

## Chapter 15

# Just Do It: The Surgical Checklist



For the second Global Patient Safety Challenge, the WHO chose making surgery safer. My involvement was minor. One day, a year or so after the hand hygiene program started, I received a call from Pauline Kelly, my friend from the Reporting Guidelines project. The World Alliance leaders had decided to do a Patient Safety Challenge on a surgical topic. This made good sense, since surgical mishaps were well recognized as a major cause of mortality worldwide. Nearly half of all AEs discovered in the Medical Practice Study were related to a surgical operation. She asked me if I thought Atul Gawande would be willing to lead it.

My immediate reaction was that it was unlikely. By then, by virtue of his insightful New Yorker articles and his first highly successful books *Complications* and *Better*, Atul was already a celebrity and very much in demand. In addition, he was establishing a center for patient safety research and still practicing surgery. He was a very busy man. But, no harm in asking him, I said. If he would do it, it would be a very successful project.

The topic, safe surgery, was certainly an appropriate global public health problem. Nearly 300 million surgical operations are performed annually around the world. In industrialized countries the rate of major complications has been estimated at 3–16% of surgical procedures, with a death rate of 0.4–0.8% [1, 2].

Studies in developing countries suggest a much higher death rate of 5–10%. This translates to an estimate that 7 million surgical patients

suffer significant complications each year and 1 million die. Approximately half of these appear to be avoidable [1]. Surgical mortality is 10–100 times higher than maternal mortality from childbirth.

A week or so after my phone call from the WHO, Atul walked into my office. “WHO wants me to do a Global Patient Safety Challenge on a surgical problem. What do you think?” (This is encouraging, I thought: he is willing to consider it!) Well, I said, recalling the reporting guidelines experience, the WHO is very bureaucratic, so working with them can be frustrating at times. On the other hand, they are serious about safety, and if you succeeded in developing an effective intervention it could improve the care of millions of patients around the globe. If you can put up with the grief, you could make an important contribution. He said he would think it over.

To WHO’s and my delight, and the world’s benefit, Atul decided to take it on. In January 2007, the Safe Surgery Saves Lives initiative began. Atul assembled a team that compiled a background document of safety practices with known benefits to surgical patients. The document established targets for improvement and the specific practices necessary to achieve these targets [3].

An international group of nearly 100 experts was then convened to review the background document and suggest additional topics to be considered. This group included surgeons, anesthesiologists, nurses,



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patients, experts in infectious disease, engineers, and organizational leaders who represented the range of practice environments around the world, from primitive developing countries, such as Ghana and Mongolia, to Western democracies, such as New Zealand and the USA.

They identified four areas of potential improvement in surgical safety: surgical site infection prevention, safe anesthesia, safe surgical teams, and measurement of surgical services. They decided to implement a surgical checklist.

The idea of using a checklist to reduce harm was not new. Commercial aviation had used them for years, and Peter Pronovost had recently brought the term to national attention with his pathbreaking work eliminating central line infections [4]. Nor was the concept of a surgical checklist unprecedented. It had been tried with some success at Columbus Children's Hospital, the University of Toronto, Johns Hopkins, and by Kaiser hospitals in southern California [5] and in Australia [6].

The checklist built on another idea that was catching on in the USA to avoid wrong-site and wrong-patient errors: a "time out" at beginning of an operation. In 2004, the Joint Commission launched its Universal Protocol for Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery. It comprised three sets of steps: preoperative verifications, marking the operative site, and a "time out" immediately before the operation.

As the Safe Surgery Saves Lives checklist was developed, each potential step was carefully considered by the international group, and each draft checklist was subjected to a trial by a clinical team. Issues with logistics, timing, and team interactions were worked out, and confusing language was clarified. It was then trialled in a variety of other settings.

Expert working groups were also created to review the available scientific evidence and write a supporting document, *Guidelines for Safe Surgery*, which the WHO issued in 2009 [7]. It focused on critical steps that should be universally followed, such as making sure it is the right patient, having blood available if needed, and briefing the team. And, consistent with the WHO mandate, these were practices that could be implemented in any operating room regardless of the sophistication of the environment.

It's not that simple, of course. The "checklist" they devised is a series of steps to be taken at three critical junctures in care: before anesthesia is administered, immediately before incision, and before the patient is taken out of the operating room. Success at implementing these steps depends on full participation of every member of the team, especially the surgeon.

Before induction of anesthesia, members of the team orally confirm the surgical site and procedure and that the patient has verified his or her identity and has given consent. The team confirms that the surgical site is marked, the pulse oximeter is on, and that all members of the team are aware of the patient's allergies. If there is a risk of blood loss of 500 ml or more, appropriate access and fluids are available.

