Original Article

Simulation training in obstetrics and gynaecology: What's happening on the frontline?

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Background: Despite evidence supporting simulation training and awareness that trainee exposure to surgery is suboptimal, it is not known how simulation is being incorporated in obstetrics and gynaecology (O&G) training across Australia and New Zealand.

Aim: To investigate the current availability and utilisation of simulation training, and the attitudes, perceived barriers and enablers towards simulation in Australia and New Zealand.

Method: A survey was distributed to O&G trainees and fellows in Australia and New Zealand. The survey recorded demographic data, current exposure to simulation and beliefs about simulation training.

Results: The survey returned 624 responses (24.3%). Most trainees had access to at least one type of simulation (87%). Access to simulators was higher for trainees at tertiary hospitals (92% vs 76%). Few trainees had a simulation curriculum, allocated time or supervision for simulation training. 'Limited access' was the highest rated barrier to using simulation. Lack of time, other training priorities and cost were identified as further barriers. More than 80% of respondents believed simulation improves surgical skills, skills transfer to the operating theatre, and the addition of simulation to the RANZCOG curriculum would benefit trainees. However, a minority of respondents believed simulator proficiency should be shown prior to performing surgery. The need for a curriculum and supervision were highlighted as necessary supports for simulation training.

Conclusions: Despite simulator availability, few trainees are supported by simulation training curricula, allocated time or supervision. Participants believed that simulation training benefits trainees and should be supported with a curriculum and teaching.

Key words: computer simulation [MeSH], gynaecology, obstetrics, operative/education [MeSH], simulation, surgery, surgical procedures.

Introduction

Obstetrics and gynaecology (O&G) trainees are reporting limited confidence to perform the range of procedures required at the end of their training.[1] The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) faces the challenge of ensuring trainees receive adequate surgical teaching and opportunities for skill acquisition during their six years of training. International studies support the concern of suboptimal surgical skill following O&G training.[2,3] With the current high number of trainees and reduced surgical opportunities, additional methods of surgical teaching may be required to assist surgical skill development.[4]

Simulation training has numerous benefits for assisting the development of procedural skills and has been shown to improve performance in laparoscopic surgery.[5–9] Simulation training can be time-efficient, cost-effective, safe and reproducible.[10,11] Simulation provides a unique opportunity for trainees to acquire necessary skills prior to operating on patients.[10] Consequently, simulation training should be considered an important adjunct to traditional surgical training.[12,13]

Despite awareness that trainee exposure to surgery is suboptimal[1–3] and with emerging evidence for simulation training,[9,14,15] we know little about how simulation training is being incorporated in O&G training across Australia and New Zealand. Previous studies in the USA and Canada in surgery and anaesthesia have found financial and time constraints as commonly identified barriers to simulation training.[16–18] Clinician attitudes towards simulation training need consideration, given that in one

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study 97% of respondents felt that simulation-trained skills transferred to the operating theatre, yet only 57% felt simulation proficiency should be demonstrated prior to performing live operations.[18] The aim of this study was to investigate the current utilisation of simulation training in O&G across Australia and New Zealand, and to explore barriers, enablers and attitudes influencing the uptake of simulation.

Materials and Methods

A survey was developed through semi-structured interviews of trainees and fellows at two Queensland training hospitals and a review of relevant literature. The survey was pilot-tested before being distributed electronically (SurveyMonkey, Palo Alto, CA, USA). An email link to the survey was distributed by RANZCOG in May 2015 to the database of trainees and fellows. A follow-up email was sent one month later. The survey was deemed to meet the requirements for low/negligible risk research by the Mater Health Services Human Research Ethics Committee (Reference Number: HREC/15/MHS/17), the University of Queensland Ethics Review Committee (Approval Number: 2015001393) and was approved by the RANZCOG for distribution.

The survey elicited demographic data, current exposure to simulation and beliefs about simulation training. Demographic data included age, gender, location of employment and current training level or specialist field. Trainees only were asked whether their hospital had simulation models available, whether a simulation curriculum was in place, whether they were allocated rostered time for simulation training and whether this training was supervised or if coaching was provided. Fellows who supervised trainees were asked about their employment status and area of practice (eg generalist or subspecialty); trainees were asked their level of training and hospital rotation. All participants were asked about their attitudes towards simulation, and their perceptions of the barriers and enablers to simulation training, and responded using a five-point Likert-type scale. Participants could input free-text comments regarding their beliefs about simulation.

