming together of the surgical team with the patient in the preoperative area and a discussion that engages the patient and team members in delineating a game plan for that procedure. The briefing process might continue after the patient is sedated or asleep in the operating room, at which point a further briefing might ensue about any issues that team members might consider unsettling. These might include, for example, concerns about equipment logistics or a team member’s personal comments about what he or she believes are their limitations or knowledge will be respectfully brought to light that mitigates the concern.

A good initial briefing process has four components in which leaders

• Ensure that all team members know the game plan.
• Assure team members they are operating in an environment of psychologic safety where they may be completely comfortable speaking up about their concerns.
• Remind team members of agreed-on norms of conduct,\textsuperscript{36} such as specific forms of communication that increase the likelihood of accurate transmission and reception of information.

• Expect excellence and excellent performance.\textsuperscript{43} Reminding team members of their responsibility to do their best and remain, throughout, engaged in the performance of the team activity and centered on the game plan and team goals.

A briefing is only as good as the team leader who runs the briefing and, in general, physicians are not trained to do them nor have they trained health care frontline providers to participate in them.

The result in operating rooms is likely to be self-evident to every practitioner reading this article: the classic experience of anesthesiologists and surgeons schooled to believe in individual autonomy and the presumption of excellence, which leads to the scenario of the anesthesia provider, nurse, and technician arriving in an empty room and setting up their equipment. Then, at the appointed time, or often delayed and later, a nurse and anesthesia provider enter with a patient, at which time a dance begins between the nurse, anesthesia practitioner, and patient to gather the appropriate data and position the patient for anesthesia. Sometime during this process, or soon after, the surgeon or specialist arrives and may or may not acknowledge the presence of other team members, his or her behavior scripted on the assumption that all in the room are expert in their fields and that if they do what they are supposed to do the job will get safely done. Discussion is limited and, if there is any, it often relates to issues unrelated to the procedure, once again because of the assumption that everyone knows his or her job so that discussion about the work is redundant, might be an affront to the skills of the practitioners, or a waste of time. Nothing could be further from the truth.

Briefings, even with team members who work together daily and regularly, are necessary to remind team members of the values, norms of conduct, and practical game plan of every case. There are no shortcuts. Achieving a commonly understood game plan requires a robust briefing process by engaged leaders and team members.

Most agree that the time when the briefing process is truly useful is during critical events, when a patient is most in danger of harm.\textsuperscript{44} Extraordinary in this common insight is the lack of understanding that to do this well in critical situations, it must be routine, commonplace, and excellently performed during the many common and straightforward procedures done daily in operating locations.\textsuperscript{45} This simple concept has face validity that transcends the common naysayer’s request for data to prove it. There is an entire science, however, underlying individual and group expertise that acknowledges that improvement occurs with practice of specific aspects within a skill set.\textsuperscript{46} This same logic applies specifically to the perioperative setting.

Operating rooms and especially surgical nursing departments can and should set standards for briefings and have as a requirement for nursing participation in these areas that every case begin with a briefing. This should apply in every surgical procedure—operating rooms or interventional sites, such as radiology or gastroenterology. Whether or not the leader of a briefing is an anesthesia provider, nurse, or surgeon is open for discussion, depending on the experience of the group in performing all the components of a good briefing. These decisions may be made practically, based on the size of the provider groups who bring their care and the effort entailed to train the groups. Who initiates the briefing is less important than that the disciplines agree on and establish the expected norms of conduct for each and every procedure performed in that location. The end result will be greater participation in team practice, greater likelihood that all know the game plan, and, when combined with effective debriefings, a robust environment for continuous learning.

COMMUNICATION

There are three simple communication techniques that increase the likelihood that transmission and reception of information occur accurately and in a timely fashion.\textsuperscript{47,48}

Closing the Loop

Closing the loop, also known as readback or hear-back, is the simple technique of repeating back verbally what is requested or described in a manner that assures accurate comprehension. In technical conversations, the process is simple. “I need furosemide 10 mg please” receives a response of “furosemide 10 mg.” Note that the hearback in this case does not have to include a “thank you” or any other reflexive social response. The agreed-on norm of conduct is a succinct repeat back devoid of extraneous words. Closing the loop in this way requires other agreed-on norms. For example, requests by a surgeon to a surgical technician for a particular instrument may require no verbal response if the placement of the instrument in
the appropriate place—such as the surgeon’s hand—is obvious. It is likely, however, that unusual requests always should have a closing of the loop to ensure mutual understanding.

Closing the loop is equally important in complex descriptions, such as the history of a patient during a handoff or when a surgeon is describing a patient and procedure to an anesthesiologist, anesthesia provider, nurse, or technician. Closing the loop entails a brief readback of the information imparted to ensure the receiving practitioner understands what has been described.

