POSTER TITLE

Author name[1], presenting author[2]
[1]Institution, [2]Institution

Abstract

Contact information:
Name
Email
Institution
City, State, Country

Abstract #

The Use of Echocardiography in the Simulation Center to Foster the Teaching of Cardiac Auscultation Skills

James Day, BA, RDCS[1]
[1]Thomas Jefferson University, Philadelphia, Pennsylvania, United States

INTRODUCTION: Although proficiency in cardiac auscultation remains a fundamental skill in health care practice, echocardiography now plays a major role in the assessment of cardiac valve and wall function. These two sets of examinations are complementary in clinical practice; thus there may be a significant benefit to teaching them together during a physical diagnosis course. We describe here a pilot curriculum to teach bedside echocardiography concurrent to and in the context of cardiac ausculation.

HYPOTHESIS: Providing training with a bedside echocardiograph as a component of teaching cardiac ausculation improves the quality of the teaching and the acumen of the learner for both Echocardiography and cardiac auscultation.

METHODS: We have developed training modules to teach bedside echocardiography that have been piloted in our Advanced Physical Diagnosis (APD) Course. The APD course is an elective intensive course in physical examination for senior medical students that has an OSCE for physical examination skills before and after the intervention. In this course there is a discussion of best techniques and evidence to support the physical examination followed by structured practice with patients with real cardiac findings. In this manner all learners ausculate and examine patients with various common systolic heart murmurs including aortic stenosis, mitral regurgitation, VSD and tricuspid regurgitation. The course is taught at our Clinical Skills and Simulation Center. This past year we developed and implemented a three hour bedside echocardiography module to complement the systolic murmur teaching session. In this module, the instructor, who is a certified echocardiographer, spends the first hour describing the basics of cardiac ultrasound, then demonstrates the use of a bedsdie echo on an SP without findings. For the next hour, the learners have hands-on practice using the bedside echocardiographic equipment. In third hour 1-2 patients with real findings are examined by the faculty and students using both a stethoscope and the echocardiograph. A qualitative assessment of the module was asked of the students at the end of the course.

RESULTS: Over the past academic year, 64 students completed the pilot module in the APD course. Students have provided positive feedback on this module. The program will be increased in the upcoming academic year by adding a similar session on diastolic murmurs. We plan on adding 3 new cardiac ausculation stations to our APD OSCE to assess the impact of this new intervention on the cardiac examination skills of these learners after this intervention.

DISCUSSION/CONCLUSION: Echocardiography is not only clinically useful for diagnosing cardiac pathology, but also may be a useful complementary tool to teach cardiac ausculatation to health care professionals in the simulated and clinical environment.

Contact information:
James Day, BA, RDCS
James.day@jefferson.edu
Thomas Jefferson University
Philadelphia, Pennsylvania, United States

Abstract #3

Using Ultrasound Real Time Scanning and Simulation-Based Training to Teach Ultrasound Guided Central Venous Line Placement

James Day, BA, RDCS[1], John Kairys, Kate Berg, Dale Berg
[1]Thomas Jefferson University, Philadelphia, Pennsylvania, United States

INTRODUCTION: A new standard of care is emerging for the use of ultrasound with central venous line placement to reduce the number of errors previously associated with blind anatomical CV placement. This has tasked healthcare education to begin to train new residents in the use of ultrasound guided CV placement. The overall goal of this workshop, which involved multidisciplinary residency programs, was to improve the technical skills, by providing first-year residents with simulation based training in the performance of ultrasound guided CV placement.

METHODS: In July 2008, 162 interns from several specialties, OB-GYN, General Surgery, Anesthesia and Internal Medicine were rotated through 6 stations. Qualitative assessment of previous experience was done via questionnaire, followed by instruction via an audio visual presentation on the technique of ultrasound guided CV placement. This was in conjunction with faculty guided simulation-based instruction and demonstration. The vascular anatomy was demonstrated by scanning a first year resident to show a pusatile carotid artery and a standing collapsed vein. A Valsalva maneuver was used to show an enlarged vein where insertion would take place. The CV placement technique was then performed on a Simlab task trainer using a Sonosite Micromaxx ultrasound machine followed by a Sonosite ilook ultrasound machine. Residents then practiced the ultrasound guided procedure on the simulation models. To assure competency, faculty observed and rated performance via a checklist for CV placement technique.

RESULTS: Preliminary data suggests an increase in the ability to perform the CV technique as assessed by faculty checklist. An overall satisfaction and increase in confidence level was reported by the residents with the exposure to multiple ultrasound machine usage and the use of various CV kits. In addition, residents felt ultrasound principles, when used with lo-fidelity models increased their ability and confidence level. First year residents also felt identification of anatomical vessels by ultrasound on each other was helpful in visualizing anatomy.

DISCUSSION: We describe an innovative curriculum pilot teaching first year residents to use ultrasound guided central line placement. First year residents presented with variable experience with CV placement from medical school. Qualitative assessment shows improvement of skills and confidence level after simulation-based training in the performance of ultrasound guided CV placement.

Contact information:
James Day, BA, RDCS
James.day@jefferson.edu
Thomas Jefferson University
Philadelphia, Pennsylvania, United States

Sonographic measurement of uterus and ovaries in premenarcheal healthy girls between 6 and 13 years old: Correlation with age and pubertal status

Maryam Razzaghy-Azar, MD, Fariba Ghasemi, MD, Farideh Hallaji, MD, Abbas Ghasemi, MD, Mehdi Ghasemi[3,4]
[1]Department of Pediatrics, H. Aliasagar Hospital, Iran University of Medical Sciences, Tehran, Iran,
[2]Department of Pediatric Radiology, H. Aliasagar Hospital, Iran University of Medical Sciences, Tehran, Iran,
[3]Department of Pharmacology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran,
[4]Department of Neurology, Johns Hopkins University School of Medicine, Baltimore, Maryland, United States

Introduction: Although many investigators have attempted to evaluate the development of the uterus and ovaries in the normal population throughout childhood and adolescence and to provide reference values, there is still a wide variation in the results of previous studies regarding sonographic findings in healthy girls and adolescents. The aim of the present study was to provide normal references of sonographic uterine and ovarian size in premenarcheal healthy girls aged 6-13 years in different stages of puberty. We also correlated both ovarian and uterine parameters with chronologic age, height, weight, breast, and pubic pubertal status (Tanner staging1) in these normal subjects.

Methods: Two hundred forty healthy girls were enrolled into this prospective study (mean age±SD, 9.5±1.7 years [range, 6-13.5 years]). Pubertal status was classified according to Tanner staging. The presence of thelarche was the criterion used to distinguish pubertal girls from pre-pubertal girls.2 All subjects underwent pelvic sonographic examination for the measurement of uterine volume, body and cervical length, anteroposterior diameter of fundus, body, and cervix, ovarian volume, and both right and left prominent follicular diameter. The mean values of variables with normal distribution in different stages of breast development were compared by ANOVA and Tukey's post hoc, and the others by Mann-Whitney U test. On scatter plot graphs, fit lines at total and individual 95% confidence intervals were selected in a cubic model to demonstrate the curves of uterine and ovarian parameters according to chronologic age.

