

Simulation Training in Obstetrics and Gynaecology Residency Programs in Canada

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Abstract

Objective: The integration of simulation into residency programs has been slower in obstetrics and gynaecology than in other surgical specialties. The goal of this study was to evaluate the current use of simulation in obstetrics and gynaecology residency programs in Canada.

Methods: A 19-question survey was developed and distributed to all 16 active and accredited obstetrics and gynaecology residency programs in Canada. The survey was sent to program directors initially, but on occasion was redirected to other faculty members involved in resident education or to senior residents. Survey responses were collected over an 18-month period.

Results: Twelve programs responded to the survey (11 complete responses). Eleven programs (92%) reported introducing an obstetrics and gynaecology simulation curriculum into their residency education. All respondents (100%) had access to a simulation centre. Simulation was used to teach various obstetrical and gynaecological skills using different simulation modalities. Barriers to simulation integration were primarily the costs of equipment and space and the need to ensure dedicated time for residents and educators. The majority of programs indicated that it was a priority for them to enhance their simulation curriculum and transition to competency-based resident assessment.

Conclusion: Simulation training has increased in obstetrics and gynaecology residency programs. The development of formal simulation curricula for use in obstetrics and gynaecology resident education is in early development. A standardized national simulation curriculum would help facilitate the integration of simulation into obstetrics and gynaecology resident education and aid in the shift to competency-based resident assessment. Obstetrics and gynaecology residency programs need national collaboration (between centres and specialties) to develop a standardized simulation curriculum for use in obstetrics and gynaecology residency programs in Canada.

Key Words: Simulation, obstetrics, gynaecology, resident education, curriculum development, competency-based assessment

Competing interests: None declared.

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Résumé

Objectif : L'intégration de la simulation aux programmes de résidence se déroule à un rythme plus lent en obstétrique-gynécologie que dans d'autres spécialités chirurgicales. Cette étude avait pour objectif d'évaluer l'utilisation actuelle de la simulation au sein des programmes canadiens de résidence en obstétrique-gynécologie.

Méthodes : Nous avons conçu un sondage de 19 questions que nous avons distribué aux 16 programmes canadiens actifs et agréés de résidence en obstétrique-gynécologie. Le sondage a d'abord été transmis aux directeurs de programme; toutefois, nous l'avons occasionnellement redirigé vers d'autres membres du corps professoral participant à l'enseignement prodigué aux résidents ou vers des résidents de dernière année. Les réponses au sondage ont été recueillies sur une période de 18 mois.

Résultats : Douze programmes ont répondu au sondage (11 d'entre eux ont fourni des réponses complètes). Onze programmes (92 %) ont signalé qu'ils intégraient un curriculum de simulation en obstétrique-gynécologie dans leurs cours offerts aux résidents. Tous les répondants (100 %) avaient accès à un centre de simulation. La simulation était utilisée pour l'enseignement de diverses compétences en obstétrique-gynécologie, par l'intermédiaire de différentes modalités de simulation. Parmi les obstacles à l'intégration de la simulation, on trouvait principalement les coûts du matériel et de l'espace requis, ainsi que la nécessité de réserver du temps aux fins de la simulation tant pour les résidents que pour les éducateurs. La majorité des programmes ont indiqué que l'amélioration de leur curriculum de simulation et la transition vers une évaluation des résidents fondée sur les compétences constituaient une priorité à leurs yeux.

Conclusion : La formation au moyen de la simulation a gagné en popularité au sein des programmes de résidence en obstétrique-gynécologie. L'élaboration d'un curriculum officiel en matière de simulation pouvant être utilisé pour la formation des résidents en obstétrique-gynécologie en est encore à ses débuts. Un curriculum de simulation national standardisé contribuerait à faciliter l'intégration de la simulation dans la formation des résidents en obstétrique-gynécologie et le passage à une évaluation des résidents fondée sur les compétences. Les programmes de résidence en obstétrique-gynécologie doivent avoir recours à une collaboration nationale (entre les centres et les spécialités) pour l'élaboration d'un curriculum de simulation standardisé pouvant être utilisé par les programmes canadiens de résidence en obstétrique-gynécologie.

