Wrong site surgery—where are we and what is the next step?

Tyson K. Cobb

Published online: 21 March 2012
© American Association for Hand Surgery 2012

Abstract

Background Wrong site surgery is estimated to occur 40 times per week in hospitals and clinics in USA. The universal protocol was implemented by the joint commission board of commissioners to address wrong site, wrong procedure, and wrong person surgery.

Discussion The universal protocol has three principal components: preoperative verification, marking of the operative site, and a time-out. Despite this organized approach to this problem, current data do not demonstrate any progress. In fact some data suggest that the problem may be getting worse. It is apparent that a process relying on surgeon and surgical team memory is doomed to ultimate failure. Recommendations are made for a more in depth checklist process based on the recommendations of the World Health Organization, reports in the literature of known areas of weakness in the current process, and personal experience in hopes of establishing a more bullet proof system to avoid wrong site procedure.

Keywords Wrong site surgery · Universal protocol

The universal protocol to prevent wrong site, wrong procedure, and wrong person surgery was created by the Joint Commission Board of Commissioners to address the occurrence of these medical errors. The protocol became effective

July 1, 2004 for all accredited hospitals, ambulatory care, and office-based surgery facilities. The three principal components include a preoperative verification process, marking of the operative site, and a “time-out.”

The preoperative verification process seeks to address missing information or discrepancies before starting the procedure: the correct procedure, correct patient, and correct site. Relevant documentation includes history and physical, signed consent form, and a pre-anesthesia assessment. Diagnostic and radiologic test results as well as any required blood products, implants, devices, and special equipment needs are identified.

Before the procedure is performed, the surgical site is marked by a licensed independent practitioner who is ultimately accountable for the procedure and will be present when the procedure is performed. The mark should be unambiguous and used consistently throughout the organization. Marking the surgical site was not a new concept to the industry. The Canadian Orthopaedic Association initiated an “operate through your initials” campaign in 1994 [18], followed by a “sign your site” initiative by the American Academy of Orthopaedic Surgeons in 1998 [2].

A time-out is performed immediately before starting the invasive procedure or making an incision. All relevant members of the team actively communicate during the time-out that it is the correct patient, correct site, and correct procedure. Documentation that the time-out has been completed is performed prior to starting the procedure.

One would think that the universal protocol would have had a profound effect on wrong site surgery. However, a recent article in the *Washington Post* [3] stated that the patient safety experts say that the problem of wrong site surgery has not improved and may be getting worse. They

T. K. Cobb (✉)
Orthopaedic Specialists, PC,
3385 Dexter Court,
Davenport, IA 52807, USA
e-mail: tysoncobbmd@gmail.com

went on to say that based on state data, joint commission officials estimate that wrong site surgery occurs 40 times a week in hospitals and clinics in USA. While this figure sounds impossibly high, it is consistent with an estimate of 1,300 to 2,700 cases of wrong site procedures per year in USA by Seiden and Barach [16]. Mark Chassin, former New York State health commissioner and since 2008 president of the Joint Commission was quoted by the Post as saying, preventing wrong site surgery “turns out to be more complicated to eradicate than anybody thought.” The frustration with the lack of progress with this problem was echoed by Peter Pronovost, the medical director of Johns Hopkins Center for Innovation and Quality Patient Care, who stated, “It is disheartening that we have not moved the needle on this.”

Data from the Joint Commission reveal 531 cases for the 6-month period between January 1, 2011 and June 30, 2011 compared to 418 for the entire year of 2004. These data are based on voluntary reporting and may not reflect relative frequency of events or trends in events over time [17].

Orthopedic surgery has been reported to have the highest rates of wrong site surgery [15]. It has been speculated that orthopedic surgery has a higher incidence of wrong site surgery because it is a high-volume specialty with significant technical complexity in terms of equipment demands, staff training, and familiarity [15].

Meinberg and Stern conducted a survey of hand surgeons and found that 21 % of respondents reported performing at least one wrong site surgery [10]. Eighty percent of these wrong site surgeries involve the fingers. The authors noted that the true incidence of wrong site surgery could be higher than their reported findings since this was a voluntary survey and some surgeons may be unwilling to report events. Their findings, however, are very similar to a poll taken among neurosurgeons. Twenty-five percent of polled neurosurgeons reported making an incision on the wrong side of the head and 35 % reported wrong level lumbar surgery at some point in their career [8].