Results: Among 240 healthy girls in this study, 101 (42%) were pre-pubertal (8.8±1.3 years [range, 7-12]) and 139 (58%) were pubertal (10.1±1.7 years [range, 6-13]). A gradual increase with age was observed in all uterine and ovarian measurements. Cubic model analysis provided the curve estimation for all measurements assessed in relation to age.3 Both uterine and ovarian parameters were significantly correlated to age, height and weight, and stages of puberty. Uterine volume was <3.5 cm3 in 98% of prepubertal girls, and in stage 2 it was significantly more than in stage 1 (3±3.2 versus 1.7±1.7, respectively) (P<0.001). Uterine body length was also significantly greater in stage 2 than stage 1 (17.5±4.5 versus 14.6±3.3, respectively) (P<0.001).

Conclusion: The reference values for uterus and ovaries were determined in healthy girls. There is a progressive increase in size of internal female genitalia in relation to age, height, weight, and puberty. Uterine volume and body length presented the best correlation with age and stage of puberty.

Contact information:
Mehdi Ghasemi, MD
Mghasem2@jhmi.edu
Johns Hopkins University School of Medicine
Baltimore, Maryland, United States

Ultrasound in Anatomy

Bethany Corliss[1]
[1]Ohio State University College of Medicine, Columbus, Ohio, United States

Objectives: The purpose of this study was to integrate ultrasound into the curriculum of the first year medical students' anatomy course and evaluate its utility.

Methods: First year medical students attended two 1-hour ultrasound lectures and three 1.5-hour small group hands on sessions. Senior medical students, residents, and faculty proctored each ultrasound session which focused on the extremities, the torso, and neck ultrasound techniques. Pre- and post-surveys were administered to assess student perception of their ability to perform and interpret ultrasound and the utility of the course. Ultrasound images were tested as part of the students' anatomy practical exam.

Results: Two hundred nineteen year medical students were enrolled in the anatomy course in August 2010. Of the 63 students that completed the post survey, 84.13% agreed or strongly agreed that exposure to ultrasound facilitated their understanding of 3-D relational anatomy. Also, 93.55% of students agreed or strongly agreed that the hands on sessions were helpful. Overall, 91.94% of students agreed or strongly agreed that the Ultrasound in Anatomy course was a valuable experience, and 86.71% of students agreed or strongly agreed that the course increased their interest in ultrasound.

Conclusions: Ultrasound can effectively be incorporated into an anatomy curriculum utilizing didactics and hands on exposure for first year medical students. Medical students found this course component to be valuable, not only in enhancing their understanding of anatomic relationships, but also in increasing their interest and experience in ultrasound. The data is limited by the response rate to the survey. Future iterations should focus on the ideal balance of didactic instruction and hands on ultrasound exposure.

Contact information:
Bethany Corliss
Bethany.corliss@osumc.edu
Ohio State University College of Medicine
Columbus, Ohio, United States

Abstract #17

Motivation of Geriatricians to learn Bedside Portable Ultrasound (GERIBUS) For Application In the clinical practice and in education

Andres F. Leone, MD [1], Sarah Schumacher, MD[1], Debra E. Krotish PhD,[2] Paul Eleazer MD, [3]
[1] Division of Geriatrics, University of South Carolina School of Medicine, Columbia, South Carolina, United States, [2] SeniorSMART® University of South Carolina School of Medicine, Columbia, South Carolina, United States

Background: Technological advances have allowed ultrasound machines to become portable and pocket size aids to diagnosis and clinical evaluation. As technology becomes more available, physicians are challenged to educate themselves and new generations of health providers in the usage of bedside portable ultrasonography.

Objectives/Design: The aim of this study was to survey a representative sample of Geriatricians in the state of South Carolina to evaluate their current knowledge about the use of Ultrasound machines in the primary care of the elderly, their willingness to adopt the technology and willingness to educate physicians and medical students, while identifying hurdles for the implementation in their clinical and educational environment.

Participants: Fourteen physicians and Geriatricians participated in the survey.

Setting: Outpatient Geriatric practice, PACE Program (Program of All-Inclusive-Care), Inpatient Geriatric Practice, Home Based Care Veterans Affairs Hospital Program.

Survey: A 22 item survey that included demographics, prior utilization of Ultrasonography, confidence, perspectives and plausible uses for Bedside Ultrasound in the clinical setting and in education.

Results: Most physicians (92.8%) had heard of BPUS performed by Primary care physicians. While, 21.4% had already had some formal training, and that same number also had some training interpreting ultrasound. (Interpreting at least 100-200 scanned images). But only one physician felt comfortable using the machine and none felt ready to instruct other medical staff and students. A great majority of the participating group of physicians (71-85%) expressed an interest in learning this new skill to apply it clinic, research and medical education. Challenges for wide implementation were identified.

Conclusions: Geriatric Bedside Ultrasound is a technology that is now available to the practitioner. Participating Geriatricians are ready to embrace this technology in clinical practice and in medical education. Challenges to current implementation include: cost, training, liability, credentialing.

Contact information:
Andres F. Leone, MD
Andres.leone@palmettohealth.org
University of South Carolina School of Medicine / Palmetto Health Richland
Columbia, South Carolina, United States

Abstract #18

Setting up a regional community of practice for the use of ultrasound in undergraduate healthcare programmers in the North-East of England, U.K.

Debra Patten, B.Sc., PhD[1], Lesley Scott[1]
[1]Newcastle University, Newcastle upon Tyne, United Kingdom

The CETL4HealthNE was established in 2005. This regional collaboration of 5 university partners and 4 NHS partners aimed to 'foster curriculum development for employability in the modernised health care service'.

Strong collaboration at strategic and operational levels has enabled partners to design and deliver innovative learning and teaching programmes across a range of healthcare professions. An example is the use of portable ultrasound (PU) to prepare undergraduate healthcare students for later clinical training.

8 PU systems were purchased and a regional community of practice, the Ultrasound Group (USG), was established to support educators involved in the programme. The USG comprises educators in radiography, physiotherapy and medicine and its purpose is to develop creative teaching and learning activities, explore and troubleshoot practice and policy around implementing new initiatives, and to evaluate and report research findings.

The USG has led good practice in the region and developed a local policy to ensure the care and safety of students, educators and the persons being scanned involved in ultrasound-based teaching activities; this work resulted in an international publication(1).

Currently PU is embedded in several undergraduate curricula across the region, e.g. in medicine it is used to teach living and cross-sectional anatomy, the principles of blood pressure measurement, and the cardiovascular response to simulated haemorrhage. It is used to teach anatomy in diagnostic radiography degree programmes. Physiotherapy students use PU to record physiological measurements of the musculoskeletal system and thereby develop knowledge and skills in scientific methodology.

Notwithstanding the progress made, there were some barriers to the success of the ultrasound programme:

- Educators who were not trained in sonography experienced difficultly in operating scanning equipment and developing appropriate learning activities.
- Generic training by equipment manufacturers was provided, but bespoke training was required and was not readily available.
- Some partners had access to a clinical educator in sonography who was able to advise and instruct; this facilitated more rapid progress.
- Local clinical experts were willing to engage, but were largely prohibited by clinical commitments.
- Access to experts was essential for development of the programme and was achieved through engagement with the USG.
- Individual expertise was shared through the USG to promote good practice.

CETL4HealthNE has been successful in supporting the design and delivery of innovative learning and teaching programmes and in developing new ways of sharing best practice in healthcare education across a range of health professions.

