



<b>Title</b>	<b>Surgical Simulation; A Systematic Review</b>
<b>Agency</b>	ASERNIP-S, Australian Safety and Efficacy Register of New Interventional Procedures – Surgical PO Box 688, North Adelaide, South Australia 5006, Australia; Tel +61 8 8239 1144, Fax +61 8 8239 1244, college.asernip@surgeons.org; www.surgeons.org/asernip-s
<b>Reference</b>	ASERNIP-S Report Number 29. ISBN 0 909844 60 7 Full text available: <a href="http://www.surgeons.org/asernip-s/publications2.htm">http://www.surgeons.org/asernip-s/publications2.htm</a>

## Aim

To assess the effectiveness of surgical simulators in comparison to each other, no training, or other methods of surgical training.

## Conclusion and results

*Evidence rating:* Poor – there was insufficient evidence since most of the RCTs were flawed and outcomes were often not comparable.

*Efficacy:* Cannot be determined – the inconclusive outcome of this review may be related to small sample sizes and the validity and reliability of outcome measurements.

*Results:* 26 RCTs with 668 participants were included, although RCT quality was often poor. Computer simulation generally showed better results than no training, but was not convincingly superior to standard training (eg, surgical drills) or video simulation (particularly when assessed by operative performance). Video simulation did not show better results than no training, and data were insufficient to show if video simulation was superior to standard training or use of models. Model simulation may have been better than standard training, and cadaver training may have been better than model training. None of the RCTs compared computer simulation vs. model training.

## Methods

*Search strategy:* Studies were identified by searching MEDLINE, PREMEDLINE, EMBASE, PsycINFO, CINAHL, Current Contents, Cochrane Library, Science Citation Index Expanded from inception to week 3, 2003. NHS Centre for Research and Dissemination (UK), NHS Health Technology Assessment (UK), and the National Research Register (UK) were searched on 25/03/2003. Additional articles were identified in the reference sections of the studies retrieved.

*Study selection:* RCTs assessing any training technique using at least some elements of surgical simulation compared to any other methods of surgical training, or

no surgical training, were included for review. Articles needed to address at least one of the following outcome measures: surgical task performance, objective or subjective, or satisfaction with training techniques.

*Data collection/analysis:* Data from studies were extracted by an ASERNIP-S researcher using standardized data extraction tables developed *a priori* and checked by a second researcher. Results were not pooled across studies since outcomes were not comparable. Relative risks for dichotomous outcome measures or weighted mean differences for continuous outcome measures with 95% confidence intervals were calculated for some outcomes in individual RCTs.

## Further research/reviews required

Further research was recommended in the context of training for particular performance standards. Ideally, studies should be multicenter trials with standardized approaches and sufficient participants. The skills being evaluated should be part of a standard surgical skills training course, not just stand-alone technical skills. Once efficacy has been determined, cost-benefit analyses could be attempted.