The root cause of wrong site surgery is multifactorial. Distraction has been cited as a key player in many events. The results of distraction from the staff are arguably higher in orthopedics and hand surgery because of the comparatively high demands relative to equipment and volume.

In comparison, pilots are required to complete multiple steps during the safe operation of aircraft. Omission of a single step can result in accidents and death. Checklists have been implemented in the airline industry in order to reduce the incidence of errors and accidents. The checklist approach assumes and accepts that humans working in a complex system inevitably make errors when attempting to carry out procedures by memory alone [13]. In the same way that a standardized checklist has reduced the incidence of accidents in the airline industry, a similar approach by the

World Health Organization (WHO) has been used successfully to reduce the incidence of wrong site surgery [5, 12]

This checklist is similar to our universal protocol [7]. It has three phases: sign-in, time-out, and sign-out. The “sign-in” is the preoperative verification process whereby all pertinent data are confirmed and includes surgical site marking. The second step time-out is similar to the time-out process defined by the Universal Protocol. The third stage “sign-out” is performed prior to removal of the drapes whereby verbal verification that all procedures have been performed, swab and instrument counts are correct, and postoperative management is outlined. This step has obvious benefits relative to the surgical outcome as well as ensuring that all procedures have been performed.

Where Has the Universal Protocol Failed?

With three distinct steps of the universal protocol to safeguard against wrong site surgery, how is the process failing? The first line of defense is the preoperative verification process. This process can easily be flawed by mistakes in the scheduling process, weeks or even months before the procedure. When the wrong procedure is scheduled, it should be caught during the verification process. The step is complicated by the fact that patients may not know exactly what procedure they are having performed. In fact, there are reports of wrong patient surgeries occurring because patients have answered to the incorrect name [6]. Incorrect information from patient and/or families was reported to be a factor in 17 reports of wrong site procedures in one study [4]. Scheduling mistakes could be identified by independent double checks such as cross checking with physician’s plans on the history and physical. However, this level of verification may not be required by institutional policy [1].

In the author’s experience, most institutions do not cross check the scheduled procedure with the surgeon’s history and physical and other preoperative notes. Likewise, preoperative studies such as X-rays and MRIs are not verified and double-checked by facility staff for the correct patient, site, and diagnosis. Wrong site procedures have been reported to be potentially avoided by verification against patient medical record information in 41 cases and by verification against surgeon office records in 33 cases in the same study. Nevertheless, it would appear that the level of verification currently required in USA lacks the detail and depth to truly make this step of the process foolproof.

Anatomic sites such as knees are subject to error with respect to right or left. The propensity for error and confusion is significantly greater for hand surgeons with respect to the digits where the question is not simply right versus left but rather which of the ten digits are involved. Some

hand surgeons have used numbering systems to identify each digit. This system is convenient and easy to note in the chart, but it can be confusing to patients and health care personnel who are not familiar with the system. While the surgeon may use a notation of five digits on each hand starting with the thumb, the patient and other health care personnel may consider the thumb separate from the four additional digits on each hand. The surgeon therefore considers the “third” the long finger; however, the patient may consider the third digit to be the ring finger. Therefore an un-ambiguous notation such as thumb, index, middle, ring, and small should be utilized to avoid confusion.

The second defense is surgical marking. However, preoperative skin preparation can erase the site mark, especially when chlorhexidine skin preparation solution that requires skin scrubbing is used [9]. Correct site markings have failed to prevent wrong site surgeries [4]. Because the markings often are erased by the prep, the team may assume that the mark has been removed with the surgical prep and fail to stop the procedure on the wrong extremity. In fact, 38 % of wrong site surgeries in Minnesota in 2010 were reported to have the correct site marked [11]. For years, at least in the author’s experience, the emphasis has been on marking the correct “side” not “site.” “Doctor, can you mark the ‘side’ so we can take the patient back?” The implication is right versus left. One study found that wrong side surgery only represented 56 % of the reported adverse events. Initials on the right hand narrow the field of interest to the right hand but not the correct procedure. While patient participation does not prevent confusion, patient participation could potentially enhance the process. Unfortunately, depending on the facility’s policy, the patient may or may not participate in this process.

Distraction has been cited as a primary factor leading to the breakdown of the universal protocol, especially at the third and final step of time-out. The time-out is the final verification step. During this step all other activities should be suspended such that the entire team focuses on and agrees with the stated facts of the patient and procedure. Nevertheless wrong site surgery continues to occur despite documented formal time-outs [4].