Contact information:
Debra Patten, B.Sc., PhD
Debra.patten@nclac.uk
Newcastle University
Newcastle upon Tyne, United Kingdom **Abstract #20**

Ultrasound Use in Specialty Specific Training for Medical Students

Julianna Padavano[1]
[1]Ohio State University, Columbus, Ohio, United States

Objective: Ultrasound curricula that are being implemented in several institutions teach a variety of scans, without being specific to different specialties. Ultrasound in medical education at The Ohio State University College of Medicine already consists of core and enriched exposures to learn ultrasound. As part of continuing ultrasound exposure, students were offered the opportunity to learn specialty specific ultrasound scans as part of a seminar series. The goal was to increase student interest in ultrasound and to improve understanding of how ultrasound can be helpful to students in achieving their future career goals.

Methods: First through fourth year students were taught ultrasound specific scans for the following specialties: surgery, obstetrics and gynecology, internal medicine, ophthalmology, anesthesia, and orthopedic surgery/ sports medicine. The workshops were one evening immersion events where students would receive a brief didactic about the specialty specific scans and then participate in a hands-on practical scanning session.

Results: Fifty students attended the first five sessions (the last session has yet to occur) and survey responses were collected from those who attended. All students who attended every workshop either agreed or strongly agreed that they had a positive experience with ultrasound. All students who attended every workshop also agreed or strongly agreed that what they learned in the workshop they attended would be helpful to them in their future specialty of interest. Furthermore, 98% of students who attended the workshops either agreed or strongly agreed that they felt more comfortable using ultrasound.

Conclusions: Most physicians will be exposed to ultrasound the first time in residency. Having familiarity with scan acquisition and interpretation of ultrasound images can be a valuable tool that is high yield for graduating medical students. All participating students agreed that the scans they learned would be useful to them in their future careers and there was strong agreement that these workshops helped students feel more comfortable using ultrasound. A specialty preparedness ultrasound focused seminar program is a feasible method to expose students to specialty specific ultrasound exams.

Contact information:
Juliana Padavano
julianna.padavano@osumc.edu
Ohio State University
Columbus, Ohio, United States

Abstract #22

UTILITY OF ULTRASOUND IN TEACHING GROSS ANATOMY

Lance Paulman, PhD[1], Erika Blanck, DPT, ATC[1], Victor V. Rao, MBBS, DMRD, RDMS[2], Duncan Howe, PhD[2], Mary Beth Poston, MD[2], Richard Hoppmann, MD[2]
[1] University of South Carolina School of Medicine Department of Cell Biology & Anatomy, Columbia, SC, USA; [2] University of South Carolina School of Medicine Ultrasound Institute, Columbia, SC, USA

Background: The use of ultrasound in gross anatomy can strengthen understanding and retention. It is clinically relevant and shows dynamic three dimensional relations. Past studies with self report and pre/post testing show that with one or two hours of training, students gain skill and knowledge. In 2006, the University of South Carolina School of Medicine began to develop ultrasound curricula that are now integrated into learning experiences during all four years. The first classes were within the first year human medical gross anatomy course. Each of the five one-hour ultrasound anatomy units for heart, neck, abdomen, and pelvic region gave students 10-minutes of lecture, 10-minutes of scan time, and 30-minutes observing scans by their peers. The aim of this study was to use a RCT design to test the hypothesis that integration of an ultrasound class into gross anatomy curriculum improves student knowledge of anatomy.

Methods: In the abdomen unit, students were divided into dissection groups for anterior wall, viscera, and posterior wall and prosect their findings to their classmates. Students in each dissection group were randomly divided into an intervention or a control group. The intervention group attended a two-hour ultrasound class prior to the unit quiz. The controls attended the ultrasound class after the quiz. The quiz consisted of 25 multiple choice questions developed by anatomy faculty. Unit quiz scores for all control and intervention students were compared, as were the scores within each dissection group. Scores were controlled for the total points students obtained for the course. SAS version 9.2 was used; t-test was used to compare groups' unit quiz results.

Results: The mean score on the unit exam for intervention students (n=42) was 5% greater ($p<.05$) than the mean score for control students (n=42). In the anterior and posterior wall dissection groups there was no difference (n=14). However, in the visceral dissection group, the intervention group scored 9% higher ($p<.02$) than controls and also exceeded scores in both the control and intervention groups in the other two dissection groups.

Discussion: Our gross anatomy students self-report that the five ultrasound classes enable them to acquire and understand anatomical content of ultrasound images. Our RCT results confirm these self reports. The higher scores of students who both dissected the viscera and had the abdominal ultrasound training may be due to more opportunities to more efficiently develop a three dimension understanding of abdominal anatomy.

Contact information:
Duncan Howe, PhD
duncan.howe@uscmed.sc.edu
University of South Carolina School of Medicine Ultrasound Institute
Columbia, SC, USA

Abstract #33

A COMPARISON OF VERTICAL LIVER SPAN (VLS) MEASUREMENTS MADE BY MEDICAL STUDENTS WITH ULTRASOUND AND BY PHYSICIANS WITH PHYSICAL EXAMINATION

Gueorgui Mouratev, MD[1], Duncan Howe, PhD[2], Mary Beth Poston, MD[2], Victor V. Rao, MBBS, DMRD, RDMS[2], Rodney Reid, MD[1], James Varnadoe, MD[1], Stuart Smith, MD[1], Paul DeMarco, MD[2], Richard Hoppmann, MD[2]
[1] WJB Dorn Veterans Medical Center, Columbia, SC, USA; [2]University of South Carolina School of Medicine Ultrasound Institute, Columbia, SC, USA

Background: As ultrasound is introduced into more specialties, its integration into medical education is being recognized as an efficient means to meet this need. With smaller, user-friendly units available with adequate resolution, the remaining question is whether students can be trained. In this report we test the hypothesis that medical students can be quickly trained to make ultrasound VLS measurements with accuracy and precision that exceeds those made with physical examination by experienced clinicians.

Methods: Six patients from the Dorn Veterans Medical Center GI Service were placed in blinded exam rooms and ten rising second year medical students and five internal medicine physicians measured their vertical liver span along the mid clavicular line with ultrasound and palpation/percussion techniques, respectively. Students received one hour of class and hands-on instruction on VLS measurement. Students had received up to 15 hours of ultrasound instruction in their first year anatomy and physiology classes. The GI section leader obtained an ultrasound VLS reference measurement. For each patient, measurements by students and physicians were averaged and compared. The differences between these averages and the reference measurement were also compared. SAS 9.2 was used to analyze data and Bland and Altman plots were used to show each group's differences from the reference measurement for each patient.

Results: The means of student ultrasound measurements ranged from 4% to 22% above the reference and variances were from 10% to 17%. Physician measurements were 42% to 58% lower than the reference and variances ranged from 20% to 50%. The overall mean of the differences between the student measurements and the reference for each of the six subjects was 1.77 cm and the standard deviation 1.91. The overall mean of the differences between the physician measurements and the reference was 6.66 cm and the standard deviation 2.68. The difference between student and physician measurements was significant ($p<.0001$).

Discussion: Medical students with no clinical experience were able to obtain VLS measurements that were only 1.5 to 2.8 cm above the VLS reference and showed low inter-observer variability. This study supports earlier findings that 1) medical students can learn clinical ultrasound applications with minimal training and 2) that ultrasound is a more accurate and less variable method than physical examination for evaluation of liver size, even in the hands of inexperienced medical students.

