

# Ultrasound Education in the United States

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## ABSTRACT

More than any other diagnostic modality, ultrasound has made dramatic imprints on diagnosis of pregnancy, fetal well-being, detection of anomalies and aneuploidy, fetal surgery and intrauterine interventions, and early detection of pelvic masses and uterine anomalies. Continuous ultrasound education is needed to provide health care professionals the proper environment to make sound clinical judgments, accurate diagnosis and management plans. As medical technology becomes more sophisticated, new medical training will evolve. The medical educators' responsibility is to ensure that new technology will be used properly to improve and maintain the health of patients.

This is a review article on obstetrics and gynecology ultrasound education in the United States of America with specific focus on Hawaii experience.

**Keywords:** Ultrasound, Obstetrics, Gynecology, Education.

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## INTRODUCTION

The increased speed to acquire new medical knowledge, insights and research is demanding, especially in arranging ways that are innovative, creative, effective, concise and efficient. Organized, lifelong learning is becoming necessary and mandated by medical boards in order to maintain medical licensure and board certifications.<sup>1</sup> The American Board of Obstetrics and Gynecology (ABOG) has implemented learning principles and annual recertification process. An example is ultrasound education. In the last century, ultrasound has changed the practice of medicine. This is even more applicable to the field of obstetrics and gynecology. More than any other diagnostic modality, ultrasound has made dramatic imprints on diagnosis of pregnancy, fetal well-being, detection of anomalies and aneuploidy, fetal surgery and intrauterine interventions, and early detection of pelvic masses and uterine anomalies. More than ever ultrasound education is needed to provide health care professionals the proper environment to make sound clinical judgments, accurate diagnosis and management plans. Only then can contemporary OB/GYN physicians think and act confidently and effectively for the benefit of patients and the unborn fetuses. This is done with the strong belief that ultrasound education is driven by innovative thinking, adaptability and collaboration.

With the rapid advances in medical technology, ultrasound education now faces challenges on the 'best' techniques to train medical students, residents and fellows. Medical specialties across the USA have made it a requirement to obtain formal imaging training during residencies and fellowships. In obstetrics and gynecology, the use of ultrasound in diagnosis and management has become a necessity in everyday practice. It is seen as a 'virtual light' into the pelvis, making the 'miracle of life' visible as early as 6 weeks of gestation. Formal training provides practical skills in performing and interpreting ultrasounds. The physician is also provided with essential knowledge and training in obstetric ultrasound safety, which was previously lacking in the training of obstetrics residents and maternal-fetal medicine (MFM) fellows.<sup>2</sup> A successful ultrasound curriculum was implemented at Madigan Army Medical Center and shown to improve learning performance in obstetric residents.<sup>3</sup> At the John A Burns School of Medicine (JABSOM), the Department of Obstetrics, Gynecology (OB/GYN), and Women's Health implemented a similar formal ultrasound curriculum for residents and fellows.

## Medical Student Education

Currently, there are no formal requirements for ultrasound education for medical students. At JABSOM, University of Hawaii, medical students on their third year OB/GYN rotation are exposed to basics in ultrasound. They observe residents performing ultrasound examinations in labor and delivery suite, clinics and emergency room. An additional opportunity for the medical student is to observe ultrasound examination performed at the Fetal Diagnostic Center, Kapiolani Medical Center for women and children.

## Residency Education

The OB/GYN residency ultrasound curriculum at JABSOM was designed to fulfill the education objectives established by the Council on Resident Education in Obstetrics and Gynecology (CREOG) and American Institute of Ultrasound Medicine (AIUM). OB/GYN residents undergo 1 month of formal obstetric ultrasound education in their 1st year and 1 month of formal gynecology ultrasound education in their 4th year. In addition, there is ultrasound exposure throughout the entire residency program (e.g. labor and delivery rotation, emergency room, resident's clinics). The

ultrasound curriculum consists of both didactics and hands-on training. Registered sonographers who are highly experienced and specialized in OB/GYN ultrasound teach ultrasound techniques, optimization of images and instrumentation, anatomical survey and biometry. Special emphasis is on the residents' ability to properly scan patients by using different ultrasound techniques (transabdominal and transvaginal ultrasound, Doppler ultrasound, 3D/4D ultrasound), report the findings and establish diagnosis and management plans. After completing the obstetrical ultrasound curriculum, the resident is expected to demonstrate an investigatory and analytic thinking approach to clinical situations related to OB/GYN ultrasound. They must also be able to identify normal fetal ultrasound findings, abnormal fetal conditions/anomalies and maternal complications in pregnancy. They are expected to develop clinical proficiency in performing and interpreting basic obstetrical ultrasound exams. The gynecologic ultrasound curriculum requires the resident to be able to perform and interpret transvaginal and abdominal ultrasound, including sonohysterography for gynecologic patients. They should be able to identify normal and abnormal ultrasound patterns associated with organs and structures of the female reproductive system. Upon surveying the previous graduates of the residency program, the majority felt that the formal curriculum provided adequate training.