INTRODUCTION

In recent years, medical education has seen an exponential increase in the interest in, demand for, and development of simulation modalities for use in residency training programs. Medical education and training have been hampered by resident work-hour restrictions, increases in program sizes, and a reduction in tolerance for medical error. As has occurred in the aviation industry, educators looking for methods to overcome these challenges have increasingly found simulation to be an appealing option. Numerous studies have documented simulation's effectiveness for training, from teaching basic surgical skills to enhancing teamwork and leadership skills in complex emergency scenarios.¹⁻⁶ Simulation can be used to introduce new concepts and evaluate required competencies. Simulation is attractive to medical and surgical residents.⁷⁻⁹ Most importantly, there is increasing evidence to support that the skills gained from simulation translate into measurable improvements in a resident's real-life performance.^{1-3,5,10-14}

We conducted a survey to evaluate the current use of simulation in obstetrics and gynaecology residency programs in Canada. First, program representatives were asked whether they had begun to implement formal simulation curricula to teach and/or assess obstetrics and gynaecology skills. The survey was then used to identify the types of simulation modalities being used and the topics covered by simulation. Finally, the survey was used to elucidate the various perceptions of, barriers to, and future implications of simulation use in the respective obstetrics and gynaecology residency programs contacted.

METHODS

We developed a survey on the use of simulation in resident education and distributed it to all 16 program directors of active obstetrics and gynaecology residency programs in Canada (Table). We used the internet tool SurveyMonkey for survey distribution and data collection. A response rate of 75% was predetermined as an acceptable sampling of obstetrics and gynaecology residency programs in Canada. The survey was sent to each program up to five times over an 18-month period (unless a specific request to decline

was received). A link to the survey was sent directly to the program director, but occasionally the link was redirected to another faculty member involved in a program's simulation curriculum, or to a senior resident. No ethics approval was required for this project.

RESULTS

We received 12 responses from the 16 active obstetrics and gynaecology residency programs in Canada (a 75% response rate). Responses were received from nine program directors, two other faculty members involved in resident education, and one senior resident. Eleven of the 12 responses were complete. The one incomplete response did not include the forms of simulation used in the relevant program, and the respondent opted not to answer the open-ended questions.

Of the 12 program respondents, 11 (92%) stated that they had introduced a formalized obstetrics and gynaecology simulation curriculum into their residency program. One program did not have a simulation curriculum for either obstetrics or gynaecology. Nonetheless, all programs did report having access to a simulation laboratory through their department (8 of 12, 67%), hospital (7 of 12, 58%), university (8 of 12, 67%) or some combination of these. The quality, albeit subjective, of each program's simulation laboratory was deemed "average" for five programs and "state of the art" for seven.

Programs had developed their own curricula using a variety of simulation modalities and educational techniques. Six of the programs reported using the MORE^{OB} program (Salus Global Corp., London ON). This is a risk management program established to enhance professional development and patient safety on birthing wards. Six programs reported taking part in the Fundamentals of Laparoscopic Surgery Program (Los Angeles, CA) devised to both teach and assess knowledge and technical skills used in basic laparoscopic surgery. Two of the 12 respondents said that their programs required their residents to attain a set competency level on simulators before performing certain procedures on patients.

Programs were reported to use a wide variety of low-fidelity and high-fidelity simulators to educate residents in numerous aspects of obstetrics and gynaecology. For teaching obstetrical skills (Figure 1), programs were reported to use cervical assessment models (4 of 11, 36%), tear repair models (8 of 11, 73%), pelvic models (11 of 11, 100%), full-body birthing simulators such as NOELLE (Gaumard Scientific, Miami FL) or SimMom (Laerdal Medical Canada Ltd, Toronto ON) (8 of 11, 73%), and

ABBREVIATIONS

MORE^{OB} Managing Obstetrical Risk Efficiently

FLS Fundamentals in Laparoscopic Surgical Skills

ALARM Advances in Labour and Risk Management

Simulation training in obstetrics and gynaecology residency programs in Canada questionnaire

