

## The Evolution of Patient Safety in Surgery

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### Perspective

In 1979, 20 years before the Institute of Medicine's *To Err Is Human* report (1) catalyzed the creation of the patient safety field, University of Pennsylvania sociologist Charles Bosk published a book entitled *Forgive and Remember: Managing Medical Failure*.(2) The book, which became a classic, was based on 18 months of ethnographic observations and interviews with surgeons and their trainees at an unnamed academic medical center.

Describing a macho and unforgiving culture, one in which the notion of a systems approach to errors was largely unknown, Bosk ushered readers into the secret world of surgery. His description of one Morbidity and Mortality (M&M) conference captures the zeitgeist. After the case of a Mr. Will was presented, Bosk wrote that Dr. Arthur, the surgery attending, "sprang from his chair." The attending then gravely addressed the assembled surgical attendings and residents:

*I think that this case represents all the things that are wrong with the hierarchy of a teaching hospital.... The first in the comedy of errors made on this man was made by the medical service. The decision by them not to dilate his abdomen was tantamount to gross neglect.... I'm now going to turn to the errors we made in treating this man. First, I made a fundamental error this early in the training year in allowing the chief resident to operate solo in this emergency. We should have learned from experience never to do this.... The [other] guilty party is the chief resident involved. By not calling for help when he ran into trouble, the resident took undue risk with the patient's life.... In this case, we have clearly committed surgical immorality.*

Viewed against today's sensibilities, Dr. Arthur comes off as blunt and authoritative, a typical "surgical personality," more General Patton than Lucian Leape. His [root cause analysis](#) (though the term was not used in health care at that time) is an example of the kind of finger pointing that our modern safety movement eschews.

In fact, judged against modern patient safety standards, it is easy to reject Dr. Arthur's approach as anachronistic, even counterproductive. However, it is worth appreciating some of its virtues. First, he is as hard on himself as on others, a nice example of personal accountability. Second, while his focus is on the acts of individuals (particularly his own and those of the surgical chief resident), we now can appreciate that he is also arguing for system changes. Unfortunately, in 1979, the surgical field did not have access to today's terminology, nor to many of our effective tools and approaches.

For example, take the question of when residents should be able to operate independently. Today, this question would be viewed through the lens of competency assessment, accompanied by a discussion of milestones and Entrustable Professional Activities (EPAs).<sup>(3)</sup> The minimalist trainee accreditation environment of 1979 has been replaced by a far more rigorous set of standards, one that demands training programs demonstrate a culture of safety, an appropriate service-to-education ratio, and appropriate availability of, and oversight by, attending physicians.

Similarly, the chief resident's failure to call for help would not be automatically viewed as an individual defect. Rather, it would lead to a hard look at the program's culture and structure.<sup>(4)</sup> Within a strong safety culture and structure, trainees (and others) should understand that calling for help when one is in over one's head is a strength, not a weakness. Attendings should accept such calls with gratitude, rather than with words and body language that implicitly or explicitly criticize the caller for admitting his or her limitations. The attending back-up schedule should be appropriately staffed and accessible to everyone.

In the [accompanying interview](#) this month, surgeon and health services researcher Karl Bilimoria discusses advances in surgical safety, including improvements in the kind of hierarchy and culture that compromised the care of Mr. Will. Just the fact that leaders like Bilimoria are looking at surgical safety and quality with rigor, blending qualitative observations pioneered by Bosk with new methods of data collection and analysis (e.g., registry data, electronic health record data, video analysis) is evidence of significant progress. The surgical field has embraced the implementation of a variety of safety-related tools—including checklists and time-outs—that have been associated with improved outcomes.<sup>(5)</sup> An increased awareness of the importance of teamwork has, in some institutions, led to the implementation of team training and simulation programs, some of which have also been associated with improved outcomes.<sup>(6,7)</sup> Bilimoria and his team also led a national study to bring evidence to bear on the controversial issue of residency duty hours. The resulting FIRST trial, discussed by Bilimoria in another recent [PSNet interview](#), is a wonderful example of using evidence to determine how best to structure system changes.<sup>(8)</sup>

Improvements in the processes and culture in the operating room (OR) have been accompanied by an increased awareness that surgical outcomes are often determined by events outside the OR, including whether a patient has received appropriate prophylaxis against surgical site infections or deep venous thrombosis, and whether a hospital has implemented systems to prevent [failure to rescue](#) when things go wrong. And, of course, some of the gains in surgical outcomes can be traced to major improvements in anesthesia safety.<sup>(9)</sup>

Even with all of this progress, there is room for further improvement. Just as [diagnostic errors](#) have, until recently, been a relatively neglected part of the patient safety field, so too has surgical decision-making—particularly the often complex decision regarding *whether* to operate. A perfectly executed but

inappropriate operation is still an example of preventable harm.

Moreover, the use of simulators, both for training and assessment, remains sporadic. Birkmeyer's landmark 2013 study, which showed that patient outcomes were tightly correlated with surgical technique (as judged by peer reviews of intraoperative videos) has led to much discussion in surgical circles but still relatively little action.<sup>(10)</sup> What should be done in the wake of these provocative results? In my judgment, we should consider assessing hand–eye coordination when students apply to surgical residencies, similar to assessments of aspiring commercial pilots and military aviators. Furthermore, emerging evidence supports the use of video recording and review of surgical procedures, akin to the black box review after aviation crashes and near misses.<sup>(11)</sup>

We should also develop and implement methods to promote ongoing assessment of procedural skills, along with easy access to peer coaching.<sup>(12)</sup> There should be consequences for surgeons who cannot meet a baseline standard of procedural competency. Procedural competency assessments should be part of maintenance of certification programs in procedural fields. Finally, in an era of transparency of meaningful safety and quality data, it is hard to argue against providing patients with validated data regarding procedural competency. Such data will prompt improvement and help patients make more informed choices about which surgeon to see.

None of these changes are easy, but we will need to make these kinds of choices to take surgical safety to the next level. Surgery has always had the two most important ingredients for any safety program: an intense commitment to excellence and a powerful sense of accountability. Over the past 20 years, these personal strengths have been augmented by meaningful system and culture changes that have led to improvements in surgical outcomes. Continued progress will require that some of the harder questions—particularly those that involve clinician decision-making and procedural competency—be addressed in equally innovative ways.

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