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Review

The WHO safer surgery checklist time out procedure revisited: Strategies to optimise compliance and safety

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ABSTRACT

It is human nature to make mistakes, all people in all works make errors, but an amputation of the wrong leg or an inadvertently retained needle in the abdominal cavity are unanticipated incidents, that no physician in the world wants to experience. Such catastrophic events, except for the consequences on the patient's health and the physician's career, have severe financial implications on the healthcare system. Human nature, apart from making mistakes, is also able to find solutions to minimize adverse incidents. A systematic time-out in the operating room just before incision has been introduced the last two decades to help prevent wrong site surgeries and other surgical never events. Despite its effectiveness in increasing patient safety, compliance issues remain a major problem in its implementation and gaps in its daily use still occur. The current review presents patterns of wrong time-out procedures, emphasizes the problem of poor compliance and reviews the suggested strategies to increase compliance for safer operating rooms.

1. Introduction

Health care is a complex system, driven mainly by people who interact with each other to produce the best possible patient outcomes. The operating room (OR) includes an important technology-based component, which, when combined with the human-based component, can result in errors. It is human nature to make mistakes; all people in all fields make errors, but an amputation of the wrong leg or an inadvertently retained needle in the abdominal cavity are unanticipated incidents that no physician wants to experience. Such catastrophic events, besides the consequences on the patient's health and the physician's career, have severe financial implications on the health-care system. Often, they enter the legal domain or end up in media headlines, amplifying the public's perception of an existing physicians' negligence and, finally, injuring the doctor-patient relationship.

Human nature, apart from making mistakes, is also able to minimize adverse incidents. Surgical events occur worldwide, but society's move towards patient safety during the last two decades has made central management solutions necessary. Professional organizations were founded, risk management approaches were introduced, and safety procedures were implemented to indirectly reduce events through a “learning from errors” process.

The Joint Commission (TJC) is the oldest and largest US standards-setting and accrediting body in health care. TJC has worked to help ensure correct site surgery, including by implementing the Universal Protocol in 2003. The Universal Protocol has three requirements, one of which is to perform a systematic time-out to refocus on the patient in the OR just before beginning a surgical procedure (i.e. just before incision). The WHO “Safe Surgery Checklist,” released for worldwide use in 2008, also contains a time-out procedure. Despite its effectiveness in increasing patient safety, compliance remains a major problem in its implementation, and gaps in its daily use still occur.

2. The correct time-out procedure

A time-out is the surgical team's short pause, just before incision, to confirm that they are about to perform the correct procedure on the correct body part of the correct patient [1]. A time-out requires a marked operative site, but should also be done if no site is marked [2]. Multiple procedures performed by separate surgical teams require distinct time-outs. Surgeons working in more than one OR should always be present during the time-out [3]. Any member of the surgical team can call a time-out; however, it is usually the circulating nurse's task [4] or the surgeon's [5]. The time-out should be accompanied by a sign-in

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briefing, performed preoperatively, and a sign-out briefing performed after skin closure but before the patient enters the post-anesthesia care unit.

For the time-out to be performed properly, every member of the surgical team should participate and guarantee the correct patient, procedure, and site [4]. A fully performed time-out also includes reviewing the surgeon, the patient's position, possible surgical items to be used/implanted, and medications/blood products to be delivered. Altpeter et al. define patient identification and verification of operative site as "core components of time-out." They distinguish this type of time-out from a customized expanded time-out, which contains additional information for prophylactic antibiotics, normothermia, euglycemia, b-adrenergic blockade, and venous thromboembolism [6].

The inclusion of the instrumentarium during the time-out makes the process a useful tool for reducing not only wrong site surgery but also retained surgical items. Time-out checklists to guarantee that everything that will be checked and will not be overlooked are available in many hospitals. The circulating nurse, with the patient's identification band in one hand and the informed consent in the other hand, carries out the time-out, without being interrupted with irrelevant information. If all members of the surgical team agree with all information the nurse announces, the operation can start. Any discrepancy found should alert the surgical team and be proofed and corrected before the operation proceeds [7]. This is also known as the "fail-safe" manner of conducting a time-out [4]. Expanded time-out versions can include team member introduction, safety statement by the time-out leader, review of critical imaging, laser use, if applicable, and pre-incision Surgical Care Improvement [8]. All time-out elements are shown in Fig. 1.

A time-out can be performed easily, does not require any specific qualification or educational courses, can be repeated as many times as necessary, and costs nothing. Its mean duration has been measured to be 36 s [9], leaving no room for excuses for its omission, with the argument that it is time-consuming. Team member introduction helps to promote team spirit during operation [10]. Finally, pre-OR time-outs have been shown to significantly increase the rate of on-time first surgical starts [11].

