FROM THE EDITOR'S DESK

We All Use Checklists Now

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On April 5, 2018, many in the LGH community had the good fortune to hear famed surgeon and best-selling author Atul Gawande, M.D., initiate the Healthcare Scholar Lecture Series with a talk about improving performance in health care. Gawande is a relaxed, yet stimulating and informative speaker, adept at using narratives to dramatize his point that use of checklists improves the outcome of procedures. I encourage you to watch and listen to his entire talk online (the real substance starts midway), and especially the concluding Q&A with LGH President Jan Bergen, which broadens the discussion.[1]

Checklists, like recipes, assure that important steps aren't overlooked due to faulty memory or distraction. (As a surgical intern, I remember being told by my chief resident to write down all his instructions, because "a sharp pencil beats a good memory!") Checklists for medical procedures contain entries that may be simple, like hand-washing, or composite, like assuring that preoperative antibiotics consist of the right drug, in the right dose, at the right time.

One of Gawande's popular books that was distributed to attendees, *The Checklist Manifesto*,[2] provides a fuller discussion of lessons for health care derived from activities as diverse as building skyscrapers or flying airplanes. It explores the implications of a worldwide clinical study of the value of checklists based on experience first reported by patient safety expert Dr. Peter Provonost at Johns Hopkins University Hospital.

First, some background. In 2008 the World Health Organization (WHO) published guidelines identifying multiple recommended practices to ensure the safety of surgical patients worldwide. The Safe Surgery Saves Lives Study Group was developed to study whether adherence to those guidelines could be enhanced, and whether doing so would improve surgical outcomes. The group designed a 19-item surgical checklist that would be globally applicable, and assessed the result of introducing this checklist in eight pilot hospitals chosen from different WHO regions around the globe.[3] Completion of six safety measures (such as administering preoperative antibiotics within one hour before the incision) was assessed in almost 4,000 patients for several months after the checklist was introduced.

The results were clear. In rich and poor hospitals with diverse cultures, use of the checklists was *associated* with significantly better adherence to guidelines, fewer complications, and improved outcomes. Though the study created a stir when it was published in the *New England Journal of Medicine* in 2009,[3] it must be noted that the authors themselves used the phrase "associated with," not "caused," and they acknowledged the study's limitations. The study was not randomized, nor did it use contemporaneous controls, because the investigators felt it would not have been possible to randomly assign the use of checklists to specific operating rooms "without significant cross-contamination."

The control period for each hospital was a "preintervention period" of unspecified and apparently inconsistent length. Unfortunately, the relentless march of progress in medicine complicates analysis of any study that uses historical controls. Though the investigators kept the study to a duration of less than a year, they concluded that "further study is needed to determine the precise mechanism and durability of the effect [of checklists] in specific settings."

The main flaw in the study, however, is the natural tendency of people to perform better when they know they are being observed (the Hawthorne effect). The authors acknowledged that "the contribution of the Hawthorne effect is difficult to disentangle in this study. The checklist is orally performed by peers and is intentionally designed to create a collective awareness among surgical teams about whether safety processes are being completed."

The "collective awareness" created by the checklists, imposed on participants a comprehensive change in culture that heightened appreciation of protocols and standardized care, which has proven beneficial in

countless areas of medical practice.

I want to emphasize, however, that though there is uncertainty about the exact mechanism by which checklists improved outcomes in this particular study, I am a devotee of checklists. They improve outcomes even if their benefit doesn't come from the obvious mechanism of being a simple reminder, but rather from inducing a more complex cultural change that focuses attention on good practices, combined with the proven benefits of standardization of care.

Cardiac surgeons have used checklists since the dawn of our specialty. Long before medical checklists were given that name, cardiac surgery introduced a level of procedural complexity that defied the traditional culture of surgical practice.[4] The captain of the ship was replaced by the leader of a team. An open-heart operation required coordinating the surgeon's actions with those of the perfusionist operating the heart-lung machine (with its own complex protocol and checklist), and with the anesthesiologist, since all blood, drugs, anesthetic agents, and oygen went through the machine during the critical parts of the operation.

Cardiac surgery's "checklists" for preoperative and postoperative care consisted of printed orders, which were necessary at first because there were too many to remember. (It's remarkable to recall that when we initiated the open heart surgery program at LGH, it took considerable persuasion to substitute printed orders for the standard LGH order form in use then – handwritten orders on the left half of the page, doctor's notes and explanations on the right.)

Beyond serving as simple reminders, these orders were culturally different. They were not peremptory orders for nurses to carry out slavishly; their complexity required nurses to be informed partners with a broad range of skills, and the right to use those skills. When nurses interpreted orders that included protocols for managing blood sugar,[5] ventilator settings, urine output, etc., they had to use their judgment within prescribed parameters, rather than calling a physician for each adjustment and receiving a verbal order which they transcribed in the chart.

Yet, at that time LGH nurses were not permitted to interpret orders that were not specific, and there were certainly no nurse clinicians, nurse practitioners, or physician assistants. Indeed, the hospital by-laws had to be changed to permit the first nurse clinician to carry out specific procedures such as removing a chest tube.

But that is ancient history. Times have changed, and no one could imagine practicing medicine in a hospital environment now without standard protocols, PAs, nurse clinicians, etc.

In the context of checklists, however, perhaps the greatest change has been the advent of the electronic medical record. Like it or not, the EMR has revolutionized the entry of orders, which now often consist of checklists that must be confirmed or deleted, either individually or collectively. Ironically, though all physicians who use EMRs unavoidably use checklists, a computer isn't always convenient, and EMRs can even have a deleterious effect on adherence to protocols. In some situations, paper lists are being re-introduced to assure adherence to the checklists at inconvenient times.

Beneficial or not, EMRs will not become ubiquitous on a global scale for a very long time, if ever, because of their high cost. In less developed and less affluent countries, and whenever computers are inconvenient or inaccessible, conventional checklists will doubtless continue to be beneficial, because they standardize care, focus attention on best practices, and overcome the imperfections of human memory.

REFERENCES

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