Q#1	General information (university, position)
Q#2	Number of residents in your program (by postgraduate year)
Q#3	Number of hospitals affiliated with your residency program
Q#4	Are you a Salus MORE ^{OB} program member?
Q#5	What types of simulation centres do your residents have access to? (department, hospital, and/or university-based)
Q#6	How would you describe the quality of your simulation equipment? (basic, average, or state of the art)
Q#7	Do you have a simulation curriculum in your residency program? (obstetrics, gynaecology, both, or none)
Q#8	Do your residents... <ul style="list-style-type: none"> – take part in the Fundamentals in Laparoscopic Surgery Program? – have access to laparoscopic box trainers they can borrow to take off site? – need to complete certain tasks on simulators before performing them on patients?
Q#9	Please indicate which obstetrical skills you use simulation to teach.
Q#10	Please indicate which forms of obstetrical simulators your program provides access to.
Q#11	If your program uses any other forms of obstetrical simulators, or uses simulation to teach any other obstetrical skills, please specify.
Q#12	Please indicate which gynaecological skills you use simulation to teach.
Q#13	Please indicate which forms of gynaecological simulators your program provides access to.
Q#14	If your program uses any other forms of gynaecological simulators, or uses simulation to teach any other gynaecological skills, please specify.
Q#15	Please describe how simulation has been included in the residents' academic schedule.
Q#16	Since the integration of simulation into your residency program, has there been a perceived improvement in your residents' skill level?
Q#17	How is simulation regarded by the residents?
Q#18	What barriers had/have to be overcome in order to integrate simulation into your residency program?
Q#19	What are your future directions with regard to the use of simulation training in your residency program?

other modalities (2 of 11, 18%). The various technical and non-technical obstetrical skills taught using simulation are listed in Figure 2. One program was reported to have developed its own Caesarean section model for use in simulation training.

For teaching skills in gynaecology (Figure 3), programs were reported to use pelvic models (8 of 11, 73%), intrauterine device insertion models (8 of 11, 73%), laparoscopic box trainers (11 of 11, 100%), virtual-reality laparoscopic trainers (8 of 11, 73%), virtual-reality hysteroscopic trainers (5 of 11, 45%), live animal laboratories (7 of 11, 64%), dead animal laboratories (4 of 11, 36%), and cadaver laboratories (4 of 11, 36%). Moreover, five programs reported providing residents with laparoscopic box trainers that could be used at home to enhance their skills. The various technical and non-technical gynaecological skills taught using simulation are shown in Figure 4. One program also mentioned using an Essure simulator (EssureSim, VirtaMed Inc., Lithia FL) and a Myosure simulator (Hologic Inc., Marlborough MA).

With regard to the integration of simulation into residency training programs, most programs reportedly replaced

didactic sessions with simulation sessions. However, for many the integration of simulation was still in the early stages of development. Programs with a simulation curriculum were reported to have from one simulation session every two months to almost one simulation session per week. The perception among program directors and other faculty members polled was that the general knowledge and performance of residents had improved with the addition of simulation. Others commented that it was too early in the process for an accurate evaluation of their simulation curriculum. One program was reported to have seen a decline in resident performance as a consequence of increasing resident numbers and decreased time spent in the operating room. Simulation feedback had been overwhelmingly positive. Residents wanted more simulation sessions, fewer didactic sessions, and more experience with high-fidelity virtual-reality simulators.

Barriers to the integration of simulation into residency training programs are quite similar between programs, and include the cost of equipment and space and the time constraints on residents and educators. Industry assistance has helped in reducing costs while designated simulation

