Wrong-site surgery is all too common. Despite more than a decade of campaigns by major organizations to prevent such events, there are still reports of such mistakes. This article reviews the recent literature on surgical safety checklists and other tools designed to prevent wrong-site surgery and improve patient safety in the operating room. Emphasis is placed on how well institutions comply with these guidelines, the perceptions and attitudes of those who are asked to implement them, and their effectiveness. The literature shows that the implementation of such protocols has improved patient safety. In general, these efforts are viewed favorably by operating room personnel. However, the role of these checklists and other tools in reducing wrong-sided surgeries has not been proven. The goal of the health care profession should be to continue on the advances that have been made in implementing surgical checklists and preventing wrong-site surgery. Practitioners at the authors’ institution are continuously searching for ways to improve on the current protocols to prevent wrong-site surgeries. The authors recently employed a protocol in which surgical instruments are kept in the back of the room, away from the patient, until completion of the surgical time-out. This practice helps to ensure that team members are not distracted or preoccupied with setting up equipment during the time-out. This approach also helps to mitigate the hierarchal style in the operating room. [Orthopedics. 2016; 39(2):e307-e310.]

Wrong-site surgery is all too common. Despite more than a decade of campaigns by major organizations to prevent such events from occurring, there are still reports of such mistakes.¹ The Joint Commission, an independent organization that accredits and certifies more than 20,500 health care organizations and programs in the United States, developed a formal Sentinel Event Policy in 1996.²³ The goal of this policy was to help hospitals that experienced such an event to improve their safety and learn from their mistakes.³ With respect to wrong-site surgery, a sentinel event might include an invasive procedure on the wrong patient, a procedure at the wrong site, or the wrong procedure for the patient.³

In 1998, the American Academy of Orthopaedic Surgeons reported that orthopaedic surgeons have a 25% chance of performing a wrong-site surgery during their career.⁴ This led to the launch of the “Sign Your Site” campaign, advocating for orthopaedic surgeons to initial the surgical site before proceeding with surgery.⁴ The North American Spine Society followed in 2001 with the “SMaX” guidelines for signing, marking, and obtaining a radiograph of the appropriate spine segment.⁵

The Joint Commission developed the Universal Protocol in 2004. The Universal Protocol includes preoperative verification of the patient and the site, surgical...
site marking, and a time-out before any planned surgical procedure. The Joint Commission made the Universal Protocol mandatory for all accredited institutions within its oversight.

The World Health Organization (WHO), an authority within the United Nations that is responsible for providing leadership on global health matters, established the WHO Safe Surgery Checklist in 2008. This checklist was a product of the WHO Second Global Patient Safety Challenge “Safe Surgery Saves Lives” campaign. The checklist identifies 3 phases of an operation: (1) the “sign-in” phase, before the induction of anesthesia; (2) the “time-out” phase, before the surgical incision; and (3) the “sign-out” phase, before the patient leaves the operating room.

The Joint Commission reported that staff members also studied four literature on surgical safety checklists and other tools designed to prevent wrong-site surgery and improve patient safety in the operating room. The goal of this study was to determine the effect of these checklists in preventing wrong-site surgery and improving patient care. In addition, the authors sought to identify barriers to fulfilling this goal. Emphasis was placed on how well institutions comply with these guidelines, the perceptions and attitudes of those who are asked to implement them, and their effectiveness. Finally, the authors introduce their institution’s approach to preventing wrong-site surgery.

**Compliance**

Although some studies report a general trend toward improved implementation after initiation of a surgical checklist, compliance reported in other studies varied considerably. Furthermore, additional measures, such as periodic audits or monitoring, were necessary to maintain compliance. Kearns et al evaluated staff compliance after implementation of the WHO surgical checklist. They found that compliance with pre- and postoperative checklists was 61.2% and 67.6%, respectively, improving to 79.7% and 84.7% after 1 year. Helmiö et al also studied hospital compliance 1 year after implementation of the WHO surgical checklist. They found that the sign-in portion of the checklist was completed in 62.3% of cases, the time-out portion was completed in 61.1% of cases, and the sign-out portion was completed in 53.6% of cases. Although these studies looked at compliance over the course of a year, another area for future research is compliance over the course of a day. In the authors’ experience, the quality of the time-out worsened over the course of a busy day in the operating room, a phenomenon referred to as “time-out fatigue.”

No study that was reviewed reported a 100% compliance rate. Therefore, there must be identifiable factors that influence compliance. Vats et al reviewed their experience in piloting the WHO surgical checklist and found many examples of improper use, including noncompletion of checklists, hurried implementation of checklists because of pressure from surgeons and/or anesthesiologists, dismissive replies to checklist questions that typically went unchallenged, and completion of the checklist without key people being present. They identified 5 barriers and challenges to implementation of the checklist: (1) unfamiliarity with the checklist and embarrassment about its use; (2) the hierarchal style in the operating room, which was particularly an issue when the nurse in charge of running the checklist was timid and/or the surgeon or anesthesiologist was unsupportive; (3) problems with timing of the time-out portion because certain processes, such as identifying the patient, were difficult to perform after the patient had been draped; (4) duplication or repetition of items on the checklist, which was sometimes considered “wasting time”; and (5) inclusion of items on the checklist that were not relevant to certain surgical specialties in an effort to make the list all-inclusive.