Contact information:
Duncan Howe, PhD
duncan.howe@uscmed.sc.edu
University of South Carolina School of Medicine Ultrasound Institute
Columbia, SC, USA

Abstract #34

Integrated Ultrasound Curriculum (iUSC)

Ashley Davis[1]
[1]University of South Carolina School of Medicine, Columbia, South Carolina, United States

Prior to 2006, there were no known medical schools using ultrasound technology as a core teaching tool throughout the basic science and clinical curriculum. The University of South Carolina School of Medicine (USCSOM) is completing its fifth year of integrated ultrasound curriculum (iUSC). Beginning the first week of school, ultrasound is used to enhance basic science material. As the curriculum extends into the clinical courses, ultrasound teaching is expanded to include concepts such as use in diagnosis and bedside procedures. Ultrasound is a powerful learning tool that is safe for the patient. As ultrasound proves to be a vital learning and diagnostic tool that is safe for use on patients, it also becomes a vital component of medical education. The method most commonly used to deliver course content at USCSOM is hands-on labs followed by web-based modules and clinical utilization. The images can also be uploaded to a portal system for faculty review and feedback for students. During the first two years of study, ultrasound is incorporated into anatomy, physiology, pathophysiology and physical diagnosis. Most third year clerkships have an ultrasound learning component and OSCE while the fourth year involves a review of skills, an elective in emergency bedside ultrasound and a Capstone workshop.

At the University of South Carolina School of Medicine a survey was utilized to gather student feedback on their experience with the ultrasound curriculum. Among the first year students, 94% “agree” or “strongly agree” that ultrasound enhanced their ability to learn basic anatomy.[3] Physical exam skills were enhanced by the use of ultrasound in 88% of second year students.Among our third year students, 91% “strongly agree” or “agree” that their overall educational experience during clinical clerkships was enhanced as a result of incorporating the use of ultrasound technology.[3] From the student perspective, iUSC has proven not only beneficial but desired with 92% of students stating they would like to see more ultrasound training in their third-year curriculum.

Contact information:
Ashley Davis
Ashley.davis@uscmed.sc.edu
University of South Carolina School of Medicine
Columbia, South Carolina, United States

Abstract #37

Ultrasound Immersion during 4th Year Medical Student Rotation on the Undifferentiated Patient

Nelson Royall, BS[1], Bradley Schulz, BS[1]
[1]The Ohio State University College of Medicine, Columbus, Ohio, United States

The course was developed to give fourth-year medical students an introductory understanding of focused ultrasound clinical applications within the care of undifferentiated patients in shock. The experience provided students hands-on ultrasound experience in previously validated indications encompassing the head and neck, thorax, abdomen, and pelvis. Every medical student at Ohio State University completes a one month DOC1 (Differentiation of Care) rotation during their 4th year focused on the undifferentiated patient. An ultrasound immersion experience is provided at the beginning of the rotation during which overviews of shock and ultrasound indications are provided. The immersion experience consists of an hour long faculty lecture on shock and focused ultrasonography during shock situations followed by a two hour hands on session. The lecture provides evidenced-based indications for focused ultrasound in various shock scenarios, methods to perform each exam, review of ultrasound findings in these exams, and implementing exam findings into management. The students rotate through five hands on stations which are designed to introduce the students to common ultrasound exams that they may need to perform in their future practice. The vascular access station is performed on vascular phantom models and is designed to teach students US-guided peripheral and central-line placement. The transvaginal station is performed on a pelvic ultrasound simulator and familiarizes students with interrogating the pelvis and evaluating for the presence of an intrauterine pregnancy. The critical care station is comprised of thoracic ultrasound to evaluate for lung sliding and inferior vena caval compressibility to evaluate volume status. The cardiac/FAST station teaches the FAST protocol and the sub-xiphoid cardiac view for use during code situations. The aorta station teaches students to identify and measure the abdominal aorta for identification of abdominal aortic aneurysms. Students completed a survey following the experience evaluating their experiences. The course introduces all students to focused ultrasound in a way that is relevant to their education. Future evaluations will need to expand data to better understand the effect of the experience on medical student performance during their medical school and resident training.

Contact information:
Nelson Royall, BS
Nelson.royall@osumc.edu
The Ohio State University College of Medicine
Columbus, Ohio, United States

Abstract #41

A Multi-Modal Approach to Integrating Ultrasound Education in Emergency Medicine Clerkships

Matthew Blickendorf , BA,[1] Nicole Dubosh, BS, [1] Nicholas Kman , MD, [1] Aaron W. Bernard MD, [1] David Bahner MD, RDMS[1]
[1]The Ohio State University College of Medicine, Columbus, Ohio, United States

Background: As the use of point-of-care ultrasound in Emergency Medicine (EM) continues to increase, so does the need to incorporate ultrasound education in medical student EM clerkships. Bedside teaching during clinical shifts in the emergency department, however, is often limited by the time constraints of faculty. A multi-modal approach towards ultrasound education within EM clerkships was created to increase ultrasound exposure and integrate classroom learning with the utilization of ultrasound in clinical practice.

Program Details: Medical student exposure to EM at our institution includes a third-year elective and a required fourth-year clerkship. Both rotations use a similar three-part ultrasound curriculum that consists of asynchronous learning through an online ultrasound module (EM SONO), integrated lecture and hands-on learning sessions facilitated by experienced faculty members, and bedside teaching during clinical care. The online module allows students to independently learn the fundamentals of ultrasound physics, scanning technique, and image interpretation. Online quizzes are used to ensure compliance. Third-year students spend time scanning patients with pathologic ultrasound findings in the ICU and ED. Fourth-year students complete an eight-station skills lab. Both the ICU sessions and the skills lab incorporate direct observation of students by faculty. All students are required to complete a faculty-observed FAST exam during a scanning session away from clinical care. All students are educated at the bedside in the ED during their shifts and are encouraged to complete ten scans independently during the month.

Feedback: The multi-modal approach to ultrasound education has been successful in many regards. Students report that the online module allows them to become comfortable with basic image interpretation of both normal and pathologic scans. It also allows them to learn according to their own schedule and skill level with the option of revisiting the module when questions arise during clinical practice. Students enjoy fine-tuning their skills at the bedside without the pressure and pace of clinical care during the faculty-observed scanning sessions. They report confidence in applying the knowledge and skills gained away from the bedside to actual cases seen during clinical duty. Faculty members appreciate not having to teach the basics of ultrasound at the bedside and they can focus teaching points to the clinical encounter.

Conclusions: A multi-modal approach to ultrasound education in the Emergency Medicine clerkship has been well received by students and faculty.

Contact information:
Matthew Blickendorf, BA
Matthew.Blickendorf@osumc.edu
The Ohio State University College of Medicine
Columbus, Ohio, United States

Abstract #46

Educational Assessment of Medical Student Rotation in Emergency Ultrasound

J. Christian Fox, MD[1]
[1] University of California Irvine School of Medicine

Background: Medical student ultrasound education is sparse. In 2002, we began the first medical student rotation in emergency ultrasound. Objective: To evaluate if medical students can learn and retain sonographic skills during a two- or four-week elective. Methods: We gave students an exam on the first and last days of the rotation. Six months later, students took the exam a third time. A control group was used for comparison. Results: Over a 19-month period, we enrolled 45 students (25 on the two-week and 20 on the four-week elective). The four-week student post-test score was significantly better than the two- week posttest score (81% vs. 72%, p=0.003). On the six-month exam, the four-week student post-test score was significantly better than the two-week post-test score (77% vs 69%, p=0.008). The control group did not statistically improve. Conclusion: Medical students can learn bedside ultrasound interpretation with clinical integration and retain the knowledge six months later.

