



REVIEW ARTICLE

Strategies for Teaching and Assessing Obstetrics and Gynecology Ultrasound Skills: Donald School Model

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ABSTRACT

Ultrasound is a powerful tool that can improve patient safety, save lives and reduce the cost of healthcare services in both developed and developing countries. A critical step in this direction is the availability of high quality training programs and continuous medical education. While scientific medicine is based on evidence, practice of ultrasound commonly relies on the combination of clinical reasoning, experience, application of modern ultrasound technology, pattern recognition and expert clinical judgment. Sonographer's communication and interpersonal skills, empathy, tolerance and personal knowledge of the patient are equally important for the successful practice of ultrasound scanning. In this article we will define the Donald School standards and practices of obstetrics and gynecology ultrasound training, discuss the most efficient strategies for encouragement of the professional behavior, life-long learning and improvement of the ethics of ultrasound scanning.

Keywords: Point of care ultrasound, Obstetrics and gynecology ultrasound curriculum, Professionalism, Liability for negligence, Ethics of ultrasound scanning, Life-long learning.

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INTRODUCTION

The use of diagnostic ultrasound by nonradiologists has expanded in recent years, primarily due to ultrasound safety, friendly use, lower price, accessibility and portability of the ultrasound equipment. It seems that 'point of care ultrasound', used by the physician at the time of physical exam to help diagnose the problem is more efficient than complete sonographic examination at Radiology

Departments.¹ While radiologists have years of training in the modality, clinicians are equipped with clinical reasoning, skills and detailed patient information, which can expedite the evaluation process by providing immediate results. On the other side, radiologists may argue whether faster diagnosis always means more accurate diagnosis. Ultrasound users have to be aware that potential pitfalls such as lack of training, poor resolution and inadequate setting of the ultrasound machine may lead to false positive diagnosis which may increase patient anxiety and add additional diagnostic procedures and tests. Clearly we are on the crossroads where we have to determine whether ultrasound is ready to become the stethoscope of the future.

There are many unanswered questions about ultrasound: who should be performing it, when and how? What are the minimum education standards for residents to refer to when establishing different residency programs? How to create an ultrasound curriculum, how to conduct hands-on training and how to assess learners' competency? I believe that basic ultrasound education should be provided to all medical students and all the practicing physicians. This is the only way how image acquisition and interpretation will be truly integrated into daily clinical practice of family medicine and emergency medicine physicians, anesthesiologists, cardiologists, internal medicine specialists, trauma surgeons, obstetricians and gynecologists, pediatricians and neonatologists. The ability to efficiently use ultrasound findings when providing patient care in a busy clinical environment will change the way we practice medicine.

Clearly, there are many medicolegal issues with the use of 'point of care ultrasound' to start with adequate training, appropriate data storage, quality control and outcome assessment.¹ Ultrasound images obtained at the time of physical exam have to be stored into the patient's medical record, meaning that technology and infrastructure should allow us to permanently monitor the quality of sonographic exams.

Ultrasound is a powerful tool that can improve patient safety, save lives and reduce the cost of healthcare services in both developed and developing countries. A critical step in this direction is the availability of high quality training programs and continuous medical education. In this article we will try to answer some of the questions related to

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obstetrics and gynecology ultrasound education, hoping that it will stimulate communication and collaboration between the educators in the field to develop a strong database of information and distance learning resources that can be shared in medical school curricula worldwide for the benefit of our learners.

How to Teach the Art of Ultrasound Scanning?

Clearly, ultrasound is much more than physics and knobology. In many textbooks you will find that ultrasound scanning is defined as art. In obstetrics and gynecology, patients are seeking help because of reproductive health issues. Sometimes female patients come for an annual or well woman exam. However, the most common problems why patients are referred to ultrasound are the following clinical presentations: pelvic pain, abnormal uterine bleeding, pelvic mass, amenorrhea, infertility, menopause, pelvic floor relaxation, contraception counseling, pregnancy assessment and pregnancy complications. While scientific medicine is based on evidence, practice of ultrasound commonly relies on combination of clinical reasoning, experience, application of modern ultrasound technology, pattern recognition and expert clinical judgment. Sonographer's communication and interpersonal skills, empathy, tolerance and personal knowledge of the patient are equally important for the successful practice of ultrasound scanning. According to patients' surveys, sonographer's ability to listen and communicate with respect is the main reason why waiting rooms of some sonographers are packed, while others remain empty.