**SBAR**

A second communication form that promotes critical thinking and frames actions to be taken is a structured communication called SBAR (Situation, Background, Assessment, Recommendation). In departments where SBAR is used extensively, individuals can frame the conversation by actually saying, “I’m going to give you an SBAR,” thereby telegraphing to the recipient the order of the information about to be imparted. The Situation is equivalent to the headline in a newspaper. It should be designed to be brief, succinct, and capture the attention of the recipient. In a crisis situation, “The situation is that we’ve lost 300 mL of blood in the last few minutes” is an example of a clear and concerning situation statement.

Background follows in which a slightly more expansive background is given to explain the situation. “The blood loss increased when the abdomen was cranked open, the retractor tucked further under the liver, and you started to suction further down in the abdomen.”

Assessment is the evaluation or critical thinking part, and is one of SBAR’s strengths in that it promotes the analysis of contributing and causative factors that may help all team members focus on the problem at hand. “I know you’ve been mopping up in the abdomen but this bleeding seems excessive. I don’t know the problem but I’m concerned.” In and of itself the concern is enough to warrant the discussion and is a reasonable assessment if a team member’s gut feeling is the only precipitant for the SBAR.

The Recommendation further drives critical thinking: “Are you looking for a bleeding site and should I call for blood to the OR?” The surgeon may know or see something that the nurse or anesthesia provider does not and at this point add or alter the suggested actions. Regardless, the SBAR format clarifies for all a structured process of thinking and information sharing. When done well it also promotes learning.

**Critical Language**

The third communication technique is critical language, an agreed-on phrase that stops activity, described in other industries as “stopping the line.” When a team member perceives a risk and believes that there is limited time to address it, a critical phrase is a useful and powerful mechanism to gain attention of all team members and momentarily stop all activity. Agreeing on a term may help a junior team member overcome the hesitancy to speak up or the common problem of speaking up indirectly and possibly delaying needed quick action. Many obstetric units now use the term, “I need clarity,” as the critical statement known to all team members; its use stops activity so that a group evaluation may be made of the perceived risk. In the obstetrics setting, when every patient is alert and aware and families are often in attendance, the term also is neutral so as to not cause unnecessary alarm.

The test of effective teams and leaders occurs not only when a concern is real, because then action is obvious and the team member who picked up the problem is congratulated, but also when a concern is inaccurate—that is when the real test of teamwork and leadership occurs. The response by other team members in the latter case really determines the health of the team and whether or not the environment in the future will be a learning, supportive, and reliable one. Intolerance of team members when they speak up and are wrong is a sure mechanism to decrease the likelihood they will speak up in the future.

This should not be misconstrued as a requirement to tolerate mediocrity. If individuals repeatedly misunderstand or misrepresent a situation, then it is entirely possible that they need remediation or are in the wrong position. Well-functioning teams are cognizant of the difference between excellent evaluation of concerns that sometimes are wrong and incompetent evaluations that slow the team from doing its work. As long as the actions taken are appropriate, discussed openly, and pass a general “sniff test” of reasonableness by team members, the environment for outstanding team practice will remain viable.

**SITUATION AWARENESS AND CONFLICT RESOLUTION**

Conflict is an intrinsic part of teamwork. A team’s synergy derives from the inputs of each team member and the ineffable combining of perspectives and efforts to produce a sum greater than the individual parts. The strength of a team comes from the ability to evaluate, reconcile, combine,
and mesh these perspectives into a viewpoint that uses the best of all. Along the way, it is likely that team members occasionally will feel strongly—and differently—and find themselves in conflict about the team’s game plan. Much of the time these differences are grist for great relationships, and team members likely will appreciate the reconciliation process as it often is educational. Occasionally differences of opinion flare into disagreement, and the glue of the team membership is tested. At these times, hierarchy or strength of personality may determine the course of action rather than what is in the best interest of the patient. Formalized practices to manage conflict can help ensure that the best course of action prevails. An adage that is helpful is, “the sun never sets on a disagreement between two team members.” In other words, departments should have a codified mechanism for conflict resolution, committed to by all team members, to sit down with those they argue with to resolve the issues as a regular and required course of daily action. This is a true test of leadership because many of the serious discussions in this setting are unlikely to be successful if left solely to the two team members who disagree. A moderator often is necessary, a leader who has the formal authority and informal respect to facilitate a discussion that leads to resolution or clearing the air.

Norms of conduct about challenging team members can help in this regard, and rules of engagement can be agreed on as a departmental or organizational expectation. Members of the department must agree to abide by these constructs, and department leaders must be willing to censure those who do not follow them. An important part of making these conduct norms real is gaining open commitment by all department members that they will abide by them. This may entail public commitment in departmental meetings and the signing of a document where the norms of conduct are described.

