The “teaching time-out”: a novel framework for surgical education

Keegan Guidolin, MD
Han Yan, MD
Fayez Quereshy, MD, MBA

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Correspondence to:
K. Guidolin
2075 Bayview Ave
Room H317
Toronto ON M4N 3M5
keegan.guidolin@mail.utoronto.ca

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In the decade since its inception, the World Health Organization’s surgical safety checklist has fundamentally changed the conduct of surgery worldwide. A critical component of the checklist — the “pause” or “time-out” — requires all operating room staff to stop other activities and together review critical information about the case to ensure that nothing is missed. Surgical trainees in Canada are transitioning to a competency-based medical education model; a core aspect of this model requires trainees to advocate for their own learning goals. We propose the use of a detailed and formalized preoperative pause as a means to enable superior and more targeted intraoperative learning for surgical trainees.

Summary

The World Health Organization’s (WHO) surgical safety checklist was proposed in the New England Journal of Medicine in 2009 and consists of a checklist administered at 3 critical points in the perioperative period. This tool has been implemented widely and is now an essential process that occurs in almost every operating room. Its effect has been felt widely, and it has reduced perioperative complications, mortality and surgical site infections. A critical element of this checklist (and the reason it is known as the surgical “pause”) is that all members of the operative team stop other activities to review critical information about the case to minimize error.

A similar preoperative checklist has been described that serves to test trainees’ understanding of the operation’s indications, technical plan and the underlying disease process. This checklist, previously dubbed the “educational time out,” consists of 7 components: the presenting complaint, risk factors for the disease, physical exam findings, diagnosis, location/type of incision, intraoperative/postoperative concerns and treatment plan. This tool formally lists the expected knowledge of surgical trainees, serving mainly as a preoperative “quiz,” which regrettably does not contribute to the education of the trainees per se. Though they can be used to help guide further teaching, such quizzes do not provide educational value on their own. The challenge with methods such as these is that they evaluate the learner’s current knowledge rather than add to it.

Surgical trainees in Canada are now transitioning to a competency-based medical education (CBME) model, relying on the acquisition of specific competencies of individual trainees as criteria for advancement in the program. This moves away from the traditional teaching that relied on volume and exposure over many years as a method of educating surgical learners on various pathologies and their treatments. The integration of CBME into Canadian surgical training is a matter of ongoing discussion; nevertheless, because learning objectives will be customized to the trainees’ current ability, curriculum will necessarily become more goal-directed, and surgical trainees will be required to advocate more strongly for their own learning goals. Unfortunately, self-advocacy remains a challenge for learners, partly because there is currently no setting designated for such discussions. A novel tool is required...
to enable such discussions to help focus surgical learning in the context of CBME.

We propose the use of a formalized “teaching time-out” as a means to enable superior intraoperative learning, conducted by the staff surgeon and involving surgical team learners. Importantly, this is not an opportunity to test the knowledge of trainees; it is a true and earnest teaching moment when questions can be asked openly and without judgment. We propose the “LEARN” (List, Explain, Anatomy, Roles, New) framework for this teaching time-out, presented in Figure 1.

The goal of this process is that all members of the surgical team enter the operating theatre understanding the clinical context of the procedure (List) with a fleshed out mental “script” of the manoeuvres that will occur during the operation, the goals of those manoeuvres (Explain, Anatomy), and who will perform them (Roles). Most surgical learners already perform many of these tasks in preparation for surgery, including considering indications, risks, goals and anatomy. The LEARN framework will ask the surgical team to bridge the gap between textbook and patient and to contextualize their knowledge to the operation, learning from those with greater experience in the process of shared mental rehearsal. The group activity of identifying roles and responsibilities facilitates communication during the operation and emphasizes the need for learners to actively practise surgical techniques, creating a unique moment for surgical learners to advocate for their learning objectives. Finally, it is important for learners of all levels to further enhance their learning by applying new knowledge and techniques, considering new possible complications or novel research (New).

This framework was developed to optimize intraoperative learning using the previously validated techniques of mental rehearsal and cognitive task analysis. A study by Sanders and colleagues compared mental imagery rehearsal with physical practice for the acquisition of suturing skills by 65 second-year medical students randomly assigned to either practice once and rehearse twice, practise twice and rehearse once, or practise 3 times. They found no difference in the skill level among the groups, suggesting that mental rehearsal can be as effective as physical practice for surgical learning. Another study by Arora and colleagues measured technical performance of a simulated laparoscopic cholecystectomy by novice surgeons after participants were randomly assigned to either physical practice and mental rehearsal or physical practice and video lecture. They showed that mental rehearsal enhanced technical performance outside of additional physical practice. Perhaps most surprisingly, a study by Immenroth and colleagues randomly assigned 98 surgeons undergoing laparoscopic training to additional mental rehearsal, additional physical practice, or no additional training, and objectively evaluated their performance on a simulated laparoscopic cholecystectomy. Participants in the mental rehearsal group outperformed those in the additional physical practice group. A systematic review of mental training in surgical education found that despite generally small sample sizes and some methodological flaws, most studies found mental rehearsal to be beneficial in surgical learning. Mental rehearsal uses tools provided by a “cognitive task analysis,” which breaks down tasks and can be used to enhance mental rehearsal. Cognitive task analysis has been shown in a systematic review by Wingfield and colleagues to improve multiple surgical outcome parameters in real-world and simulated situations and to be a more effective learning tool for acquisition of surgical skill than traditional surgical curricula.

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**Fig. 1.** The LEARN framework. A printable version of this framework is available in Appendix 1 at canjsurg.ca/005919-a1.
Together, these studies suggest that to optimize surgical learning, a combination of both physical practice and mental rehearsal are essential. The core of the framework presented here is born from this realization, as the Explain and Anatomy steps focus on the mental rehearsal, with an emphasis on anatomic landmarks to guide the operation, while the Roles step serves to enable physical practice by learners. The remaining 2 steps in the framework serve to bookend this educational core and to remind the surgical team of the context of the operation (List) and to emphasize the importance of continuing education (New).

Concerns may be raised about the time required to conduct this teaching time-out, since the “LEARN” framework we propose is open-ended. This framework can be carried out in the period of time between completion of the WHO checklist and the time required for induction of anesthesia and line placement as necessary (e.g., time at which the patient is ready to be positioned, have skin preparation applied, etc.). Anecdotally, the depth of the discussion is tailored for time, and all elements can be reasonably addressed in 10 to 20 minutes. When more or less time is available, the tool can be expanded or contracted easily by adding or subtracting depth to the discussion as required. The tool benefits in this regard from being a framework rather than a checklist, though the true goal of the tool is to provide dedicated and tailored learning time. Indeed, as a surgical team operates together more frequently, the framework naturally guides discussion away from repeated review of basic principles and encourages progression of educational goals.

CONCLUSION

The teaching time-out proposed here is dedicated to enhancing the learning of all members of a surgical team, from the medical students to the staff surgeons. It should be considered as critical as the dress rehearsal before a musical performance, and we believe it will enhance trainee learning and goal-oriented performance in the operating room. The framework emphasizes a conscientious approach to technical learning — a factor we consider vital in the future of Canadian surgical education, especially as the education framework moves toward CBME.

Affiliations: From the Division of General Surgery, University of Toronto, Toronto, Ont. (Guidolin, Quereshy); the Division of Neurosurgery, University of Toronto, Toronto, Ont. (Yan); and the Toronto Western Hospital, University Health Network, Toronto, Ont. (Quereshy).

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