Surgical personnel work in a busy and stressful environment full of distractions. How frequently does the mind of the surgeon, assistant, and OR staff wander from the time-out? Mental awareness is further distracted by time-outs which may begin as we are busy gowning and gloving.

How Can We Do It Better?

The preoperative verification process should begin at the time of scheduling. The scheduled procedure should be checked by the surgical facility against the office notes

and confirmed with a phone call to the patient. Any conflicts should be resolved prior to proceeding with scheduling. If the scheduling process is performed months before the scheduled surgery, the process should be reverified with an update of office notes and patient confirmation. The verification process should be repeated the day of the surgery after patient arrival. The patient should be queried about any changes in their condition since scheduling. All preoperative records should be present and verified to be consistent with the scheduled procedure. Likewise, institutional policy should include verification of preoperative studies for the correct patient, site, and diagnosis. If the patient’s primary language is not English, an interpreter should be a mandatory part of the process. Having a health care provider who speaks the language does not necessarily avoid confusion among other team members who are not afforded the convenience of an interpreter to facilitate each step of the checklist process [14]. All conversations with non-English-speaking patients should be restated in English so that each member of the team is assured the completion of each step in the verification process.

Surgical sites should be marked by the surgeon who is ultimately responsible for the procedure. The patient should participate in this process by verbally agreeing with the procedure and site. Initials have been used to mark the site for years without eradication of wrong site surgery. Marking the site by drawing out the actual incision has several advantages and is the author’s preference. The patient has a much better understanding of what to expect. For arthroscopic cases, the author recommends marking out the portals, talking to the patient about possible accessory portals, and finally discussing the possibility of open incisions, should an open incision be required. This process makes for a more informed patient, lessens the chances of misunderstanding, and possibly improves patient satisfaction by setting expectations concerning the location and size of the incision as well as alternate procedures if intraoperative findings dictate a change in plans. Drawn out incisions also help clarify any potential misunderstandings with the surgical team. While any minimally invasive procedure can result in converting to an open procedure, portals marked out on the palm make it crystal clear to the entire team that the agreed intent is to perform an endoscopic carpal tunnel release and not an open carpal tunnel release. The most significant advantage of drawing the incision, rather than simply applying the surgeon’s initials, is that the surgeon is looking for the predetermined incision drawn out on the skin. Distraction may affect confirmation of the initials but not a mutually agreed-upon incision marking. The latter becomes not just part of the checklist or protocol but part of the actual procedure.

In the author’s experience, the time-out is often thrown in an obligatory fashion and frequently coexists with other

activities such as donning gloves and gown. The time-out should be like the invocation or national anthem. All other activities should stop and the entire team should focus on the stated facts of the procedure.

The sign-out phase as recommended by the WHO checklist should be performed prior to removing the drapes. This check confirms that all procedures have been performed and that sponge and needle counts are confirmed. If implants (prostheses, plates, screws, K-wires) have been placed, the type and number should be confirmed. If the goal of the procedure was to remove something (K-wires, screws, foreign bodies, bone, and “other”), the type and the number should be confirmed. This step avoids the embarrassing return to the operating room to do something that was forgotten. Often this may be a smaller comparatively insignificant procedure which is paired with a larger reconstruction. The latter, if difficult, may consume all of the team’s mental focus and energy while the lesser procedure is missed or forgotten. The author recommends doing the lesser procedure before the more mentally taxing procedure. Nevertheless, if forgotten, the sign-out phase of the checklist will serve as a reminder if any portion of the procedure has been forgotten.

Wrong site surgery and other medical errors and omissions can be devastating events for patients, surgeons, and facilities. While wrong site surgery has been deemed a “never event” meaning that it should never occur, the data show that this event continues to occur at an alarming rate. It is obvious that we work in a busy and stressful environment that precludes depending on memory alone to insure that there are no errors or omissions. The checklist has served the airline industry well for many years. However, the airline industry has more effectively implemented this policy. Pilots are taught to use this checklist system as part of their procedures in annual recurrent training exercises. The process is distinctly less organized and less strictly enforced in medical institution policy which continues to rely on surgeon and staff memory to avoid medical errors. Furthermore, the airline checklist is not called out by the flight attendant from a distance but rather is performed by the pilot. Just as pilot compliance with the checklist has successfully minimized errors in flight, so too we as surgeons must accept the process and make the designated cross-checks part of our procedures. Furthermore, current facility policies of many institutions lack the depth and detail to reliably stop medical errors and omissions in the operating room. Surgeons should encourage their institutions to implement these additional checks and cross-checks. Through a joint effort between surgeons, staff, and institutional policy, which should include all of the checks and counterchecks outlined above, we can and will significantly diminish the incidence of these devastating events.