Participants who submitted blank surveys were excluded. Fellows who did not supervise trainees were excluded. For questions relating to beliefs, perceived barriers and enablers, blank responses were excluded from the subanalysis.

Participant responses were compared by hospital type, trainee or fellow status and gender. Quantitative data were analysed by descriptive statistics and frequency distributions. Categorical data were compared using a chi-squared test, or a Fisher's exact test where the frequency was less than five. $P < 0.05$ was considered significant. Two researchers performed a thematic analysis of the free-text comments. The analysis was performed independently before findings were compared and differences resolved by consensus to establish the main themes.

Results

The survey was sent to 2573 RANZCOG trainees ($n = 603$) and fellows ($n = 1970$), and 624 survey responses were collected (158 trainees and 466 fellows). The response rate was 24.3%, with 26.2% of trainees and 23.6% of fellows completing the survey. Trainees ($n = 10$) or fellows ($n = 3$) who submitted blank surveys were excluded from the analysis. Of the fellows, 269 (58%) were involved in supervising RANZCOG trainees in procedures and were included in the analysis.

Demographic data

Full-time public staff specialists constituted over one-third of respondents, and 80.6% of fellows reported their practice to be as a generalist obstetrician and gynaecologist (Table 1). Approximately half of fellows responding worked in tertiary hospitals.

Of the trainees, 124 (83.8%) respondents were female. The majority of trainees worked in tertiary hospitals (Table 1) and 54.7% worked in a hospital with more than ten trainees.

Access to simulation training

The most common type of simulation model available was a box trainer (98 trainees, 66.2%), followed by functional anatomical models (such as a model pelvis used to practice endometrial sampling or perineal tear repair) (54.7%) and a virtual reality simulator (16.2%) (Table 2). Nineteen (12.8%) reported that simulation training of any form was not available at their hospital. Trainees at tertiary hospitals more often reported access to one or more types of simulators being available.

Few trainees reported that a simulation curriculum existed at their hospital (16, 10.8%) (Table 2). Of those who reported a simulation curriculum was present, 15 (of the 16) were located at tertiary hospitals. Trainees in Queensland most frequently reported a simulation curriculum was present (29.0%) compared to New Zealand (11.9%), Victoria/Tasmania (6.7%) and all other regions (0%). Fewer than one in five trainees reported they were allocated rostered time for simulation training, with the vast majority (92.6%) being from tertiary hospitals. More than half of all trainees (78, 52.7%) reported that no simulation training was undertaken at their hospital, despite most (60, 76.9%) having at least one type of simulation training model available. Very few trainees (6.1%) are supervised during simulation training.

Enablers of simulation training

Figure 1 shows the distribution of participants' responses regarding motivation to participate in surgical simulation. 'Desire for skill development' and 'improved live operative exposure' were the most highly rated responses. Rostered protected time received the third most 'strongly agreed'

Table 1 Employment status and hospital location

	All respondents (n = 417†) n (%)	Fellows (n = 269) n (%)	Trainees (n = 148) n (%)
Employment status (fellows only)			
Full-time public staff specialists		98 (36.4%)	
Visiting medical specialists		74 (27.5%)	
Part-time public staff specialists		51 (19.0%)	
Private specialist		26 (9.7%)	
Other‡		20 (7.4%)	
Practice type (fellows only)			
Generalist obstetrics and gynaecology		217 (80.6%)	
General gynaecology only		22 (8.2%)	
Subspecialist		30 (11.1%)	
Hospital type			
Tertiary hospital	236 (56.6%)	129 (48.0%)	107 (72.3%)
Nontertiary metropolitan	95 (22.7%)	72 (26.7%)	23 (15.5%)
Regional	69 (16.5%)	54 (20.1%)	15 (10.1%)
Rural/remote	17 (4.1%)	14 (5.2%)	3 (2.0%)

†After exclusions.
‡Responses included: subspecialty trainee, locum, academic.