Figure 1. Obstetrical simulation modalities used

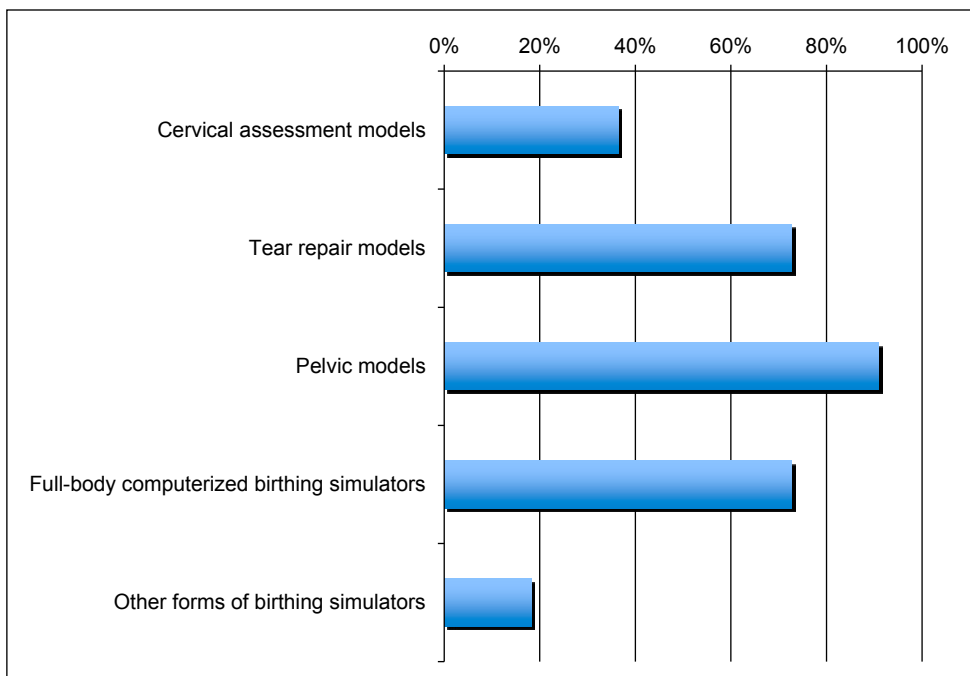


Figure 2. Obstetrical skills taught through the use of simulation

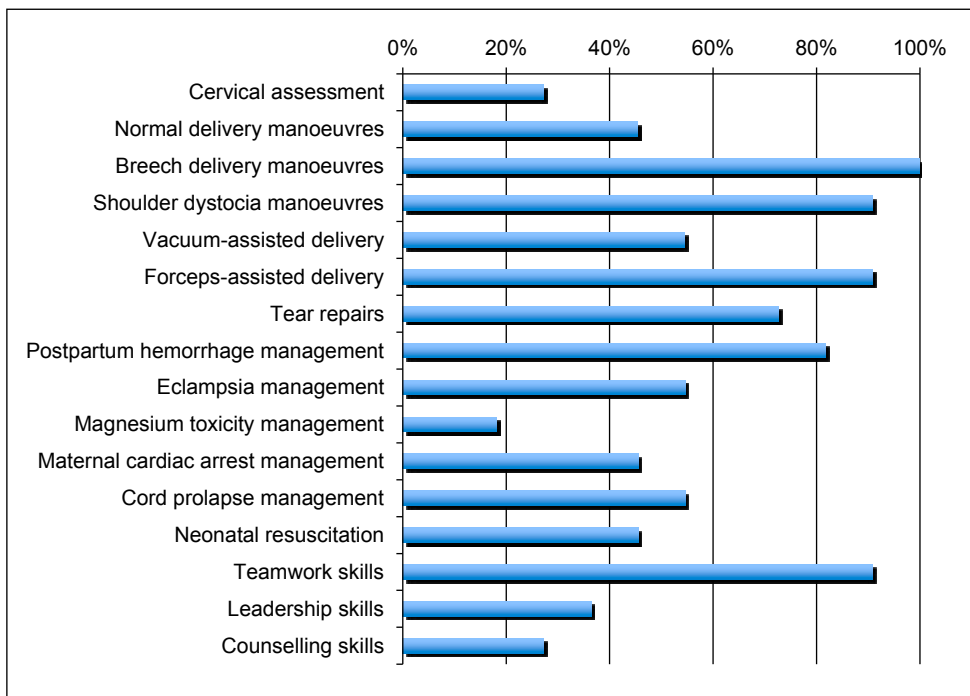


Figure 3. Gynaecological simulation modalities used

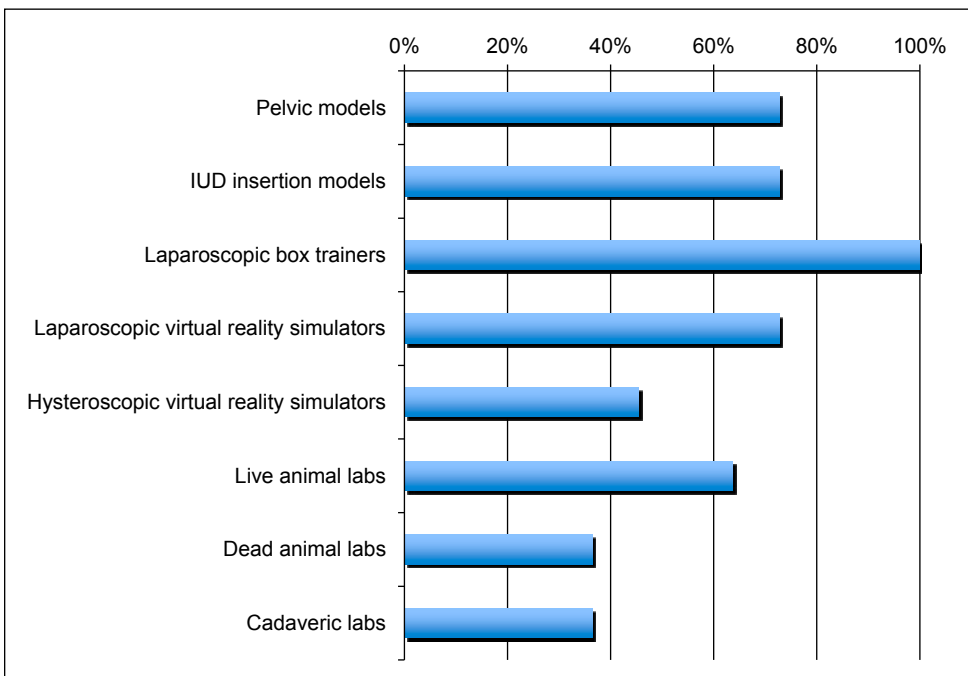
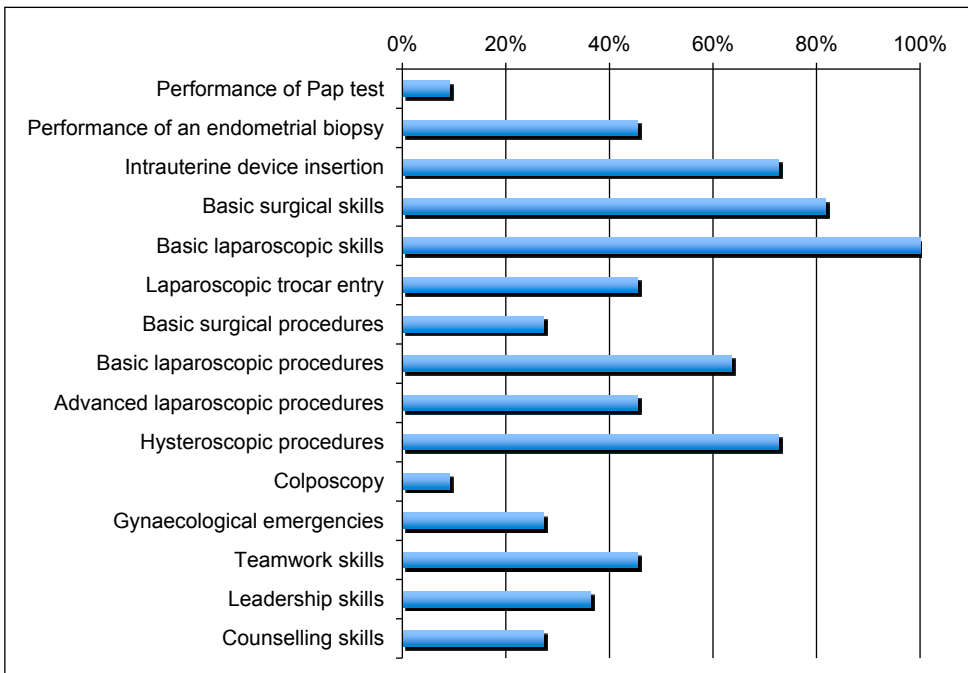


Figure 4. Gynaecological skills taught through the use of simulation



centres help greatly in facilitating simulation sessions. Simulation centres often have dedicated staff members who can play a vital role in the preparation, running, and completion of simulation sessions. This dedicated human resource can greatly reduce the time constraints on university-based educators.