Curriculum Development: Standards and Principles

The number of examinations necessary to ensure competence in ultrasound scanning varies for different ultrasound applications. In its publication World Health Organization (WHO) proposed the following guidelines in terms of number of examinations for obstetrics and gynecology ultrasound training:²

1. 50 pelvic ultrasound examinations
2. 50 first trimester pregnancy examinations, and
3. 200 second and third trimester examinations.

In this report, international group of experts provided collective views on principals of scanning, requirements for teachers of sonographers, specifics of learners' evaluation, requirements of the regional and national centers and specification of ultrasound equipment for different levels of training.² Using a similar model, Ian Donald School of Medical Ultrasound with more than 80 national branches worldwide, developed curricula, which were adopted for basic, advanced and specialized training of the physicians

and healthcare professionals who use obstetrics and gynecology ultrasound. National branches are involved in the development of training programs, setting training standards, identifying learning objectives, organizing and carrying out training courses in collaboration and under close supervision of Donald School Directors and the Executive Board. The training, equipment and practice of ultrasonography are oriented toward local healthcare problems and specific needs assessment of the national branches.

Creative and Innovative Educators

Current educational systems value memorization over thinking skills. Evaluation of the learners is also based on the assessment of the memorized information. Students are rarely asked to think deeply about the clinical presentation of their patient and are not encouraged to ask their own questions. Instead of developing their individual relationship to the knowledge they have acquired from different sources, they are commonly asked to think about the list of differential diagnosis and standard treatment options. In other words, they are not encouraged to practice the art of medicine.

Sonographers observe the information on the screen and usually take it as 'end-point' to write a description of their findings and impression portion of their report. In my opinion, the image on the screen should be a starting point for sonographer's report. Based on clinical symptoms, patient's information, clinician's knowledge and experience and appropriate use of ultrasound technology, the sonographer should define the most likely diagnosis. While routine scans of uterine fibroids and simple ovarian cysts do not require further discussion, all levels of learners may benefit from discussion, debate and disagreement about the 'interesting cases'. Critical thinking about these difficult case studies contribute to productive exchange of ideas, development of collegiality and team work, appreciation of tolerance, listening to others' opinion and responsibility of the learner to create and defend his/her own position.³ By practicing creative thinking we are preparing our learners to take an active role in the debates and discussions at regional, national and international conferences. A transition to creative thinking sessions should be initiated by educators and motivated by learners. However, be aware that change takes time and requires institutional support.

Passionate Learners

Passion is described as a powerful emotion, such as love and joy. It is often said that passionate people can change the world for the better. Hospitals and medical schools are incessantly looking to recruit passionate physicians because they know that their enthusiasm will positively affect patients' experience. So, how to develop someone's passion for ultrasound?

Passion for ultrasound is something that learners develop as they invest in the hard work and realize the benefits of sonography in daily clinical practice. Passion for ultrasound helps them to be more creative, persistent and search diligently for solutions that will benefit their patients, institution and collaborators.

Encouragement of Professional Behavior

The aim of medical profession is to heal. In addition to the cognitive skills such as data gathering, patient management, ability to perform meaningful ultrasound examination, ultrasound guided procedures and appropriately use information technology, sonographer's interaction with patients includes noncognitive skills, such as communication skills, interprofessional collaboration and specific behaviors, such as responsibility, maturity and respect for patients. The real challenge for educational programs is to create an integrated and coherent program that facilitates professional behavior. Programs must ensure that they provide experiential learning of all the aspects of professionalism either in real or simulated case examples and assure enough time for structured reflection on these experiences in a safe environment.⁴ Valid and consistent formative assessment of learners' professional behavior requires faculty to properly model learner's professional behavior. In this respect faculty development is the most appropriate tool to get faculty 'buy in'.⁵ Professionalism is multidimensional and it consists of adherence to ethical practice principles, effective interactions with patients and their families, effective interactions with people working within the healthcare system, reliability and commitment to improvement of competence in oneself, others and systems.⁵ Complexity of professional behavior requires development of effective methods of evaluation which should include self-assessment, peer evaluation and longitudinal observation.⁶