Contact information:
J. Christian Fox, MD
jchristianfox@gmail.com
University of California Irvine School of Medicine
Irvine, California, United States

Abstract #52

Effect of a Medical Student Emergency Ultrasound Clerkship on Number of Emergency Department Ultrasounds

J. Christian Fox, MD[1]
[1] University of California Irvine School of Medicine

Objective: To determine whether a medical student emergency ultrasound clerkship has an effect on the number of patients undergoing ultrasonography and the number of total scans in the emergency department.

Methods: We conducted a prospective, single-blinded study of scanning by emergency medicine residents and attendings with and without medical students. Rotating ultrasound medical students were assigned to work equally on all days of the week. We collected the number of patients scanned and the number of scans, as well as participation of resident and faculty.

Results: In seven months 2,186 scans were done on the 109 days with students and 707 scans on the 72 days without them. Data on 22 days was not recorded. A median of 13 patients per day were scanned with medical students (CI 12-15) versus seven (CI 6-9) when not. In addition, the median number of scans was 18 per day with medical students (CI 16-20) versus eight (CI 6-10) without them.

Conclusion: There were significantly more patients scanned and scans done when ultrasound medical students were present.

Contact information:
J. Christian Fox, MD
jchristianfox@gmail.com
University of California Irvine School of Medicine
Irvine, California, United States

Abstract #53

Ultrasound in Medical Education

J. Christian Fox, MD[1]
[1] University of California Irvine School of Medicine

Introduction: While there is ample research on the best approach to resident training in bedside ultrasound (BUS), little has been reported on medical student ultrasound.

Objectives: To establish baseline knowledge and compare the progress of first and second year medical students' (MS1 and MS2) in Ultrasound in Medical Education (USMedEd) our institution.

Methods: MS2s received 10 hrs of BUS training with little hands-on experience in the 2009-2010 school year. In August 2010, before any USMedEd training began, MS1 and MS2 BUS knowledge was assessed. Students completed written and hands-on practical pre-tests. Topics covered included ultrasound physics, knobology, anatomical scanning planes, artifacts, window acquisition, optimization, and interpretation. USMedEd curriculum is designed to teach these subjects with extensive didactic and hands-on instruction. Both groups complete written exams after all training sessions.

Results: MS1 mean scores for written/practical pre-tests were <35%,<8% respectively, <44%,<13% for MS2s. After 6-8 hours of training over the 6 months, skills of both groups were. The mean scores for MS2s increased to 75% while the mean, median, and mode of the MS1s reached 63%, 68%, 74% respectively.

Discussion: The initial results demonstrate that previous MS2's BUS training was insufficient and their 31% improvement could be attributed to their completion of Anatomy and Physiology in Spring 2010, which current MS1s have not. We propose that by Spring 2011 USMedEd will 1.Enhance understanding of clinical relevancy of history and physical and 2.Improve scores in medical school examinations for both groups when compared to their counterparts who did not participate in the BUS Curriculum.

Contact information:
J. Christian Fox, MD
jchristianfox@gmail.com
University of California Irvine School of Medicine
Irvine, California, United States

Abstract #54

Trinity Hypotensive Protocol Taught by Fourth Year Medical student mentors to First Year Medical Students

Tyler Dschaak[1]
[1]The Ohio State University College of Medicine

Purpose. This study evaluated a peer mentorship model for ultrasound education in first year medical students using the Trinity Hypotensive Protocol (Trinity).

Method. One hundred thirty-four first year medical students (Med1s) from the classes of 2013 and 2014 at The Ohio State University College of Medicine were enrolled in an ultrasound experience from October 2009 to February 2010 and November 2010 to April 2011, respectively. Subjects underwent an ultrasound curriculum involving faculty lectures and hands-on didactics taught by fourth year medical student (Med4s) peer mentors. Objective data was compiled using an identical ultrasound image recognition test administered pre and post-study, which included images characteristic of Trinity. Subjects also completed a timed and graded practical exam at the end of the curriculum in which they independently performed the Trinity scan on a volunteer model. Subjective data was gathered using a post-study survey assessing the students' feelings toward ultrasound education and the peer mentorship model.

Results. Results for the 2009-2010 group are as follows: mean class performance on the pre-study image recognition test was 41.0%, which improved to 81.1% post-study, students scored an average 34.8/40 (86.9%) on the practical exam and took a mean time of 16 minutes to obtain all the Trinity images. On the survey, students agreed they would benefit from continued ultrasound education throughout all four years of medical school. There was also positive feedback regarding their interactions with and ability to learn from the peer mentors.

Conclusions. Ultrasound knowledge and practical skills can be effectively taught to medical students, preparing them for portable ultrasound use in future practice. Also, a peer-mentorship model is a plausible option for medical schools to implement a vertical ultrasound curriculum.

Contact information:
Tyler Dschaak
tyler.dschaak@osumc.edu
The Ohio State University College of Medicine
Columbus, Ohio, United States

Abstract #64

The use of gelatine models in ultrasound guided intravenous cannulation

Oveland NP,[1,2] Naesheim T, Knudsen L.
[1] Department of Anesthesia and Intensive care medicine, Stavanger University Hospital, Norway, [2] Norwegian Air Ambulance Foundation, Department of Research and Development, Norway

Background- Obtaining vascular access in critical ill or injured patients is one of the most important skills in emergency medicine. Lack of easily accessible peripheral venous sites is often seen due to hypovolemia, cold extremities, body habitus, vascular disease and injection drug use(1). Different commercial ultrasound (US) training models for intravenous cannulation (IVC) exists. They offer realistic imaging characteristics, but the models are often expensive, not readily available and their substance is patented(2). As a response to this others have developed homemade training phantoms for different US procedures, such as biopsies and cannulation of fluid filled spaces and vascular structures(1, 3-5). All models have different benefits and drawbacks and their recipes vary in complexity. The latter could represent a barrier for widespread use. To our knowledge no video presentation on how to make your own US training model for IVC has previously been presented.

Objective- To present a video showing how to make a gelatine training model for US guided IVC and to evaluate the phantoms usefulness in vascular access training sessions.

Methods- We made a gelatine training model for each of the 17 participants at our US course (WINFOCUS 1st Scandinavian Course in Prehospital US). A 4 minutes video tape was recorded. After attending a 30 minutes lecture on US vascular access techniques, each participant practiced on the gelatine models. Overall, on a Likert scale of 1-5, they rated the usefulness of the phantom training (1=bad and 5=excellent).

Results- The participants rated the usefulness of their training to 4.38 points (SD±0,62) out of 5. Our 4 minutes video demonstration is displayed at this poster and available at YouTube™.

Conclusion- US guided intravenous cannulation is a skill that multiple medical specialities will need to add to their armamentarium. Our training model for IVC is easy to make by following the video demonstration. The gelatine model can be punctured multiple times. When needed the model can be melted in the microwave and reused in new models. The usefulness of the model in hands on vascular access sessions proved very promising. See the video at YouTube™.

Contact information:
Nils Petter Oveland, MD
nils.petter.oveland@norskluftambulanse.no
Norwegian Air Ambulance Foundation, Department of Research and Development
Stavenger, Norway

Abstract #65

Can Bedside Ultrasound Be Used to Evaluate Cardiomyopathy in Hypertensive Patients?