### **MFM Fellowship Education**

In 2009, JABSOM's Department of Obstetrics, Gynecology, and Women's Health initiated a fellowship in MFM. It was prompted by a 2008 survey of MFM physicians that found the majority of time in practice was spent in ultrasonography.<sup>4</sup> To prepare fellows for the ultrasonography aspect of MFM practice, obstetric ultrasound training was implemented followed the guidelines set forth by the ABOG, the accrediting body for nationwide fellowship programs in MFM. During the 3-year fellowship program, fellows have five 1-month dedicated rotations in MFM Imaging. During these periods, fellows focus on hands-on scanning, image interpretation, patient counseling and exposure to advanced imaging modalities such as Doppler, fetal echocardiogram, 3D/4D ultrasound, and invasive ultrasound guided procedures, including chorionic villus sampling (CVS), percutaneous umbilical blood sampling (PUBS) and amniocentesis. In addition, the imaging curriculum for fellows requires them to show competency in performing detailed obstetric ultrasound examinations, interpreting images and identifying anomalies, and counseling patients about risks, benefits and alternatives of various invasive fetal testing. If an anomaly is found, they must be able to

provide counseling on management options and discuss prognosis. Fellows also have the ability to gear their learning toward a specific facet of ultrasound that is of particular interest to them. The program offers faculty with the establishment of additional expertise in CVS, fetal echocardiogram as well as gynecologic ultrasound.

### **Continuing Medical Education**

Continuing medical education (CME) is a large component of ultrasound education for physicians who trained prior to the institution of formal ultrasound training during their residency. Additionally, ultrasound trained specialists and sonographers need to keep their knowledge and skills continuously updated and challenged with rapidly developing techniques in ultrasound and genetics. In conjunction with the Ian Donald Interuniversity School of Medical Ultrasound–Hawaii Branch, the Department of Obstetrics, Gynecology, and Women's Health at JABSOM was first to bring CME in OB/GYN ultrasound to Hawaii. Since 2005, the department has held the 'contemporary OB/GYN ultrasound: recent advances and clinical practice' conference biannually. The conference has grown from a modest 1-day course held at Kapiolani Medical Center for women and children to a 2-day conference held at the Ala Moana Hotel with nationally and internationally renowned speakers and participants. The goals of the conference are to effectively educate the OB/GYN community in Hawaii on the recent innovations and trends in obstetrics and gynecologic ultrasound as well as to provide a foundation for those physicians who perform office ultrasounds.

By providing high quality CME in OB/GYN ultrasound in Hawaii, our local physicians, sonographers and allied health care professionals are given the option to attend a high quality, focused conference and earn their CME credits without having to travel out of state and having to close their practices. In addition, it accommodates medical students, residents and fellows to gain ultrasound education in a high quality forum to discuss different clinical scenarios and diagnostic challenges. Interactive sections with audience participation and discussions are especially well received.

The next OB/GYN ultrasound conference will be held on September 13th to 14th, 2013. Conference information can be found at the web link: [www.ultrasoundhawaii.org](http://www.ultrasoundhawaii.org).

### **The Future**

Formalized ultrasound education should be considered in the curriculum for medical students. Currently, there are only two US Medical Schools that have developed a 4-year ultrasound curriculum.<sup>5</sup> At the Ohio State University College of Medicine, a formal ultrasound training program

that focuses on ultrasound physics, terminology, knobology, and focused protocols have been in place since 2000. Beginning of 2005, an advanced ultrasound education that includes imaging interpretation was added.<sup>5</sup> Their students have graduated from medical school with advanced knowledge and skills in ultrasound that have helped them excel in their careers.

New technology is accompanied by new procedures. OB/GYN residents are required by CREOG to understand and perform 3rd trimester amniocentesis under ultrasound guidance. MFM fellows are required by ABOG to perform genetic amniocentesis, CVS and PUBS under ultrasound guidance. Simulation trainings have evolved in the past few years to fulfill these requirements. Simulation models can range from simple self-made models to sophisticated machines. For example, a self-made amniocentesis training model has been described to be made out of an exam glove, condom, tap water and needle.<sup>6</sup> On the contrary, the simulation model was commercially built to contain a realistic pelvic anatomy made from materials that match the acoustic characteristics of real human tissue. These models are constantly improving to meet training needs.

As medical technology becomes more sophisticated, new medical training will evolve. The medical educators' responsibility is to ensure that new technology will be used properly to improve and maintain the health of patients.

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