3. Patterns of incorrect time-out procedures

Although time-outs are simple, cost nothing except for time, and are easy to perform successfully, this is not always the case. Even if "the team time-out procedure itself is a personal, verbal operation and therefore cannot be performed half-heartedly as simple marked checks" [12], several patterns of incorrectly performed time-outs have been described [7]: (a) **Borderline.** Here there is a light discrepancy from what is called a normal or acceptable time-out. For example, the circulating nurse could perform the time-out without cross-checking the patient's identification band. However, the time-out does contain the most significant information. (b) **Related**. This pattern includes only verification of the patient's name and the operative site, but no information about the surgeon, position, and/or instrumentation/implants is given. It is similar to the borderline time-out, but in this case important elements are also omitted. (c) **Contrary**. The time-out is here only technically and passively performed (e.g. when the nurse asks "the patient is well-known to us, does everyone agree?"). It is called contrary because it is in contrast with the goal of a time-out, which is active systematic information proofing. (d) **Invented.** The invented time-out is similar to a contrary time-out, in that it is performed only to be recorded. Typical cases of invented time-outs are the ones called when no one pays attention. The process in this case is not seen as a chance to refocus to the patient but as a compulsory task to be done. (e) **Illegitimate**. This is the worst case. Here, the operation proceeds with no time-out at all.

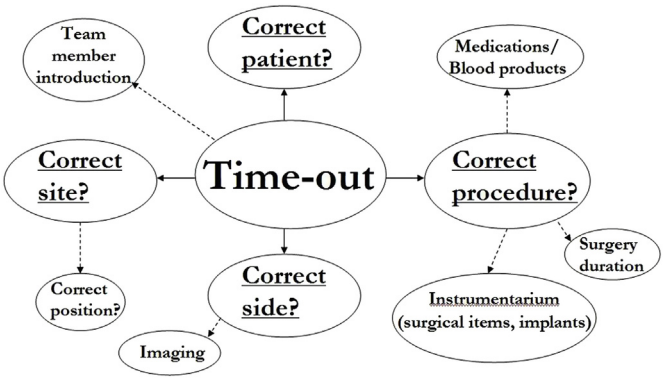

Fig. 1. Time-out elements.

4. The problem of poor compliance

The time-out process can avert a potential communication breakdown and, not unexpectedly, an unacceptable time-out process is almost always behind a never event. Time-out related issues are shown to be the most common root cause of adverse events, scoring above structural/human factors or equipment issues (second place) and lack of standardization of critical clinical processes (third place) [13].

The checklist promotes active cooperation and communication among team members [14]. However, a common problem with checklists is that their introduction in clinical practice often leads to the surgical staff's increased workload [15]. Almost all team members participate in the time-out more than half of the time [16]. However, time-out does not add to stress [17]. Surgeons have been identified as a barrier in implementing time-out checklists as they are focused on time and complain if too many details are added, which can affect the time-out process [16].

Compliance rates with the time-out process are valuable for use in identifying potential areas for improvement. In Norway, only 5% of surgical teams have been shown to be familiar with the Universal Protocol. Despite this fact, over 90% of staff agreed that a time-out protocol could prevent wrong site surgery and should therefore be implemented in the OR [18]. One Swiss study demonstrated correctly applied time-out sections in 96–100% of 72 on-site observations [5]. A multi-center Dutch study reported a mean compliance of 73% after analyzing 1232 surgical procedures in 16 hospitals. No linear compliance trend could be observed during the study period [19]. Forty-four percent of the time-outs were performed without the surgical team's attention, and 56% of them were performed with an incomplete team (see invented time-out above) [19]. In a German study, 41% of the time-outs were performed only between anesthetist and surgeon [20].

The most important reason for these low compliance rates seems to be the lack of awareness of the importance of the time-out procedure among health-care professionals and the staff's time pressure due to tight schedules [19]. Only 60% of participants have knowledge of the theoretical framework behind the WHO campaign, while 88% work with safety checklists [20]. Few participants feel they have to ask the duration of a surgery as they "know how long most surgeries last" [16]. OR staff feels more involved with improving patient safety, in comparison with the rest of the hospital staff (95% vs. 55%, respectively) [21]. Birnbach et al. interviewed 105 OR personnel to assess if surgical team members know the names of the individuals with whom they are working. The anesthesiology resident was shown to be the least well-known. The surgical staff expressed the belief that it is significantly more important to be known than to know others. The authors conclude that "OR personnel may consider introductions to be another bureaucratic hurdle instead of the safety check they were designed to be" and that "this first step of the time-out is often being performed perfunctorily" [22].