Table 2 Type of simulation training available and presence of simulation training support for trainees at their hospital

	All trainees responding to survey (n = 148) n (%)	Tertiary hospital (n = 107) n (%)	Nontertiary hospital (n = 41) n (%)	P-value (tertiary compared to nontertiary hospitals)
Type of simulation training				
Box trainer	98 (66.2%)	75 (70.1%)	23 (56.1%)	0.16
Functional anatomical model (eg pelvis, gynaecology model)	81 (54.7%)	65 (60.7%)	16 (39.0%)	0.03*
Virtual reality simulator	24 (16.2%)	22 (20.5%)	2 (4.8%)	0.02*
Live animal model	4 (2.7%)	3 (2.8%)	1 (2.4%)	0.99
Tissue model	1 (0.7%)	1 (0.9%)	0 (0%)	0.99
Cadaveric model	0 (0%)	0 (0%)	0 (0%)	0.99
Other†	1 (0.7%)	1 (0.9%)	0 (0%)	0.99
More than one type	63 (42.6%)	53 (49.5%)	10 (24.4%)	0.01*
At least one type	129 (87.2%)	98 (91.6%)	31 (75.6%)	0.02*
None	19 (12.8%)	9 (8.4%)	10 (24.4%)	0.02*
Simulation training support				
Simulation curriculum is present	16 (10.8%)	15 (14.0%)	1 (2.4%)	0.04*
Trainees are allocated rostered time for simulation training	27 (18.2%)	25 (23.4%)	2 (4.8%)	0.01*
Trainees are always or mostly supervised for simulation training	9 (6.1%)	6 (5.6%)	3 (7.3%)	0.71

*Significant.
†One trainee reported use of fruit.

response. 'Simulator is available at home' and 'competition with peers' received more neutral, disagree or strongly disagree responses.

Barriers to simulation training

Highly rated responses to 'What do you think prevents registrars from undertaking surgical simulation training?' were 'limited access to simulation equipment', 'lack of time' and 'other training priorities' (Fig. 1). 'Lack of interest' and 'don't think it's necessary' were rated lower.

Beliefs about simulation training

Strongly rated beliefs of the participants were that hospitals should provide the resources for simulation training, that simulation improves skills, that skills transfer to the operating theatre and that the addition of simulation to the

