JOURNAL OF Surgical Simulation

Journal of Surgical Simulation (2015) **2,** 40–41
DOI: 10.1102/2051-7726.2015.0009

EDITORIAL

Developing simulation centres to advance surgical simulation

Lars Konge[1,*] and Bijendra Patel[2]

[1]Centre for Clinical Education, University of Copenhagen and the Capital Region of Denmark, Copenhagen, Denmark; [2]Barts Cancer Institute, Queen Mary University of London, London, UK

**Corresponding author at: Centre for Clinical Education, University of Copenhagen and the Capital Region of Denmark, Copenhagen, Denmark. Email: lars.konge@regionh.dk.*

Date accepted for publication: 12 June 2015

The combination of shorter working weeks for surgical trainees, increased complexity of surgical procedures, and a greater concern for patient safety has made it obvious that initial training of technical skills should take place outside the operating room.[1] No industry in which human lives depend on the skilled performance of responsible operators has waited for unequivocal proof of the benefits of simulation before embracing it. There is an overwhelming body of literature supporting the use of simulation-based training when acquiring surgical skills and the question is no longer if trainees should practice on simulators but how.[2] The effective implementation of simulation in the surgical curriculum is still a big challenge and it has become evident that simply buying a simulator is not enough for learning to occur.[3] To develop a successful simulation centre, it is important to structure the training according to best evidence practice.

Simulation offers unique opportunities compared with traditional training on patients. It is suddenly acceptable to learn through errors and studies have indicated that directed, self-regulated learning can be superior to instructor-led learning.[4,5] It must be emphasized that many more skills are incorporated into the technical training of a surgeon (including the cognitive skills of anatomic recognition, decision making, alternate planning, and so forth), and that the simulators are but one part that can contribute to the overall improvement in performance and assessment of proficiency.

Furthermore, simulation can provide a standardized testing environment where trainees can demonstrate their competence without risk to patients or the need for intervention by a supervisor. The mastery learning principle where trainees train to a fixed criterion has impact on patient outcomes and the test itself increases the motivation of trainees and the retention of skills (testing effect).[6,7]

Short course versus distributed learning

Substantial evidence shows that distributed learning is superior to massed practice as several hours of uninterrupted training result in fatigue and cognitive overload to a degree that impairs or even hinders active learning.[8] Despite this evidence, simulation-based training is often being delivered as traditional, day-long, instructor-led courses ending with a certificate of attendance instead of a final test to ensure basic competency.

The first masters level course, MSc in surgical skills and science, was pioneered in 2005 at Queen Mary University of London and to date this is the only university offering a higher education degree for acquiring operative surgical skills by simulation. The course is based on the teaching principle that distributed learning is superior and proficiency in operative technique requires practice, repetition, and time.

Traditional courses are easy to schedule but require much simulation equipment as hands-on training is essential when learning surgical skills. It is highly efficient to have two people share a simulator and support each other (dyad training) but more than two trainees per simulator will dilute active participation and reduce motivation.[9] Individual, distributed training where trainees practice for 1–2 hours at a time can be logistically challenging, especially when staff are needed to attend to expensive and/or complicated simulation equipment, direct the self-regulated learning and give feedback to increase the efficiency of training.[10]

Developing simulation centres and learning from others

Developing a surgical simulation centre is not an easy task and success is not guaranteed even if all of the evidence-based principles are adhered to. Local constraints regarding resources in terms of economy, space, personnel, and

simulation equipment make it impossible to create one single best answer of how to do it. However, by studying the experiences of others, we may be inspired to implement initiatives that would work well in our own environment and avoid making the same mistakes as others before us. The *Journal of Surgical Simulation* would like to facilitate this notion of learning from others' experiences by introducing a new series called Simulation Centres that will allow faculty from centres around the world to publish a detailed report of their facilities.

The manuscript

We invite all leading teaching centres worldwide to submit a manuscript as described below.

The description does not need to qualify as scholarship in the traditional sense but will be subjected to careful editorial decision and peer review. Influential simulation centres with a strong surgical focus and unique features that could inspire others in the simulation community will be prioritized.