One challenge rule that has shown promise as a mechanism to resolve disagreements is a set of escalating challenges which, if they do not resolve the differences, lead to collaboration with others. One set is to use the words, curious, concerned, challenge, collaborate. If a team member is troubled by a course of action taken by another team member, he or she might say, “I’m curious why you’ve chosen this particular course of action.” In departments where the challenge rules are understood, the recipient might realize that the team member addressing them has started a challenge process. If the response does not satisfy the team member’s curiosity, he or she might next say, “I’m concerned about the course of action we’re taking.” This ups the ante in the challenge, and the recipient should now clearly appreciate that a negotiation needs to occur if a further challenge is to be avoided. If the response does not alleviate the concern, the team member may move up to the third level of challenge and say, “I’m not comfortable with this course of action and I feel I have to challenge it.” If circumstances permit, this challenge should lead to a set of prescribed actions, the primary one being involving a third party who has the expertise or objectivity to help resolve the difference of opinion. It may be necessary to identify who these arbiters are, although in some groups it may be adequate that any other member of the team be called on to help.

The department would have to agree on a mechanism to help the two team members resolve their differences should an arbiter be unavailable. In some, hopefully infrequent, situations, a decision needs to be made rapidly or no third person is available, for example during middle-of-the-night emergency procedures. In that case, hierarchy or accountability for the patient may have to be the deciding factor, although departments might experiment with other, better solutions (a senior person is assigned responsibility for clinical and challenge situations, with the clear understanding that the threshold for calling is to be set at a very low level).

No solution takes into account every situation, but a formal and clear set of conduct norms pertaining to conflict resolution is essential to ensure that the inevitable deviation of behavior from norms that is intrinsic in each of us as a characteristic of humanness is managed effectively.

LEADERS ENGAGED IN SAFETY AND RELIABILITY THROUGH THE USE OF DATA

The components of reliability and team practice that support safe care require leadership engagement before implementation; all leaders must understand the concepts well enough to explain them to others—concepts they believe are important enough to make them foundational to further action.

Presuming that there is agreement to move forward, education and practice are necessary if safety is to flourish; without ongoing effort, including practice, measurement, and continuous learning, the practices described in this article are likely to extinguish—even in those departments that perceive them to be of intrinsic value. They consume some time and require a continuously different paradigm than is current in health care today and a kind of reflection that many individuals avoid.
for many complex reasons. Team excellence requires organizational and individual concentration.

A powerful measure that, if used wisely, leaders will find essential is the measurement of safety culture within an operating room, hospital, or healthcare system. Evaluation of provider attitudes toward safety, teamwork, management, and improvement offer a valuable perspective on the strengths and weaknesses of specific clinical care areas and the relationships between care providers. Further, if they can not be measured, how can they be managed? The Safety Attitudes Questionnaire is one widely used and validated instrument that has been used in more than 2000 hospitals. Hospitals can measure safety culture at a clinical unit level and then map these units and compare them with specific high-risk clinical areas: obstetrics, surgery, critical care, emergency medicine, oncology, and areas identified by claims and injury within the hospital from their own data. Interventions in each clinical unit then can be chosen to strengthen specific weaknesses and safety culture tracked over time, in combination with other operational or outcome measures, to follow improvement. Between safety culture and direct observation, another measurement tool becoming increasingly well understood, organizations now have powerful tools to engage clinical teams in constructive dialog about their strengths in and barriers to delivering optimal care. Feeding back this information is a powerful driver to help improve team cultures over time. The development of Web-based platforms to allow easy safety culture data entry, analysis, and report generation is an active area of interest and research. In the coming years, health care and health care culture, like every other sector, will become ever more illuminated by metrics.

**HEALTH LITERACY**

Health literacy is the ability of patients and their families to understand the process and goals of their medical care. Awareness and consistent approaches to this issue can have a huge impact on the quality and safety of clinical care. Large numbers of patients are at risk. There are five levels of health literacy. Virtually all the readers of this article are level 5—quite literate. Approximately 20% of the American population is level 1, which means they have a difficult time reading the headlines of a newspaper. Many others are level 2, which means they have difficulty reading a bar graph, interpreting a bus schedule, or understanding a pie chart on the front page of USA Today. In major metropolitan United States markets, 40% to 70% of the population is literacy level 2 or below. They are seriously at risk for having lower health status and increased costs.

There are some simple tools that are effective and available through the American Medical Association. The first technique is Ask Me 3, which means that every patient and their family members should leave a medical encounter with knowledge of three key aspects of their care: What is my basic medical or surgical problem? Why is it important I know this? and What needs to happen for me to get better? The second technique is called a teach-back. Instead of asking, “Do you know what we talked about?” and having them politely nod their heads if they understand or not (and often they do not), we now ask, “You’ve heard us talk about this; please take a moment and tell me how you’ll explain this to your family.” This closed-loop technique greatly increases the chances that patients and their families actually do understand the process and goals of their medical care. This is impressively low-hanging fruit in the quest to improving medical care. Gail Nielsen and her colleagues at Iowa Health System have done probably the most comprehensive implementation program on health literacy. They have systematic training for all their clinical staff, during which patients who have had literacy issues share their stories with clinical staff.