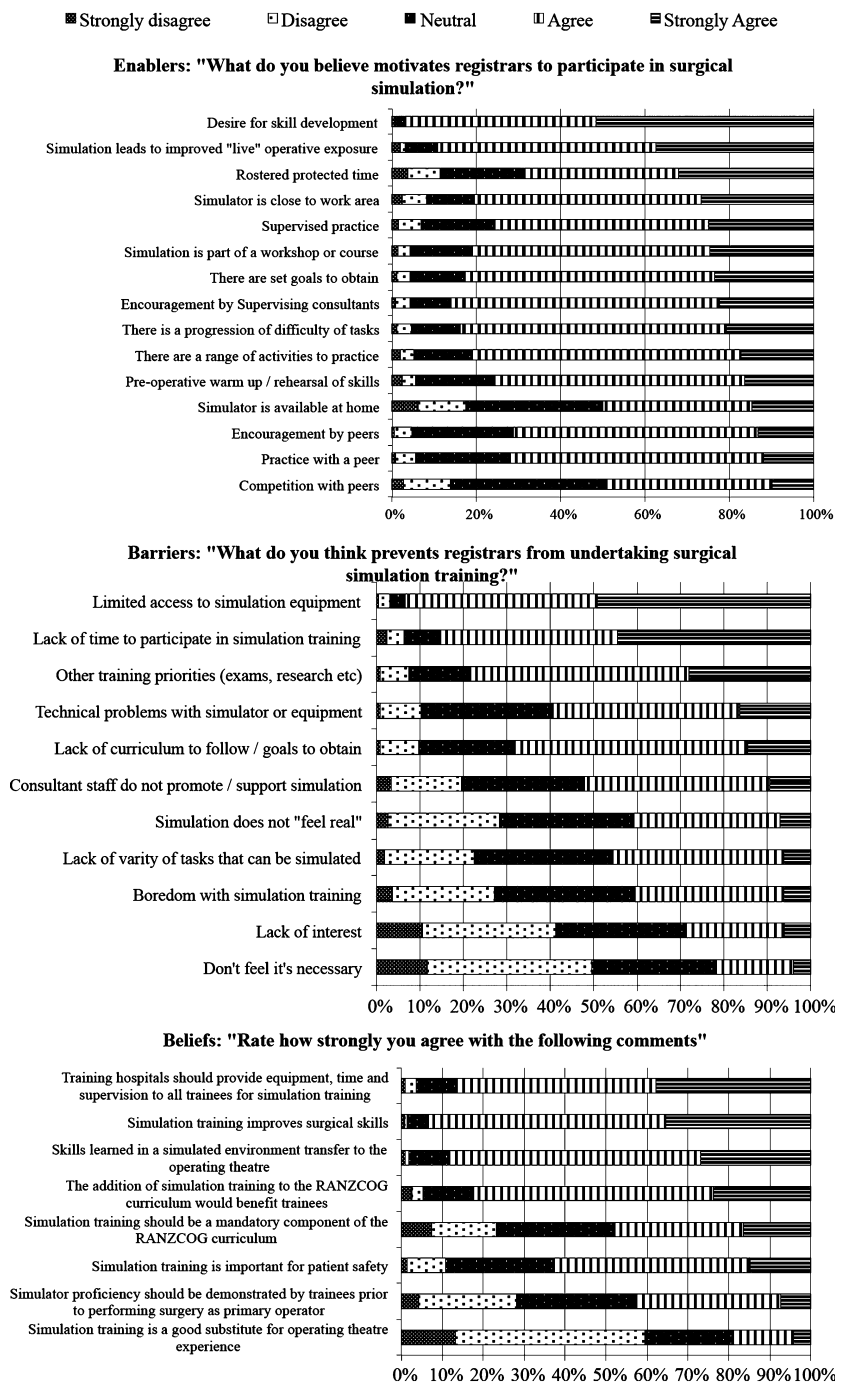

Figure 1 Attitudes towards surgical simulation training.

RANZCOG curriculum would benefit trainees (Fig. 1). Items related to simulation being mandatory or that proficiency should be shown prior to performing surgery received fewer agree or strongly agree responses. Less than 20% of respondents agreed that simulation training is a good substitute for operating theatre experience.

Fewer trainees (29%) than fellows (51%) agreed or strongly agreed that simulator proficiency should be demonstrated prior to performing surgery as the primary operator ($P < 0.05$). Trainees were more likely to agree or strongly agree that training hospitals should provide equipment, time and supervision for simulation training (91% vs 84% $P < 0.05$). They responded similarly to other beliefs. The small number of male trainees (24) limited a detailed analysis by gender. Responses were mostly similar when comparing male and female trainees,

with the exception of 'simulator proficiency should be demonstrated by trainees prior to performing surgery as primary operator' (males 4% vs females 34%, $P < 0.05$) and 'training hospitals should provide equipment, time and supervision to all trainees for simulation training' (males 70% vs females 96%, $P < 0.05$).

Thematic analysis

A thematic analysis of free-text comments by survey participants revealed four main themes. These were curriculum, time, cost and the role of simulation (Table 3).

Discussion

Simulation training appears accessible to the majority of Australian and New Zealand trainees, although a disparity in availability was found between hospital type and regions. An overall lack of formal integration into a curriculum was reported. While most respondents felt simulation training improves skill and performance and would benefit trainees if added to the RANZCOG curriculum, there was less support for mandatory implementation or demonstration of simulator proficiency prior to operating. Analysis of survey free-text comments highlighted themes of the role of simulation, as well as the financial and time constrains associated with training; issues consistent with previous surveys of simulation training in medicine.[16,18]

The survey had a large number of participants, both trainees and fellows, and representation from a variety of hospital types and regions. Simulator access in tertiary and nontertiary hospitals differed, with the majority of trainees with access to virtual reality simulators being from a tertiary hospital. Furthermore, only one in 12 respondents from tertiary hospitals reported no access to simulation models, compared to one in four respondents from nontertiary hospitals. Such differences may reflect the influence of a few established simulation programs at tertiary hospitals. This may also reflect differing budget priorities in tertiary hospitals, a focus on academia or the motivation of senior specialists. Similar factors may be influencing the regional differences in simulation access. Regardless, when considering that O&G trainees rotate through a range of hospitals, it is important that all settings have similar access to simulation training to ensure consistent procedural skill development.