Awareness of Liability for Negligence

Based on surveys performed by American Institute for Ultrasound in Medicine (AIUM) and American College of Obstetricians and Gynecologists (ACOG) numerous cases of diagnostic ultrasounds in Obstetrics and gynecology have been filed which are at various stages of litigation.⁷ The majority related to failure to diagnose ectopic pregnancy, adnexal torsion, multiple pregnancies and detect fetal anomalies.^{8,9} A number of other cases concern failure to perform ultrasound when deemed appropriate. The remaining cases are related to misinterpretation of the results, visualization of the artifacts that were mistaken for lesions, delay in communication with referring clinician and sonographer-related issues.⁷

Because ultrasound is a fast evolving field, the following questions should be addressed by international and national ultrasound societies:

1. What are the indications for obstetrics and gynecology ultrasound?
2. Does the practice of ultrasound scanning vary by location and expertise availability?
3. What is the standard of skills and minimal training requirement in regard to performance and interpretation of ultrasound?
4. Does the standard of care ultrasound differ for primary care physicians, radiologists, obstetricians and gynecologists, sonographers and other physicians who use 'point of care ultrasound'?

Ethics of Ultrasound Scanning

Ethics is an emerging subdiscipline of ultrasound scanning because there are clinical dimensions of sonography that only ethics can identify and address.¹⁰ Being defined as the disciplined study of morality, ethics is deeply involved in many aspects of ultrasound scanning. To promote excellence in patient care by fostering responsibility and accountability among diagnostic medical sonographers, Society of Diagnostic Medical Sonographers (SDMS) has issued the code of ethics.¹¹ In order to promote patient well-being the diagnostic medical sonographer shall provide information to the patient about the purpose of the sonography procedure and respond to the patient's questions and concerns. Patient's autonomy, individuality and the right to refuse the procedure should always be respected and recognized. The care should be provided in a nonjudgmental and nondiscriminatory manner, promoting the privacy, dignity and comfort of the patient by thoroughly explaining the examination, patient positioning and implementing proper draping techniques. Confidentiality of acquired patient information should be maintained according to national and international patient privacy regulations. Patient's safety should be promoted during the provision of sonography procedures and while the patient is in the care of the diagnostic medical sonographer.

To promote the highest level of competent practice, diagnostic medical sonographers shall obtain appropriate diagnostic medical sonography education and clinical skills to ensure competence, achieve and maintain specialty specific sonography credentials.¹¹ Sonography credentials must be awarded by a national sonography credentialing body that is accredited by a national organization which accredits credentialing bodies. The sonographer should uphold professional standards by adhering to defined technical protocols and diagnostic criteria established by peer review. Each physician and/or sonographer should acknowledge personal and legal limits, practice within the defined scope of practice and assume the responsibility for

his/her actions. Continued competence should be maintained through lifelong learning, which includes continuing education, acquisition of specialty specific credentials and recertification.¹¹ Sonographer should always perform medically indicated ultrasound studies, ordered by a licensed physician or their designated health care provider; protect patients and/or study subjects by adhering to oversight and approval of investigational procedures, including documented informed consent. Sonographer should be accountable and participate in regular assessment and review of the equipment, procedures, protocols and results.¹¹

To promote professional integrity and public trust, SDMS states that the diagnostic medical sonographer shall be truthful and promote appropriate communications with patients and colleagues; respect the rights of patients and colleagues; avoid conflicts of interest and situations that exploit others or misrepresent information; accurately represent his/her experience, attend education and credentialing; promote equitable access to care; collaborate with professional colleagues to create an environment that promotes communication, respect an ethical practice; engage in ethical billing practices; engage only in legal arrangements in the medical industry, and report any deviations from the Code of Ethics to the institutional leadership for internal sanctions, local intervention and/or criminal prosecution.¹¹

SDMS Code of Ethics is very similar to the one issued by Donald School of Ultrasound, as are the objectives to promote the science and art of ultrasound scanning through research and education in the field of medical ultrasound, by providing continuous training and facilitating the dissemination of information through scientific publications.