Michael Beres[1, 2]
[1]University of South Carolina School of Medicine, [2]Department of Emergency Medicine, Palmetto Health Richland Hospital, Columbia, SC

Objective: The objective was to compare emergency department patients with hypertension (HTN) to normotensive controls (CNTL) using bedside ultrasound to identify cardiomyopathy (CM).

Methods: Patients with a triage systolic blood pressure greater than 160 mm Hg or diastolic blood pressure of greater than 100 mm Hg were compared to age-matched normotensive controls with similar acuity levels. Patients with preexisting cardiomyopathy by history were excluded. All patients underwent bedside ultrasound examination in the ED. Measurements were obtained to compare overall cardiac function between the two groups. Left ventricular ejection fraction (LVEF) and left ventricular mass index (LVMI) were calculated to compare systolic function. Mitral valve E-wave to A-wave ratio (E/A) and mitral E-wave deceleration time (MV Dec T) were used to compare diastolic function. Cardiac output (CO), and cardiac index (CI) were also calculated for comparison between the two groups. Significant differences between the groups were defined by an alpha ≤ 0.05 in a two-tailed test.

Results: One-hundred three patients were enrolled, 52 in the CNTL group and 51 in the HTN group. There were no statistically significant differences found in LVEF, E/A ratio, MV De T, LVMI, and CO. There was a statistically significant difference in cardiac index. 6% more hypertensive patients had systolic dysfunction, 12% more hypertensives had diastolic dysfunction, 14% more hypertensives had an elevated LVMI, and 8% more hypertensives met our definition of cardiomyopathy. However, none of these differences was statistically significant. Linear regression analysis did not show any significant correlation between MAP and the computed variables (LVEF, E/A, MV Dec T, LVMI, CI).

Conclusions: When comparing ED patients with hypertension to normotensive controls, there was no statistically significant difference in the prevalence of cardiomyopathy as determined by bedside ultrasound. The differences detected revealed more cardiomyopathy in the hypertensive group, but a study with more power would be required for this result to reach statistical significance.

Contact information:
Michael Beres
michael.beres@uscmed.sc.edu
University of South Carolina School of Medicine
Columbia, South Carolina, United States

Small group teaching of abdominal anatomy to medical students using ultrasound

Greg M. Sweetman[1]
[1] The University of Notre Dame Australia

Diagnostic Ultrasound has been used to enhance learning of anatomy.(1-4) The safety of ultrasound is well documented.(5) Access to small diagnostic ultrasound machines with high image quality is now increasingly possible and in the clinical environment, clinician performed ultrasound is becoming increasingly important.

In a pilot program 104 medical students in year 1, and 106 students in year 2 of a 4 year graduate course, in the 2011 academic year are undertaking additional tuition in abdominal anatomy using ultrasound. It is believed this will assist in understanding key anatomical relationships both in cross sectional imaging and to demonstrate living anatomy, in contrast to the use of specimens or cadavers. The medical course is delivered as a problem based learning (PBL) course, and as part of this the students will undertake ultrasound sessions in their PBL groups (9 students in each group) during the weeks in which they are studying problems related to the gastrointestinal system.

The ultrasound machine used is a portable machine (GE Healthcare LOGIC BOOK XP) with a 3 Mhz curvilinear transducer. The machine has Doppler capability. An additional slave monitor [20 inch LCD] is used to improve viewing conditions for the group. A curriculum outlining both learning objectives and key focus questions has been developed. These are intended to cover both key anatomical features and link to important clinical states.

Initial demonstration is undertaken by either a tutor sonographer or non radiologist clinician with scanning expertise. Informed consent to participate in a teaching ultrasound is gained from the students prior to the sessions. Students undertake sonography on each other to demonstrate the variation in living anatomy with an emphasis on ‘learning by doing.’

In sessions of 2 hours duration, after the initial demonstration students identify the anatomical features of the learning objectives together with answers to the key focus questions. Student feedback regarding the sessions is ongoing. Feedback is obtained from the students via an online survey (www.SurveyMonkey.com). Early responses have indicated that all students have found the sessions to be beneficial and to provide a clearer understanding between surface and internal anatomy.

Contact information:
Greg M. Sweetman
gmsweet @bigpond.net.au
The University of Notre Dame Australia
Fremantle, Western Australia

Abstract #67

Use of ultrasound to enhance understanding of the cardiac cycle (CC) and EKG relationship.

LB Wilson, [1] VV Rao,[1] RA Hoppmann, [1] RC Vakani, J Kreiner, [2] MB Poston, [1] D Howe[1]
[1] Univ of South Carolina School of Medicine, [2]Palmetto Health Richland Hospital

We sought to determine if combining ultrasound (US) with the electrocardiogram (EKG) would enhance our student's overall understanding of and ability to effective apply the EKG and cardiac cycle (CC) relationship. We asked for volunteers from the first year medical student class who were in their second semester. All students were currently taking the medical physiology course where they received instruction on the CC and EKG. Instruction included one lecture on the CC, three lectures on EKG and arrhythmias, a cardiac ultrasound laboratory and an EKG laboratory. With the exception of the cardiac ultrasound laboratory, they were previously (approximately one month) examined on these topics. Thirty students participated in the study. They were randomly divided into two equal size groups: 1) Underwent a hands-on combined ultrasound/EKG laboratory, or 2) Allowed an equivalent period of time to review the material previously presented to them. After the laboratory, all students were then given a ten question exam with questions pertaining to the interplay of the CC and the EKG. None of the questions specifically required them to visually identify ultrasound recordings. Students who participated in the US laboratory scored non-significantly higher on the CC/EKG exam (61±8) compared to those who did not receive the laboratory instruction (55±5). Comparing students based upon their current grade in physiology, students in the upper half of the course who participated in the laboratory showed a higher, although non-significant, average on the CC/EKG exam (70±9 vs 56±6), while students in the lower half who participated in the lab showed no difference from those that did not participate (53±7 vs 54±10). These results support the hypothesis that utilizing ultrasound to supplement classroom and laboratory instruction enhances the student's overall understanding and application of basic science principles.

Contact information:
Britt Wilson, PhD
britt.wilson@uscmed.sc.edu
University of South Carolina School of Medicine
Columbia, South Carolina, United States

Abstract #68

Development of technical skills in focus assessed transthoracic echocardiography

Christian Alcaraz Frederiksen,[1] Peter Juhl-Olsen, Dorte Guldbrand Nielsen, Berit Eika, Erik Sloth
[1]Department of Anaesthesiology and Intensive Care Aarhus University Hospital

Background
Real-time point-of-care ultrasound protocols like focus assessed transthoracic echocardiography (FATE) [1] provide information on cardiopulmonary status in a fast and systematic manner, but little is known about the technical skills required to perform a FATE examination.
We hypothesized that a limited intervention would improve the technical skills in FATE and that MD's with no experience in FATE would adopt technical skills allowing for image quality suitable for interpretation.

Methods
Twenty-one MD's with no previous training in FATE or echocardiography received an initial theoretical and practical introduction (2 hours), after which baseline examinations were performed on two healthy volunteers. Following this, all MD's were subjected to an intervention comprising ten supervised FATE examination on patients in the institutions medical department. For effect measurement a second examination (evaluation) of the same two healthy volunteers from the baseline examination was performed. Images were analyzed and graded according to the following five aspects: 1) Anatomical presentation, 2) sector optimization, 3) gain adjustment, 4) image sharpness, and 5) interpretational value. Items 1, 2, 4 and 5 received a numeral score on a 5-point scale and item number 3 received a numeral score on a 3 point scale. A global image rating was calculated for all participants with a minimum score of 20 and a maximum score of 92.
A Vivid E9 (GE Healthcare, Horten, Norway) ultrasound system equipped with a M5S transducer (1.5 – 4.5 MHz) was used for all ultrasound examinations.