Before skin incision, the entire team (nurses, surgeons, anesthesia professionals, and all others participating in the care of the patient) orally confirms that all team members have been introduced by name and role and reconfirms the patient's identity, surgical site, and procedure. The surgeon reviews critical and unexpected steps, operative duration, and anticipated blood loss. The anesthesia staff reviews concerns specific to the patient and confirms that prophylactic antibiotics have been administered if indicated. The nursing staff reviews confirmation of sterility, equipment availability, and other concerns. The team confirms that all essential imaging results for the correct patient are displayed in the operating room.

Finally, in the third stage, before the patient leaves the operating room, the nurse reviews aloud with the team the name of the procedure; that the needle, sponge, and instrument counts are complete; that any specimen is correctly labeled; and whether there are any issues with equipment to be addressed. The surgeon, nurse, and anesthesiologist review aloud the key concerns for the recovery and care of the patient.

The use of the checklist was tested in eight hospitals in eight cities (Toronto, Canada; New Delhi, India; Amman, Jordan; Auckland, New Zealand; Manila, Philippines; Ifakara, Tanzania; London, England; and Seattle, WA) chosen to represent a range of economic circumstances and diverse populations. Data was collected from 3733 patients before and 3955 patients after the implementation of the checklist [8].

The results showed that the rate of any complication at all sites dropped by 36%, from 11.0% at baseline to 7.0% after

introduction of the checklist; the total in-hospital mortality dropped 47%, from 1.5% to 0.8%. The overall rates of surgical-site infection and unplanned reoperation also declined significantly. Interestingly, ensuring the correct identity of the patient and site through preoperative site marking and oral confirmation was new to most of the study hospitals.

The results made headlines. To the average person it just made sense. Of course, you would want to be sure you were operating on the right person and doing the right operation. Of course, you would introduce yourself to all the members of the team. If use of the checklist can reduce surgical mortality by 47%, then why wouldn't all hospitals start using it immediately?

The WHO agreed. On January 14, 2009, the checklist was made public, and the WHO launched the *Second Global Patient Safety Challenge: Safe Surgery Saves Lives* with the aim of persuading hospitals everywhere to adopt the checklist. Its use was mandated or strongly encouraged by several governments, including those of the UK and the Netherlands [9]. By the end of 2009, the surgical checklist was being used in 10% of American hospitals and over 2000 hospitals worldwide [5]. In 2017, the WHO reported that the checklist was being used by a majority of surgical service providers around the world [10].

Reports appeared documenting the results of implementing the checklist. There were some impressive successes [11–15]. The Veterans Health Administration provided extensive training and staged implementation and demonstrated an 18% decrease in mortality after 1 year [12]. In the Netherlands, six high-performing hospitals showed reductions of 39% in complications and 48% in mortality [11]. In the UK, results were mixed, but generally positive [16]. A 2013 meta-analysis of seven controlled studies of checklist implementation showed a 41% reduction in complications and a 23% decrease in mortality [17].

But some studies showed little or no effect. Strangely, the point of some reports seemed to be to prove that it was a bad idea [18]. Compliance was a problem everywhere, especially by surgeons. Use of the checklist was not turning out to have the impact that the initial study indicated was possible.

The reasons were not obscure. Implementing the surgical checklist is not nearly as simple as it seems on the surface. The issue is not the

technical challenge of getting people to tick off boxes on a list, but the social challenge of changing human behavior [9]. And the checklist represented a major change in how everyone in the operating room functioned. The successful implementation by Peter Pronovost of a checklist to prevent CLABSI was far simpler. It dealt with a single established procedure and far fewer participants, but even doing that was difficult [19].

As quality improvement specialists know, the crucial element in implementing a new safe practice is teamwork. All stakeholders have to be involved in the process change for it to work. Unfortunately, this was still a relatively foreign concept among physicians, especially surgeons, whose definition of a good team was often having assistants who knew what to do and did what they were told to do.

Getting people to be good team players has been the biggest challenge for improving patient safety overall. The surgical checklist put that idea front and center. Successful hospitals implemented it in the way it was intended: as a set of reminders carried out by a team that worked together to prevent errors. They had the will to succeed and leadership at the top and at the team level.

In a 2015 retrospective analysis, Haynes et al. noted several other elements that were crucial to success [20]. First, the checklist must be modified by the local team to meet its needs. Although the authors stressed this in the initial report, it was typically ignored by teams that failed. They didn't make it *their* checklist. They didn't take ownership of the checklist. As a result, they felt that it was something they *had* to do, not something they *wanted* to do.