The manuscript should consist of the following elements:

(1) Introduction and history
(2) Facilities and equipment
(3) Courses
(4) Instructors and support staff
(5) Trainees and/or research students
(6) Research and publications
(7) The future, which should include your perceived secret for success and tips on success in learning
(8) Key personnel and contact information
(9) Good photographs and, if possible, a video of the centre

We start the series off with descriptions of two collaborating but very different centres.

(1) CRESENT, the Center for Research, Education and Simulation Enhanced Training at King Fahad Medical City in Riyadh, Saudi Arabia, a high-resource centre, is leading in the Arabic world and is currently building the first simulated hospital in the world.[11]
(2) The Simulation Centre at Rigshospitalet in Copenhagen, Denmark, has a very research-oriented approach to surgical simulation with 13 PhD students and ongoing research projects in many surgical fields.[12]

We hope you will enjoy this new addition to our journal and urge you to consider submitting descriptions and experiences from your own centres.

Lars Konge, Co-Editor

Bijendra Patel, Editor-in-Chief

Conflict of interest

The authors declare that they have no conflict of interest.

References

1. Reznick RK, MacRae H. Teaching surgical skills–changes in the wind. N Engl J Med 2006; 355: 2664–9.
2. Stefanidis D, Sevdalis N, Paige J, Zevin B, Aggarwal R, Grantcharov T, et al. Association for Surgical Education Simulation Committee. Simulation in surgery: what's needed next? Ann Surg 2015; 261: 846–53. doi: 10.1097/SLA.0000000000000826..
3. Strandbygaard J, Bjerrum F, Maagaard M, Rifbjerg Larsen C, Ottesen B, Sorensen JL. A structured four-step curriculum in basic laparoscopy: development and validation. Acta Obstet Gynecol Scand 2014; 93: 359–66. doi: 10.1111/aogs.12330.
4. Ziv A, Ben-David S, Ziv M. Simulation based medical education: an opportunity to learn from errors. Med Teach 2005; 27: 193–9.
5. Brydges R, Nair P, Ma I, Shanks D, Hatala R. Directed self-regulated learning versus instructor-regulated learning in simulation training. Med Educ 2012; 46: 648–56. doi: 10.1111/j.1365-2923.2012.04268.x.
6. McGaghie WC, Issenberg SB, Barsuk JH, Wayne DB. A critical review of simulation-based mastery learning with translational outcomes. Med Educ 2014; 48: 375–85. doi: 10.1111/medu.12391.
7. Kromann CB, Jensen ML, Ringsted C. The effect of testing on skills learning. Med Educ 2009; 43: 21–7. doi: 10.1111/j.1365-2923.2008.03245.x.
8. Mackay S, Morgan P, Datta V, Chang A, Darzi A. Practice distribution in procedural skills training: a randomized controlled trial. Surg Endosc 2002; 16: 957–61.
9. Tolsgaard MG, Madsen ME, Ringsted C, Oxlund BS, Oldenburg A, Sorensen JL, et al. The effect of dyad versus individual simulation-based ultrasound training on skills transfer. Med Educ 2015; 49: 286–95. doi: 10.1111/medu.12624.
10. Strandbygaard J, Bjerrum F, Maagaard M, Winkel P, Larsen CR, Ringsted C, et al. Instructor feedback versus no instructor feedback on performance in a laparoscopic virtual reality simulator: a randomized trial. Ann Surg 2013; 257: 839–44. doi: 10.1097/SLA.0b013e31827eee6e..
11. Lababidi H, Munshi F, AlAmar M, Konge L, Lonn L, Schroeder TV, et al. CRESENT - The Center for Research, Education and Simulation Enhanced Training, King Fahad Medical City, Riyadh, Saudi Arabia. J Surg Simul 2015; 2: doi:10.1102/2051-7726.2015.0010.
12. Konge L, Bjerrum F, Nayahangan LJ, Schroeder TV. Developing and running a surgical simulation centre – experiences from Copenhagen, Denmark. J Surg Simul 2015; 2: doi: 10.1102/2051-7726.2015.0011.