**Perceptions and Attitudes**

To successfully implement a protocol, it is important to have the support of the people who are expected to carry it out. The literature showed that, although there was an overall positive perception of the surgical safety checklist, some key team members limited its successful implementation. In particular, some surgeons were not enthusiastic about the implementation of surgical checklists in the operating room. However, anesthesiologists and nurses were largely supportive of surgical checklists and believed that these protocols were instrumental in increasing team communication and morale. Helmiö et al evaluated user opinions of the WHO surgical checklist in otolaryngology. Of the respondents, 76.0% agreed that the checklist improved operating room safety and 68.0% believed that it helped to prevent errors. Further, 93.0% reported that they would want the checklist to be used if they were having surgery. Conversely, some considered surgical checklists an inconvenience in emergency cases. Fourcade et al reported that staff members expressed concern that prompting patients for their names several times immediately before the induction of anesthesia might create unnecessary anxiety. However, this was not shown to be an issue in another study.
Effect on Improving Patient Safety

The effect of surgical safety checklists on patient safety measures has been reported in the literature. A recent meta-analysis found that the use of the WHO surgical safety checklist improves patient safety in the operating room by decreasing postoperative complications and mortality. The use of this checklist has also been shown to improve processes such as timely use of prophylactic antibiotics. Perhaps 1 way that these checklists improve patient safety is through their effect on team communication. One goal of the WHO surgical safety checklist is to improve patient safety by increasing team communication. This is an important consideration because most clinical errors and instances of wrong-site surgery result from a lack of communication among team members. The literature is consistent in reporting that, after their implementation, surgical safety checklists help to improve team communication and decrease communication failures.

Effect on Preventing Wrong-Site Surgery

In addition to improving patient safety, an important goal of using surgical safety checklists is to help to prevent human error that may result in wrong-sized surgery. However, it is difficult to determine whether efforts that are in place to prevent wrong-sized surgery are effective. The Joint Commission reported that the reporting of most sentinel events is voluntary and represents just a small proportion of actual events. Therefore, no conclusion can be drawn about the actual relative frequency of events or trends in events over time.

Some studies give insight into the effect of these checklists on preventing wrong-site surgery. Panesar et al showed that the use of a surgical safety checklist could have prevented 28 of 133 wrong-site surgeries. Although this finding gives support to the use of these checklists, it says little about whether surgical checklists prevent wrong-site surgeries. This is a difficult claim to study in practice. According to Treadwell et al, because wrong-site surgery is rare, showing a statistical reduction would require an unfeasibly large study. To the authors’ knowledge, there is no research knowledge that makes this assertion. Devine et al performed a systematic review and found no literature to support the ability of the Universal Protocol to decrease the rates of wrong-site and wrong-level surgery. Rather, the potential for surgical safety checklists to prevent wrong-site surgery is assumed, based on clinical expertise.

Other Considerations

Another factor that must be considered is site marking before surgery. Currently, in compliance with the Universal Protocol, all patients must have the operative site marked at or near the surgical site before they enter the operating room. Although this marking may be adequate in most cases, it does not eliminate instances in which the wrong procedure is performed at the correct site. This was well illustrated in a case in which carpal tunnel release was performed when the intended procedure was trigger finger release. Perhaps a better protocol would be to require the surgeon to mark out the surgical incision while the patient is still in the holding area. That practice would help to eliminate ambiguity about the operative site and also help to improve the patient’s expectations of the size and location of the surgical incision. This may be significant because many patients in 1 study were unaware when asked to identify the surgical site.

The Canadian Orthopaedic Association developed a program called “Operate through Your Initials” in which surgeons were advised to mark their initials over the intended incision. Although this system has been shown to be effective, it has limitations. For example, a surgeon may have difficulty marking out the planned incision or marking the incision site on a patient who has a cast or splint that covers the surgical site. It many cases, it would be painful to remove the splint before the patient is under anesthesia. In these cases, the operative site may be marked in the operating room after the induction of anesthesia.

Approach at One Institution

Practitioners at the authors’ institution are continuously searching for ways to improve on current protocols to prevent wrong-site surgeries. A recent protocol required surgical instruments to be kept in the back of the room, away from the patient, until completion of the surgical time-out. This practice helps to ensure that team members are not distracted or preoccupied with setting up equipment during the time-out. This approach also may help to mitigate the hierarchal style in the operating room, as described by Vats et al, and the reluctance of senior surgeons to support surgical checklists, as described by Helmiö et al. In these settings, the surgeon might grab the scalpel or injection during the time-out, making the surgical technician and the other operating room staff feel rushed. When the instruments are placed in the back of the room, this situation is much less likely to occur because the operative instruments are not within reach. The aviation industry takes a similar approach in which the engines of an airliner cannot be turned on before completion of the cockpit checklist. According to the National Transportation Safety Board, preflight checklists provide a means to remind crew members that all necessary items for a safe flight have been completed before takeoff. Similarly, the surgical checklist provides a means of reminding the operating staff that all necessary items for a safe surgical procedure have been completed.

Conclusion

Despite initiatives by major health organizations to improve surgical safety, there is still work to be done to ensure...
that events such as wrong-site surgery no longer occur. Implementation of such protocols has improved patient safety and, in general, is viewed favorably by operating room personnel. The role of these guidelines in preventing communication errors may help to reduce the incidence of wrong-sided surgeries, although this has not been proven. The health care industry should continue to improve on the advances that have been made regarding surgical checklists and preventing wrong-site surgery.

REFERENCES