Results
Mean global image rating on baseline examinations was 70.2 (68.0-72.4) and mean global image rating on evaluation was 75.0 (72.9-77.0), p=0.0001 (Wilcoxon signed rank test). On evaluation 93% of images were suitable for interpretation.

Discussion
The data presented suggest that a very limited intervention is needed to improve the technical skills of MD's in FATE. Further analysis of background data and previous experience with ultrasound is needed to further characterize the studied population. Different factors including spatial visualization ability and its effect on handling of the ultrasonic equipment may also need further attention.

Conclusion
Improvement of technical skills in FATE can be achieved with a limited intervention and upon completion of intervention 93% of images achieved are suitable for clinical interpretation.

Contact information:
Christian Alcaraz Frederiksen, MD
caf@ki.au.dk
Department of Anaesthesiology and Intensive Care Aarhus University Hospital
Aarhus, Norway

Abstract #69

Hand-carried ultrasound use in family medicine: a preliminary assessment of two training approaches

Felix Wong[1]
[1]Medical College of Wisconsin

Hand-carried ultrasounds (HCUs), like the GE Vscan, have the potential to revolutionize imaging in the family medicine by increasing the amount of information available during physical exam[1], and studies have shown that medical students, residents, and physicians can be quickly trained to use HCUs to perform precisely defined tasks[2,3,4]. However, several factors limit the rate of adoption of HCUs in more fluid task environments, such as family medicine. Issues restricting HCU implementation in this setting include concerns about appropriate competency based training, compatibility with radiology interpretation standards, appropriate uses in a family medicine setting and documentation in the medical record. This effort focuses on evaluating two alternative training strategies – one that broadly addresses ultrasound skills versus one that is device specific – as part of a preliminary effort to reduce uncertainty surrounding the adoption of the Vscan in Family Medicine at an academic medical center. Evaluating these protocols offers starting points toward identifying the most critical training components for this context, an important step in primary care adoption of HCUs.

To explore the training requirements for the Vscan, two existing online training[6] programs were identified: 1) the University of South Carolina (USC) lectures, which emphasizes general ultrasound fundamentals and procedures, and 2) the GE product-specific training for the Vscan. A pre-pilot study featuring a task-completion scoring approach was used to evaluate performance differences between two students who received USC training and one who received Vscan-specific training. Each student was assessed in an Objective Structured Clinical Examination-like setting with volunteer patients. A radiologist evaluated student performance by re-imaging the defined set of organs with specific views and anatomy identifications to produce crude accuracy scores for each student. The views and anatomy selected for were common to both programs, allowing comparison of teaching strategies between the two approaches. Surveys were also administered to measure students' confidence in their performance.

The two USC trained students completed more tasks accurately and had greater confidence regarding their task success than the GE trained student. These exploratory results suggest that the USC approach, emphasizing general knowledge of ultrasound techniques, may be more appropriate for developing competence with HCUs than a device specific approach, although small sample size and methodological limitations clearly necessitate further investigation. However, this process illuminated several additional hypotheses worth exploring and forthcoming efforts aim to explore this pattern of results with a larger sample and greater experimental control.

Contact information:
Felix Wong
fwong@mcw.edu
Medical College of Wisconsin
City, State, Country

Abstract #70

Interest Group Alliance: A Pilot Program to Improve the Ultrasound Education of Students and Clinicians

Jason Talmadge[1]
[1]The Ohio State University

Ohio State University Medical Center (OSUMC) is at the forefront of ultrasound education for both medical students and resident physicians. Ultrasound proficiency requires not only qualified faculty educators, but also dedicated models in order for the participants to learn and perform basic scanning techniques. A group of medical students expressing interest in ultrasound have been taught to serve as trained standardized ultrasound patients (TSUPs). The training of these students is focused on the proper technique for acquisition of images as well as the identification of structures seen during basic critical care scans, so they can actively participate in the teaching of the physicians. In order to facilitate a symbiotic relationship, a pilot program was initiated to match medical student TSUPs that are interested surgery with the ultrasound training of surgeons. The goal of this pilot project is to improve the ultrasound education of the clinicians while simultaneously providing students an opportunity to work with specialists in their primary field of interest. These students assist with monthly ultrasound training of surgeons geared toward trauma and critical care situations. To date, three monthly lectures have been held with concentration on the Focused Assessment with Sonography for Trauma (FAST) scan and allowing for interactive scanning sessions to improve image acquisition skills. Twenty one total surgical residents and fellows have participated in these sessions with nine medical students TSUPs. Monthly sessions are scheduled as the pool of TSUPs interested in surgery has expanded. The efficacy of this pilot program will be assessed and future plans include creating further targeted modeling pools that can specifically address the interests of students and faculty in varying disciplines. Enhanced ultrasound education can have a strong impact on quality clinical practice as well as facilitating early exposure of medical students to practicing physicians in their field of interest.

Contact information:
Jason Talmadge
Jason.Talmadge@osumc.edu
The Ohio State University
Columbus, Ohio, United States

Abstract #71

The Medical Student Model Pool: Medical student ultrasound exposure from serving as models of normal anatomy

Emily M. Hoover[1], Peter J. Ciolek[1], David P. Bahner[1,2], Daralee Hughes[1]
[1]College of Medicine, [2]Department of Emergency Medicine, The Ohio State University

OBJECTIVE: There has been increased growth in the use of bedside ultrasound in such diverse fields as surgery, emergency medicine, critical care, urology, and others both nationally and, in particular, at this institution. In order to prepare the next generation of clinicians to utilize ultrasound and to serve the increasing need for ultrasound models to demonstrate normal anatomy, the Medical Student Model Pool was developed for second-year medical students. This program proposes that medical students can be exposed and taught a wide variety of ultrasound scans and scanning techniques by acting as models of normal anatomy, resulting in increased familiarity with many commonly-performed scans.
METHODS: All second-year medical students were given the option of participating in the Medical Student Model Pool. Those who chose to participate received a hyperlink to a spreadsheet listing the ultrasound training sessions in need of ultrasound models and were asked to commit to the sessions as their schedules allowed, with the stipulation that ten hours be completed over an eight-month period. In addition to serving as ultrasound models, students received didactic training in a broad range of ultrasound applications including FAST, cardiac, aorta, critical care, pelvic, and procedural techniques. These sessions allowed the students to operate the ultrasound machines as well as gain experience identifying the anatomy visualized during the most common ultrasound scans. A survey was developed (Likert scale 1-5) to assess confidence in image acquisition and determine whether the experience was worthwhile for students.
CONCLUSION: Medical students can be used as normal anatomic models when training other medical students, residents, and faculty members in the use of bedside ultrasound, resulting in increased student familiarity with a wide variety of ultrasound scans. This is a skill that will be in high demand as students enter their clinical clerkships and residency training. Early exposure to ultrasound as a medical student model allows students to gain confidence in ultrasound procedures and a familiarity in the common focused scans used by multiple specialties.