This survey exposed an apparent lack of formal uptake of simulation in surgical training curricula, despite the apparent availability of simulators. Less than one in 10 trainees have a simulation curriculum, or supervision or coaching for simulation training at their hospital. Almost 90% of trainees have access to one type of simulator, yet 'limited access to simulation equipment' was the highest rated barrier to the use of simulation. Possible explanations include perceived lack of access due to the location of simulation equipment, the working order of equipment, or a lack of protected time for simulation training or supervision, factors which have been highlighted in previous studies.[16–20] A lack of time, availability of simulation equipment and cost were identified from survey comments as common obstacles to simulation training that further support these assumptions. The need for a curriculum and supervision were highlighted as necessary supports for simulation training, which may assist the uptake.

In examining the beliefs of participants around simulation uptake and utilisation, the survey revealed that while trainees and fellows believe simulation training is beneficial and that simulation training was important for patient safety, a minority agreed that simulation proficiency should be demonstrated prior to live surgery. In a study of general surgery trainees, Shetty *et al.*[18] similarly observed that the majority of participants believe simulation training improves surgical performance, yet just

Table 3 Themes identified and representative comments from analysis of survey comments

	Trainees	Fellows
Curriculum	'It has not been particularly useful in my experience to have a box of equipment in an office somewhere – a curriculum, clear goals and supervision would be much more useful'	'simulation training like all forms of training will work best if structured, supervised and goal directed' 'we need stronger and structured surgical curriculum rather than a simple surgical competency form at the end of year 5'
Time	'Protected time with a senior trainee/consultant will be great'	'protected time needs to be provided for simulation training'
Cost	'Hospitals are under resourced and focus on service provision and constantly sacrifice surgical training'	'most hospitals have limited resources, time and money to provide this as part of training'
Role	'simulation training should augment not replace actual operating' 'great way of practicing operations and skills when limited operating time is available'	'simulation will never replace real operating theatre experience, but it helps with dexterity, depth perception and general know-how. It improves skills and accelerates the learning curve on real patients' 'simulation does allow for a build up of skills where there is a lack of surgical cases'

over half consider that proficiency should be demonstrated prior to beginning live operating. Of note, fewer trainees than fellows, and fewer male than female trainees supported a proficiency threshold. This could reflect trainee concern about the creation of additional assessments or barriers to live operating; gender differences might signal variation in preferences for surgical training. Users of simulation may also be concerned about realism, skill transfer to theatre and a lack of demonstrable benefit to patient outcomes.[21–23] Making simulation mandatory is one strategy to address the knowledge–action disconnect. Formalising simulation within the curriculum would also help it to be seen as part of routine training rather than an additional burden.[3,24] In the absence of some formal requirement of trainees to participate in simulation, it seems unlikely that there would be any significant change to the access, uptake and utilisation of simulation for trainees.

There are a number of limitations to this study. The response rate of 24% was low, although similar to previous surveys distributed to RANZCOG members.[25–27] It is possible that participation bias could have influenced the findings. The finite population surveyed, however, does help increase the precision of estimates.[28] As no validated questionnaire existed for the study aims, the questions were devised from interviews of trainees and fellows in Queensland. Although there was the opportunity for free comments, the options given in each question may have limited the responses of the participants.

Despite these limitations, this survey presents a number of novel findings regarding the current use of simulation training and the beliefs regarding simulation training of trainees and fellows in O&G in Australia and New Zealand. Further research into how simulation training can be successfully implemented into a unified surgical curriculum may be useful. Potentially, the future integration of simulation as part of the mandatory requirements of O&G training, with protected time and adequate distribution of appropriate resources across training hospitals and regions could improve the surgical training within our specialty.

Conclusion

Despite the apparent availability of simulation training equipment, there is very little evidence that RANZCOG trainees are supported by local simulation training curricula, allocated time or supervision. There is a clear disparity between tertiary and nontertiary hospitals in access to or support for simulation training. Fellows and trainees believe that simulation training is beneficial to skill acquisition and to skills transfer to the operating theatre, and the addition of simulation training to the RANZCOG curriculum may be of benefit to trainees. Respondents reported that simulation training should be supported with a curriculum, allocated time and teaching.

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