Compliance differs among hospital types, being lower in academic hospitals than in teaching hospitals. No relationship between time-out

compliance and hospital size could be found. On the contrary, there are differences among individual hospitals, possibly because of different organizational structures. Interestingly, a negative relationship between time-out compliance and patient's age has been established, particularly during verification of the surgical procedure [19]. The authors describe this result as unexpected, “since the time-out procedure should be executed in the same way for all patients” [19].

5. Strategies to increase compliance

Mount Carmel Health System (Ohio) has recognized the value of the time-out process and, under the guidance of TJC and the Association of Operative Registered Nurses (AORN), has developed a new tool to ensure its implementation in the OR. All instrument sets are equipped with sterilized metal plates bearing the word “Time-out” to remind of its necessity before incision [7]. Yoon et al. reported a significant reduction in improperly performed time-outs after educational interventions [23]. Leadership training and teamwork training have been identified as two avenues for future improvement [10]. Simulation-based learning programs have also been proposed as useful tools in improving the recognition of time-out protocol. Such programs also give the participants the opportunity to become proactive high-risk invasive procedures performed outside of operating room [24].

Another novel method of supporting the time-out procedure is to deliver the checklist via audio, which improves overall team involvement in time-out [25]. The time-out process can also be mediated electronically. This approach is feasible and inexpensive, but its effectiveness in preventing wrong site surgery remains to be proven [26].

A potential strategy recommended to increase the time-out effectiveness is to involve the patient in the process. The majority of patients express satisfaction regarding their participation in the surgical time-out process [27]. Active patient involvement, however, requires patient's awareness of the process's usefulness. Lee et al. questioned 60 patients who underwent operations after an extended time-out performed before anesthesia. Sixty-five percent could not remember the time-out at all, and 6% could recall it but were indifferent. Only 29% remembered the briefing and felt thereby reassured [21]. The authors interpret these results as indicating “that the pre-induction extended time-out did not cause patients to experience more anxiety” [21]. To aid the Universal Protocol's promotion and encourage patients to actively participate in decisions concerning their treatment, AORN launched an annual awareness campaign entitled “National ‘Time-out’ Day” in 2004 [1]. This action gained extensive media publicity, and since its inception has been held every year in June. In the future, more such campaigns, with emphasis on patient involvement in the decision process, should be introduced and greeted.

6. Conclusion

The time-out process remains a crucial element of the WHO checklist and should be performed correctly in order to avoid wrong site surgeries and other adverse events. Despite their benefits, time-outs still have low compliance rates, the most important reason for this being the lack of awareness of time-outs’ importance among health-care professionals. Several strategies, mainly educational, have been introduced to increase compliance.

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References

[1] B.L. Carney, Evolution of wrong site surgery prevention strategies, AORN J. 83 (2006) 1115–1122 https://doi.org/10.1016/s0001-2092(06)60121-x.
[2] D. Dunn, Surgical site verification: a through Z, J Perianesth Nurs 21 (2006) 317–331 https://doi.org/10.1016/j.jopan.2006.07.005.
[3] S.K. Banschbach, Revisiting the universal protocol, AORN J. 89 (2009) 257–259 https://doi.org/10.1016/j.aorn.2009.01.001.
[4] N.M. Saufl, Universal protocol for preventing wrong site, wrong procedure, wrong person surgery, J Perianesth Nurs 19 (2004) 348–351 https://doi.org/10.1016/j.jopan.2004.08.001.
[5] R. Schwendimann, C. Blatter, M. Lüthy, et al., Adherence to the WHO surgical safety checklist: an observational study in a Swiss academic center, Patient Saf. Surg. 13 (2019) 14 https://doi.org/10.1186/s13037-019-0194-4.
[6] T. Altpeter, K. Luckhardt, J.N. Lewis, et al., Expanded surgical time out: a key to real-time data collection and quality improvement, J. Am. Coll. Surg. 204 (2007) 527–532 https://doi.org/10.1016/j.jamcollsurg.2007.01.009.
[7] K.A. Dillon, Time out: an analysis, AORN J. 88 (2008) 437–442 https://doi.org/10.1016/j.aorn.2008.03.003.
[8] N. McLaughlin, D. Winograd, H.R. Chung, B.V. Wiele, N.A. Martin, University of California, Los Angeles, surgical time-out process: evolution, challenges, and future perspective, Neurosurg. Focus 33 (2012) E5 https://doi.org/10.3171/2012.8.focus12255.
[9] S. Cullati, S. Le Du, A.-C. Raë, et al., Is the Surgical Safety Checklist successfully conducted? An observational study of social interactions in the operating rooms of a tertiary hospital, BMJ Qual. Saf. 22 (2013) 639–646 https://doi.org/10.1136/bmjqs-2012-001634.
[10] N. McLaughlin, D. Winograd, H.R. Chung, B. Van de Wiele, N.A. Martin, Impact of the time-out process on safety attitude in a tertiary neurosurgical department, World Neurosurg 82 (2014) 567–574 https://doi.org/10.1016/j.wneu.2013.07.074.
[11] L. Martin, J. Langell, Improving on-time surgical starts: the impact of implementing pre-OR timeouts and performance pay, J. Surg. Res. 219 (2017) 222–225 https://doi.org/10.1016/j.jss.2017.05.092.
[12] A. Oszvald, H. Vatter, C. Byhahn, V. Seifert, E. Guresir, Team time-out" and surgical safety-experiences in 12,390 neurosurgical patients, Neurosurg. Focus 33 (2012) E6 https://doi.org/10.3171/2012.8.focus12261.
[13] J. Neily, C. Soncrant, P.D. Mills, et al., Assessment of incorrect surgical procedures within and outside the operating room: a follow-up study from US veterans health