Most programs reportedly aimed to increase the amount of simulation used in their residents' education, including multidisciplinary simulation sessions to enhance teamwork skills between different groups of health care providers. Using simulation to enhance a resident's skills and knowledge in a stepwise fashion to reach predetermined milestones or competencies was found to have increasing appeal. This assessment approach may then be used to determine when residents are ready to transfer their skills from a simulated environment to real life.

DISCUSSION

Although the popularity of simulation is increasing, its incorporation into medical education has been a slow and arduous process, especially in the specialty of obstetrics and gynaecology. The Association of American Medical Colleges identified in a 2011 survey that simulation was most commonly used in internal medicine, emergency medicine, general surgery, pediatrics, anaesthesiology, and obstetrics and gynaecology residency programs.¹⁵ Furthermore, internal medicine,¹⁶ general surgery,¹⁷ and anaesthesiology¹⁸ programs are increasingly using simulation as a method of competency assessment. Obstetrics and gynaecology has lagged behind other specialties in using simulation as a means of resident evaluation, as well as in the development of standardized simulation curricula.^{19,20} In contrast, general surgery programs use the FLS program and the American College of Surgeons/Association of Program Directors in Surgery surgical skills curriculum as tools for both resident education and assessment. Both the FLS program and the surgical skills curriculum have been shown to improve resident performance in real life scenarios.^{21–23} The validity of the FLS program for use in obstetrics and gynaecology residency programs has also been assessed.^{24,25} The FLS program comprises both a skills and a cognitive component. Because it is more focused on general surgery, the cognitive component of the FLS program has been found to be less reliable for use in obstetrics and gynaecology resident education.²⁶ Nonetheless, obstetrics and gynaecology resident education is currently deficient in its use of standardized simulation curricula.

A survey in 2011 found that 14 of the 16 active obstetrics and gynaecology residency programs in Canada (88%)

had a simulation centre on site or nearby. Seven programs had a formal technical simulation curriculum, four had a formal non-technical simulation curriculum, and three programs reported having both.²⁰ A more recent survey on laparoscopic training in accredited obstetrics and gynaecology residency programs in North America found that 96% of programs had access to a simulation skills laboratory and 73% had some form of a laparoscopic training curriculum. Despite this, 41% of programs reported not being satisfied with their current form of laparoscopic training.²⁷

The present survey identified that the use of simulation is increasing in obstetrics and gynaecology resident education. All respondents indicated that they have access to a simulation laboratory, and 11 of the 12 respondents reported having some form of a simulation curriculum. Most respondents stated that their program's simulation curriculum was still in the early stages of development and that they were struggling with challenges imposed by time constraints and costs. However, since the 2011 survey,²⁰ there has been an increase in the use of simulation in obstetrics and gynaecology resident education in Canada, although its development has been slow.

Numerous studies have validated various simulation modalities and sessions for use in obstetrics and gynaecology resident education. In obstetrics, simulation has been shown to improve residents' actual performance in managing shoulder dystocia,^{1,2} eclampsia,²⁸ breech vaginal deliveries,¹³ and postpartum hemorrhage.²⁹ Furthermore, simulation training has improved residents' confidence levels²⁹ and their teamwork and leadership skills on labour and delivery units.^{30,31} Likewise, in gynaecology, simulation can improve a resident's actual performance in basic laparoscopic⁵ and hysteroscopic skills,¹⁰ and can be used as an assessment tool to predict a resident's live operative performance.¹¹

Educational research in the use of simulation does have limitations. Most studies have a small sample size and are performed at a single institution.³² This limitation introduces a high risk for bias when interpreting results and may limit a study's external validity. Additional research is also needed on whether simulation is of similar benefit to junior and senior residents. Likewise, more educational research is needed on retention from simulation sessions and the frequency with which such sessions must be repeated in order to maintain knowledge or skills.³³ Lastly, how much simulation is too much? It is difficult to assess at what point the benefit from simulation exercises plateaus. It is time for research to move away from the validation of simulation modalities and towards defining what is

necessary to optimize curriculum development and the integration of simulation into resident education.