Learning Ultrasound is Cool

Since the first day I have touched the probe I have not stopped learning and becoming more proficient in ultrasound. And when you think that you have seen everything, you realize that there is a new dimension to the ultrasound scanning: 3D and 4D ultrasound. Indeed, there is always something new to learn and apply to your ultrasound practice. Performing research in the dynamic field of ultrasound, sharing experience, teaching junior faculty and students, and above everything - helping your patients is very rewarding. As educator I would like to add, teaching ultrasound in obstetrics and gynecology is also fun and cool!

Ready for Practice Based Learning

Practice based learning is education that originates from experiencing real work in real situations. This kind of learning experience has always been a prerequisite for medical profession and is traditionally used in ultrasound

education. It is well known that practice is the most important ingredient of effective instruction. It has been demonstrated that practice based learning speeds up the learning process, aids long term retention and facilitates recall.¹² If practice is delayed for any reason, the instruction is considered less effective.¹³ To develop mastery of ultrasound scanning learners must acquire clinical knowledge (including basic sciences, such as anatomy and physiology), understand the basics of physics, and obtain ultrasound scanning skills. Integration of knowledge and scanning skills is mandatory for performing complex ultrasound scanning and achieving optimal hand-eye coordination. Practice and repetition lead to greater fluency and automaticity, which increases the efficiency, accuracy and precision of the sonographic exam. Finally, learners must know the indications for ultrasound exam to understand when and how to apply what they have learned.

Prepared for Lifelong Learning

I continue to be surprised with the number of people who believe that they have completed their education by obtaining a certain degree or diploma. Degree is only a passport to start gaining the experience and start learning by doing. Curious ones who learn by thinking and who always want to know more are those who will clearly become engaged in lifelong learning.

Lifelong learning is defined as learning that is pursued throughout life, learning that is flexible, diverse and available at different times and different places.¹⁴ Four 'pillars' applied to lifelong learning in ultrasound would read as:^{14,15}

1. *Learning to know*: Mastering learning tools rather than acquiring structured knowledge (the most appropriate learning tools in ultrasound education are interactive tutorials, learning modules consisting of videos, didactics, case studies and assessment portion).
2. *Learning to do*: Equipping sonographers for ultrasound scanning including innovation and adaptation of learning to their future work environment (implies training on the equipment sonographers will use in their practice/clinic).
3. *Learning to live together and with others*: Developing culture of collaboration and team work simultaneously with development of individual competence is best preparation for inter-professional education which fosters the ability to peacefully resolve conflict between physicians of different specialties, radiologists, sonographers, nurses and other healthcare providers.
4. *Learning to be*: Developing the ability to keep learning for a lifetime in the formal, semi-formal and non-formal settings implies nurturing person's complete development by promoting the professional growth and continuous medical education.

CONCLUSION

Ian Donald Inter-University School of Medical Ultrasound is an interesting educational model, predominantly based on learners' self-reflection. National branches are in charge of organizing educational activities which enable them to achieve the goals that are relevant and specific to their geographic location. It is the responsibility of expert educators and Donald School leadership to create the most appropriate learning activities which will allow different levels of learners to achieve their individual and group goals, define incremental steps and specific plans for each level of competency, create measurable learning objectives and define a realistic timeline for goals completion. Ian Donald Inter-University School of Medical Ultrasound's motto to promote the science and art of ultrasound scanning by implementing recent ultrasound advances with confidence, creativity and enjoyment has become its practice.

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