administration medical centers, JAMA Netw Open 1 (2018) e185147https://doi.org/10.1001/jamanetworkopen.2018.5147.
[14] A. Grzybowski, R. Patryn, J. Sak, A. Zagaja, A. Włoszczak-Szubzda, Surgical safety checklist. Procedure for the safety of procedures, Int. J. Surg. 41 (2017) 174–175 https://doi.org/10.1016/j.ijsu.2017.03.087.
[15] J. Bergs, F. Lambrechts, P. Simons, et al., Barriers and facilitators related to the implementation of surgical safety checklists: a systematic review of the qualitative evidence, BMJ Qual. Saf. 24 (2015) 776–786 https://doi.org/10.1136/bmjqs-2015-004021.
[16] V.E. Lyons, L.L. Popejoy, Time-out and checklists: a survey of rural and urban operating room personnel, J. Nurs. Care Qual. 32 (2017) E3–E10 https://doi.org/10.1097/ncq.0000000000000191.
[17] M.T. Corbally, Can we improve patient safety? Front Pediatr 2 (2014) 98 https://doi.org/10.3389/fped.2014.00098.
[18] A.S. Haugen, S. Murugesh, R. Haaverstad, G.E. Eide, E. Søfteland, A survey of surgical team members' perceptions of near misses and attitudes towards Time Out protocols, BMC Surg. 13 (2013) 46 https://doi.org/10.1186/1471-2482-13-46.
[19] S.M. van Schoten, V. Kop, C. de Blok, P. Spreeuwenberg, P.P. Groenewegen, C. Wagner, Compliance with a time-out procedure intended to prevent wrong surgery in hospitals: results of a national patient safety programme in The Netherlands, BMJ Open 4 (2014) e005075https://doi.org/10.1136/bmjopen-2014-005075.
[20] C. Neuhaus, A. Spies, H. Wilk, M.A. Weigand, C. Lichtenstern, “Attention everyone, time out!”: safety attitudes and checklist practices in anesthesiology in Germany. A cross-sectional study, J. Patient Saf. (2017), https://doi.org/10.1097/pts.0000000000000386.
[21] S.L. Lee, The extended surgical time-out: does it improve quality and prevent wrong-site surgery? Perm. J. 14 (2010) 19–23.
[22] D.J. Birnbach, L.F. Rosen, M. Fitzpatrick, J.T. Paige, K.L. Arheart, introductions during time-outs: do surgical team members know one another's names? Jt. Comm. J. Qual. Patient Saf. 43 (2017) 284–288 https://doi.org/10.1016/j.jcjq.2017.03.001.
[23] R.S. Yoon, M.J. Alaia, L.H. Hutzler, J.A.I. Bosco, Using “near misses” analysis to prevent wrong-site surgery, J. Healthc. Qual. 37 (2015) 126–132 https://doi.org/10.1111/jhq.12037.
[24] E.J. Jeong, H.S. Chung, J.Y. Choi, et al., Development of simulation-based learning programme for improving adherence to time-out protocol on high-risk invasive procedures outside of operating room, Int. J. Nurs. Pract. 23 (2017) e12529 https://doi.org/10.1111/ijn.12529.
[25] S. Reed, R. Ganyani, R. King, M. Pandit, Does a novel method of delivering the safe surgical checklist improve compliance? A closed loop audit, Int. J. Surg. 32 (2016) 99–108 https://doi.org/10.1016/j.ijsu.2016.06.035.
[26] B.S. Rothman, M.S. Shotwell, R. Beebe, et al., Electronically mediated time-out initiative to reduce the incidence of wrong surgery: an interventional observational study, Anesthesiology 125 (2016) 484–494 https://doi.org/10.1097/aln.0000000000001194.
[27] S.D. Kozusko, L. Elkwood, D. Gaynor, S.A. Chagares, An innovative approach to the surgical time out: a patient-focused model, AORN J. 103 (6) (2016) 617–622 https://doi.org/10.1016/j.aorn.2016.04.001.