Second, because the changes called for are extensive, implementation of a checklist should be started on a small scale to work out remaining kinks in the process. This pilot process also uncovers "champions," the respected local surgeons who are key to success of the full rollout.

Third, training sessions are required for all participants to enable them to understand and become comfortable with the new ways. Successful programs typically devoted months to training prior to beginning the implementation. Fourth, the implementation team regularly observed the use of the checklist in practice and provided and received feedback from the clinicians [20].

Most hospitals need help to implement the checklist. They lack the resources and expertise to lead the effort and build teams. As shown

by the experience with the Massachusetts Coalition implementation of reconciling medications and communicating critical test results (see Chap. 8) and Peter Pronovost's work implementing a checklist to eliminate central line infections, statewide or system-wide collaboratives are effective ways to provide local teams with direction, coaching, and the opportunity to learn from each other [9].

The barriers to implementation of the checklist—the causes of failure—are largely social. The most common has been resistance by surgeons who were loath to give up their hallowed role as “captain of the ship.” Most thought they already had a good team and were not keen about involving others. Some felt that use of memory aids is an admission of weakness or lack of skill or knowledge, others that standardization is a limit to their clinical judgment [21]. Some gave dismissive answers to queries and complained that the process delayed the operation (although the checklist can be completed in 2 minutes); some just refused to participate [22].

Self-introductions were awkward for surgeons, and for other members of the surgical team, as was speaking up. In a system with a long tradition of steep interpersonal hierarchy, it was contrary to their concepts of their roles and what they had been taught. So, when surgeons pushed back, few resisted. Some had a fear of legal responsibility if a complication occurred after they had signed a form. But the biggest change required was in the surgeon's behavior.

A year or two after the checklist was in use, I asked Atul how it was going. He was pleased with the national uptake, he said, although he was concerned that in too many operating rooms surgeons still weren't on board. Too often it was left to the nurse to check the boxes, just one more thing they were required to do.

“Do you know what part of the checklist surgeons find hardest to do?” he said. “Asking all the member of the team to introduce themselves.” This step is crucial to the fundamental point of the checklist: converting the many participants in the operating room into a team that worked well together, supported one another, and in which each individual felt personal responsibility for the patient and making sure everything went right.

I was not surprised. In my 27-year surgical career, I had never done that. Nor had any other surgeon I knew. I thought I had a great team: my scrub nurse and circulating nurse had been with me for years, and we worked well together and enjoyed each other. Our several

pediatric anesthesiologists were good friends of mine, and we worked well together with few conflicts. But I never paid any attention to those other people in the operating room who were assisting the nurses or anesthesiologists, running for blood, getting more instruments, etc.

The idea of involving them in the operation, much less expecting others to take responsibility for my doing the right operation on the right patient, never occurred to me, nor to any of my colleagues. If the idea had come up, we would have rejected it. We were, after all, the “captain of the ship,” and it was everyone else’s job to do our bidding.

For example, over my years as a pediatric surgeon I performed hundreds of inguinal hernia repairs in children. I was sure that one day I would operate on the wrong side. I really worried about that. It never occurred to me to share that worry with others of the team or ask them to help me make sure it didn’t happen. It never did happen, but that was just good luck.

The surgical checklist changed all of that. If the team took it seriously, if they could indeed function as a team, then everything that takes place in the operating room is everyone’s responsibility. Clearly, having many eyes on the question of right patient, right operation, right site makes a difference. It takes a team to make care safe. The checklist is a tool that can make that happen.

## Conclusion

The surgical checklist story is in many ways the story of patient safety. It is built on a practice borrowed from other industries, notably aviation, where its effectiveness in preventing errors is well-established. It derives its power from its theoretical basis—the human factor principle of avoiding reliance on memory—and from its practical effect: reinforcing teamwork that is essential for safe practice. Thanks to the work of Gawande and others, it has been successfully adapted for use in health care. When used properly, as in the VA, the Netherlands, and Scotland, the surgical checklist is a powerful tool for reducing harm and mortality.

But using the surgical checklist properly has been an immense challenge. Requiring that it be used has not generally been a successful strategy. The system is too easily gamed. If the surgeon is not on

board, it is easy to go through the motions and have the nurse ensure that all the boxes are ticked. The larger point of the checklist—to encourage a conversation about important practices and empower all members of the team to take responsibility—is lost.

Teamwork is the heart of successful voluntary adoption of the surgical checklist. Developing meaningful teams is also arguably the most fundamental culture change needed overall to make health care safe. As noted in earlier chapters, major efforts in team training and reinforcement of teamwork in collaboratives have yielded impressive improvements, including the implementation of the surgical checklist, but we still have a long way to go. For now, the surgical checklist, like all of patient safety, is still a work in progress.

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