Surgical trainees can practise technical skills using surgical simulation before they start to assist in operations on real patients. The Australian Safety and Efficacy Register of New Interventional Procedures - Surgical (ASERNIP-S) looked at whether skills gained through simulation training improve the performance of the surgical trainee in the clinical setting.

THE FOLLOWING INFORMATION IS A SHORT VERSION OF THE FULL SYSTEMATIC REVIEW AVAILABLE AT WWW.SURGEONS.ORG/ASERNIP-S/PUBLICATIONS.HTM

Main messages

ASERNIP-S looked at the limited evidence available on whether skills gained through surgical simulation training can transfer to the operating room and noted that:

• no firm conclusions could be drawn due to differences in the design of the studies
• further research was needed, such as randomised controlled trials or well-designed non-randomised comparative studies, with standardised assessment of trainees
• future studies could explore differences in skills transfer between simulation training and patient-based training; the types of training which give trainees the most skills; the effect of mentoring; and the changes in staff productivity due to surgical simulation training.

What is surgical simulation training?

Traditionally, surgical trainees have gained practical experience by watching experienced surgeons perform operations on patients and providing assistance. However, the opportunities to train in this way are limited. Recently technologies have been developed allowing trainees to practise their skills in artificial surgical environments before entering the operating room. This is called surgical simulation training and is used as a supplement to patient-based surgeon training.

An artificial surgical scenario may be set up with:

• physical simulators, using tissues made of plastic, rubber and latex. This is the most widely available system.
• human cadavers
• animals (anaesthetised or euthanased)
• virtual reality simulators with computer-generated tools and tissues. The simulated tissues are programmed to react to being cut and sutured, like real tissues.
• hybrid simulators combining physical and virtual reality simulators. A physical object (e.g. mannequin) is linked to a computer program providing visual images and feedback on the progress of the simulated operation.
Are the skills learned in surgical simulation transferable to the operating room?

ASERNIP-S looked at whether the skills learned through surgical simulation can transfer to the operating room. The group could not draw any firm conclusions from the limited evidence (rated as 'average') and recommended further research be conducted. However, trainees who received simulation training prior to patient-based assessment appeared to perform better than trainees who did not, for laparoscopic gall bladder removal, colonoscopy/sigmoidoscopy, catheter-based intervention for occlusive disease (1 study), and total extra-peritoneal hernia repair (1 study). For endoscopic sinus surgery, there were no differences between the groups (1 study). In one study, patient-based trainees performed colonoscopy/sigmoidoscopy better than trainees who received only simulation training with no mentoring or supervision.

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What is ASERNIP-S?

The Australian Safety and Efficacy Register of New Intervenational Procedures - Surgical (ASERNIP-S) is a program of the Royal Australasian College of Surgeons. ASERNIP-S conducts literature reviews on the safety and/or effectiveness of new surgical techniques before they are widely accepted into the health care system. Each review collects all relevant information, or evidence, on new and standard techniques or technologies. The quality of evidence is assessed. ASERNIP-S then makes recommendations regarding the procedures, that are endorsed by the College. Reviews are regularly updated. ASERNIP-S recommendations are sent to hospitals and surgeons in Australia and overseas, and published on the website with summaries for consumers.
Glossary

Evidence: the research studies included in the review

Randomised controlled trial: A study in which researchers randomly place participants in groups. The new surgical procedure will be performed on one group of patients, while the other group of patients will undergo the conventional operation. Researchers measure and compare the outcomes of the patients from the different groups.

Patient-based surgical training: surgical trainees learn how to perform operations by watching and assisting experienced surgeons in operations on real patients

Surgical simulation training: a teaching method using objects, devices or simulators which imitate operative conditions so that surgical trainees can practise their skills and techniques

Systematic review: ASERNIP-S conducts literature reviews on the safety and/or effectiveness of new surgical techniques before they are widely accepted into the health care system. Each review collects all relevant information, or evidence, on new and standard techniques used to treat a medical condition. The quality of evidence is assessed. ASERNIP-S then makes recommendations on the safety and/or effectiveness of the procedures that are then endorsed by RACS

Acknowledgments

Figure 1 is provided courtesy of Mentice AB, Sweden.
Figure 2 is provided courtesy of the Royal Australasian College of Surgeons.