References

1. Minnesota Department of Health. Adverse health events in Minnesota: 7th Annual Public Report, January 2011, can be accessed at <http://www.health.state.mn.us/patientsafety/ae/2011ahereport.pdf>
2. American Academy of Orthopaedic Surgeons. Advisory statement: wrong-side surgery. (American Academy of Orthopaedic Surgeon’s website). October 2003. Available at: www.aaos.org/about/papers/advistmt/1015.asp
3. Boodman SG. The pain of wrong site surgery. Washington Post June 20, 2011. http://www.washingtonpost.com/national/the-pain-of-wrong-site-surgery/2011/06/07/AGK3uLdH_story.html
4. Clarke JR, Johnson J, Fennelly ED. Getting surgery right. *Ann Surg.* 2007;246(3):395–405.
5. De Vries EN, Prins HA, Crolla RM, Den Outer AJ, et al. Effects of comprehensive surgical safety system on patient outcomes. *N Engl J Med.* 2010;363(20):1928–37.
6. Giles SJ, Rhodes P, Clements G, Cook GA, Hayton R, Maxwell MJ, Sheldon TA, Wright J. Experience of wrong-site surgery and surgical marking practices among clinicians in the UK. *Qual Saf Health Care.* 2006;15(5):363–8.
7. Haynes AB, Weiser TG, Berry WR, et al. A surgical safety checklist to reduce morbidity and mortality in a global population. *N Engl J Med.* 2009;360(5):491–9.
8. Jhawar BS, Mitsis D, Duggal N. Wrong-site and wrong-level neurosurgery: a national survey. *J Neuro Surg Spine.* 2007;7(5):467–72.
9. Mears SC, Davani AB, Belkoff SM. Does the type of skin marker prevent marking erasure of the surgical site markings. *Surgery: Open Access Journal of Plastic;* 2009. p. 342–6.
10. Meinberg EG, Stern PJ. Incidents of wrong-site surgery amount hand surgeons. *J Bone Joint Surg AM.* 2003;85:193–7.
11. Minnesota Patient Safety Alert June 22, 2010, Appendix F safety alert. Ceorole Minnesota Department of Health
12. Neily J, Mills PD, Young-Xu Y, Carney BT, West P, Berger DH, Mazzia LM, Baull DE, Bagian JP. Association between implementation of medical team training program and surgical mortality. *JAMA.* 2010;304(15):1693–700.
13. Panesar SS, Nobel JD, Mirza SB, et al. Can a surgical check list reduce the risk of wrong site surgery in orthopaedics? Can a check list help? Supporting evidence from analysis of a national patient incident reporting system. *J Orthopaedic Surg Related.* 2011;6:18.
14. Ring DC, Herndon JH, Mayer GS. Case 34-2010-65-year-old woman with an incorrect operation on the left hand. *N Engl J Med.* 2010;363:1950–7.
15. Robinson PM, Nuir LT. Wrong-site surgery in orthopaedics. *J Bone Joint Surg (BR).* 2009;91(10):1274–80.
16. Seiden SC, Barach P. Wrong-side/wrong-site, wrong-procedure and wrong-patient adverse events: are they preventable? *Arch Surg.* 2006;141(9):931–9.
17. The Joint Commission. Facts about the Universal Protocol. January 2011. <http://www.jointcommission.org/assets/1/18/Universal%20Protocol%201%204%20111.PDF>. Accessed December 6, 2011.
18. Wright PH, Burnaby BC. Committee on Orthopaedic Practice and Economics (COPE), position paper on wrong sided surgery in orthopaedics (Canadian Orthopaedic Association website). Available at: <http://www.coa-aco.org/library/health-policy/wrong-sided-surgery-in-orthopaedics.html>

A mentor and friend, William Pederson, MD, credits his father for this bit of wisdom. “Experience is a masterful teacher and a fool learns by no other.”