**DISCLOSING UNANTICIPATED ADVERSE EVENTS/JUST CULTURE**

An ethical environment and one that is considered just and fair also must include the ability to have honest, open conversations with patients and their families in the aftermath of an adverse event. Most doctors, nurses, and hospital leaders traditionally have had little or no formal training in having these difficult conversations at times that are major life experiences for vulnerable patients in the aftermath of harm. There is an increasing body of evidence that having the capability of skilled individuals to facilitate open, honest conversations in the aftermath of an adverse event not only provides much better care but also greatly reduces the risk for lawsuits.

COPIC, the largest malpractice carrier in Colorado, has had an early intervention program for the past several years through which physicians are incentivized by premium reductions to report within 24 hours any adverse event or negative patient interaction. COPIC then uses skilled personnel to reach out directly to patients and their families to see how they can help support and, when feasible, resolve the situation. These personnel are trained to be supportive, to ensure that the patients believe they have a straightforward ally to
work with and that they will not be abandoned by their health care provider as a result of the disagreement or mishap. If patients want an attorney, they have to drop out of the program. They have resolved more than 3000 cases, writing a check to one in four patients for an average of approximately $5000. Only seven patients have dropped out and retained lawyers; two have filed suits. \textsuperscript{56}

Kaiser Permanente has a national ombudsman mediator program adopted from the National Naval Medical Center in Bethesda, Maryland. There are trained ombudsman mediators in almost all Kaiser hospitals whose job is to take care of clinicians, patients, and their family members in the aftermath of an adverse outcome. These individuals report directly to the CEO in each hospital, and centrally to Kaiser Risk Management, to ensure clarity of reporting and minimize the likelihood that their actions will be influenced by the priorities of hospital departments. Their goal is to be an impartial advocate so that parties involved can engage in a productive dialog that helps resolve the issues. This program has been well received by all parties, and early indications are that it probably helps reduce claims.

**SUMMARY**

For many reasons, health care overall has been slow to adopt the reliability engineering well known for decades to other industries. National health care systems have their own reasons and in each and every one there are confounding factors that blind leadership and physicians to many of the threads listed. In the United States, the primary problem is in the methods of reimbursement because payment has been unrelated to quality or safety. \textsuperscript{57}

Although prescient and leading-edge health systems are moving forward, there are many pockets of resistance and significant parts of the United States health system have not started down this path, but the general trend is likely to favor those who adapt to the new paradigm—because outcomes are now measurable, benchmarking increasingly is associated with pay for performance, and increasingly well-coordinated consumerism favors well-organized and forward thinking groups.

In summary, comprehensive patient safety and quality solutions share fundamental principles. They tend to require a holistic framework that is part of a core strategy, a carefully constructed structural framework that matches the strategic goals, and where execution occurs at a variety of levels.

First, changing the culture of patient safety through leadership engagement and team training ensures that people across hospitals and health care systems are more likely to achieve the goals required for safe and reliable care. The success of technology implementation is equally dependent on effective leadership engagement and teamwork, and, if well implemented, these efforts go further than improving safety and technology; they mitigate clinical, operational, and financial risk by improving organizational ability to makes all types of needed changes.

Second, healthy patient safety solutions should be measurable, unit specific, dynamic, and risk adjusted. Cultural assessment, measures obtained through direct observation, and actions tracked as a component of learning to action cycles all aid in assessing patient safety milieu.

Third, all our work is for patients and should be patient focused. Patients must be considered team members and, to ensure comprehension of their clinical problems, health literacy concepts applied. At the same time, they are our patients—which requires effective disclosure policies be used to support them and clinicians when care goes wrong.

Fourth, the ideal approach in managing cost-effective safety programs is to deliver the best in clinical practice and scientific rigor in a manner that scales across large organizations and networks. The only way to ensure ongoing improvement is knowing how to spread change in a standardized manner where providers, through cycles of learning, can speak up about their insights and concerns and see actions generated as a result. A just culture increases the likelihood that individuals will speak up.

And, fifth, because changing culture demands judgment and takes time, programs that draw on leading clinical expertise and sustainable operational modeling are likely to deliver safe and reliable care—especially when flourishing under the disciplines of ongoing assessment, action, and accountability.

Increasingly, precise invasive treatments performed as part of prescriptive protocols achieve, when performed well, targeted and reliable results. This trend ensures increasing operating room complexity. A culture of reliability is not optional, it is essential, and today we have the knowledge to achieve it.

**REFERENCES**

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