Two primary barriers have limited the incorporation of simulation into resident education: the cost of equipment and space, and the need for dedicated time for residents and educators.³⁴ Nonetheless, institutions, departments, and hospitals have spent large sums of money on simulation centres and equipment before developing simulation curricula.³⁵ Thus, it appears that time constraints have been the more significant barrier. There has subsequently been a call to increase collaboration between different North American obstetrics and gynaecology residency programs and between obstetrics and gynaecology residency programs and those of other surgical specialties.^{17,20,36,37} This collaboration would lessen the time constraints associated with curriculum development, limit a program's need to develop its own curriculum, and help to standardize resident education across centres. This will become increasingly important as postgraduate medical education transitions to competency-based methods of assessment.³⁸

In Canada, the recently developed Surgical Foundations curriculum,³⁹ modelled on the CanMEDS framework,⁴⁰ is now a requirement in most Canadian surgical residency programs (i.e., general surgery, vascular surgery, cardiac surgery, neurosurgery, plastic surgery, orthopedic surgery, otolaryngology, and urology). All accredited obstetrics and gynaecology residency programs in Canada recently voted to make this a requirement in their programs as well. Surgical Foundations is a two-year curriculum consisting of didactic and simulation sessions covering core competencies in basic surgical knowledge and skills. For further curriculum development, other simulation-based sources that may be of help include the Association of American Medical Colleges, which houses an online repository of simulation sessions and curricula available for widespread use.⁴¹ Specific to obstetrics and gynaecology, programs such as MORE^{OB} and ALARM focus on using simulation as an educational method for health care providers. National and international collaboration may be fostered through various committees and interest groups such as the Association of Academic Professionals in Obstetrics and Gynaecology Education Innovation Committee and the obstetrics and gynaecology simulation interest group at the Simulation Summit of the Royal College of Physicians and Surgeons of Canada.

To date, extensive effort has been put into various levels of research and development directed at simulation for resident education. In a recent article on laparoscopic training for gynaecology residents, Shore et al. proposed three clear recommendations: (1) simulation should be used

in all surgical residency programs across North America; (2) programs should adopt a unified approach to simulation-based education; and (3) simulation should be used to assess competencies before both real-time performance and specialty certification.²⁷ These recommendations can easily be generalized to include the field of obstetrics as well. Ultimately, what remains for obstetrics and gynaecology residency programs is to synthesize current research, knowledge, simulation modalities, and curricula into a unified and standardized simulation curriculum for use in postgraduate medical education. This process, however challenging, will be facilitated and aided through the collaboration of different centres and specialties, both nationally and internationally.

CONCLUSION

Simulation is increasingly relied upon for both education and assessment of residents because of resident work hour restrictions, increases in program sizes, and a reduction in tolerance for medical error. The integration of simulation into postgraduate education has been slow and has been hampered by barriers related to costs and time constraints. The present survey indicates that the majority of obstetrics and gynaecology residency programs in Canada have attempted to introduce some form of formal simulation training into their program. All respondents reported having access to simulation centres; however, a standardized simulation curriculum for use nationally in obstetrics and gynaecology resident education and evaluation has yet to be developed. Such a curriculum is increasingly required to standardize resident education, facilitate competency-based assessments, and ensure that residents across the country receive comparable training. In order for this to occur, national collaboration is needed across centres and specialties. A shift in focus is necessary, from the development of multiple individual curricula to the sharing of ideas and resources. The ultimate goal should be to have a single educational curriculum that will meet the needs and requirements of all obstetrics and gynaecology residents in Canada.

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