Contact information:
Daralee Hughes
Daralee.Hughes@osumc.edu
The Ohio State University
Columbus, Ohio, United States

Obstetric Ultrasound in Medical Education: A Call for Systematic Ethical Analysis

Christine M. Peterson, MD[1]
[1]University of Virginia School of Medicine

As medical schools increasingly use actual patients to teach students at every level, significant ethical questions arise, most of which are as yet insufficiently explored[1,2]. When the patient-teachers are children, the issues become more complex, and when they are fetuses, still more troublesome. The use of ultrasonography of *in utero* fetuses for undergraduate medical education is, or should be, ethically controversial. The inadequacy of data about effects on the fetus of repeated and/or prolonged sound wave projection, persistent ambiguity about the legal and moral standing of fetuses as well as the obligations and rights of pregnant women, and variability in the pedagogical value of such exercises at different points in the curriculum together provide ample reason that systematic ethical analysis should guide decision-making about this educational activity.

Despite its reputation for being a very safe imaging procedure, ultrasound has observable bioeffects that should be carefully considered given the vulnerability of the developing fetus. Concerns have been expressed in particular about the potential for harm from thermal effects, although meaningful direct evidence is lacking.[3,4] Published epidemiologic studies have significant limitations: the largest ones precede currently routine use of higher energy levels, more recent studies are small and methodologically flawed. It may no longer be possible to conduct a well-designed large-scale epidemiologic study of ultrasound's effects because its use during pregnancy is so widely accepted. Moreover, it is unlikely that any ethically acceptable study could mimic the sound wave exposure possible when multiple groups of students observe multiple sequential ultrasounds of one fetus.

Eight national and international professional organizations, in response to efforts to commercialize fetal imaging for profit, have issued statements that strongly advise against performing obstetric ultrasound exams that are not medically indicated.[5-13] The statements also promote the "ALARA principle" (as low as reasonably achievable) with respect to exposing the fetus to sound energy. These guidelines would seem to argue against involving pregnant women in exercises where uterine ultrasound examinations are performed for purely educational purposes without any clinical benefit.

In the presence of inadequate scientific data on fetal effects and in the light of such statements, ethics research can help determine whether and how educational ultrasonography of pregnant women may be justified. We present the critical issues to be considered, including an exploration of the putative educational benefits, and practical consideration of what would constitute sufficiently informed consent from various theoretical perspectives (principlist, virtue-based, feminist, and others).

Contact information:
Christine Peterson, MD
cmp8x@virginia.edu
University of Virginia College of Medicine
Charlottesville, Virginia, United States

Abstract #73

POSTER TITLE

Author name[1], presenting author[2]
[1]Institution, [2]Institution

Abstract

Contact information:
Name
Email
Institution
City, State, Country

Abstract #

"Pushing" the boundaries of technology in medical education

David Bahner, MD[1]
[1]The Ohio State University

Background: Today's learners have progressively embraced more technologically advanced learning tools. Lectures are now podcasts, textbooks are e-books, and pharmacopeias are web apps. Web 2.0 and social software are becoming an important way students stay connected to each other[1]. Although educators do not necessarily need to be fluent in these different technological advances, a certain level of awareness is beneficial to the educator-student relationship[2,3]. There is ample recent literature about the uses of blogs, podcasts and wikis in medical education[2,3,4]. However, there is not much literature on the educational use of "push technology" via Twitter. Twitter is an online service that launched in 2006[5]. Twitter enables users to send and receive short messages, also known as tweets, to his or her audience[6]. Twitter posts can be viewed by anyone on the twitter website or sent to a follower's smart phone, PDA, or other electronic device. This technology allows educators to send facts and updates to their students. The uses are only limited by the 140 characters allowed per tweet.

Objective: To test a novel ultrasound curriculum using "push technology" via Twitter to deliver content in real-time to mobile devices.

Methods: A curriculum consisting of high-yield ultrasound concepts was developed and posted to a Twitter page every morning at 9am EST beginning on July 1st 2010. Per Twitter guidelines, each post or "tweet" was limited to 140-characters. Students who signed up to the service received instant notifications "pushed" directly to their mobile devices following the posting of a new tweet. Tweets were subdivided into monthly categories covering essential ultrasound topics such as echocardiography, aorta, FAST, etc which were designed to model the honors ultrasound curriculum at The Ohio State University College of Medicine. The curriculum was supplemented by normal and pathological images as well as hyperlinks to helpful online resources.
Results: Daily "tweets" were posted each morning starting July 1st 2010. By March 23rd 2010 the number of followers reached 130. Fifty-six links to external pages were included within the curriculum, twenty-five of which pointed to images created specifically for the course.
Conclusions: Due to its ease of use and widespread applicability, Twitter is an excellent application of "push" technology to deliver focused educational content. This pilot study has demonstrated the potential of Twitter as a means to both supplement and enhance traditional educational methods. Further investigation is being conducted to evaluate the efficacy of this curriculum as a teaching tool.

Contact information:
David Bahner, MD
david.bahner@osumc.edu
The Ohio State University
Columbus, Ohio, United States

Abstract #74

Global Health Elective During Radiology Residency: an Educational Model

Andria Jones, MD[1,2], Kristen DeStigter,MD[1,2], Brandon Chapman[1], Gwendolyn Fitz-Gerald[1]
[1] University of Vermont, [2] Fletcher Allen Healthcare

Introduction: There is demand by resident physicians for international health experiences, and in many specialties, resident-in-training global health opportunities have become more abundant. Roughly one-third of general surgery residency program directors[1] and half of pediatric residency programs offer global health electives to their residents.[2] Radiology, not historically a participant in global outreach, has demonstrated utility in imaging diagnosis and treatment in remote parts of the world. Since modern ultrasound technology is the safest, most affordable and most portable imaging modality available, it is ideally suited for imaging in resource constrained areas. Using ultrasound, radiologists are realizing their potential to make a positive impact on global health; radiology resident enthusiasm for global health experiences is also rising even though outlets for hands on experience are not yet commonplace. We present an educational model for a radiology resident global health elective based on an ultrasound research project conducted in Uganda during the summer of 2010. To our knowledge, there has been no previously described similar elective curriculum in global imaging for diagnostic radiology residents.
Methods: The elective was offered as part of an ultrasound outreach/research project in Kamuli, Uganda. Designed with well defined goals and objectives based on the ACGME core competencies of residency education, the elective incorporates tools for assessment as well as a model for program quality improvement. We describe the processes for institutional approval, supervision, evaluation, elective funding, and travel preparation. Furthermore, we describe the role of the radiology resident in this global health experience.
Results: A radiology resident successfully completed the elective and follow-up assignments, which satisfied requirements for an away elective in residency education by the institutional Graduate Medical Education Committee and met criteria for ACGME requirements. This resident generated a quality improvement project and gave insight to defects in protocols that were then modified to improve patient care. Additionally, the resident stimulated interest in global health and imaging outreach in resident peers, and remains involved in this global health project.
Conclusions/Future Directions: Recent changes to the diagnostic radiology residency exam structure that allow for elective time in the fourth year of training may offer an opportunity to institute this template for global health education into the curriculum of radiology residents interested in making an impact on imaging healthcare disparities around the world.

Contact information:
Andria Jones, MD
andria.jones@vtmednet.org
University of Vermont/Fletcher Allen Healthcare
Burlington,Vermont, United States

Abstract #75

USE OF POINT-OF-CARE ULTRASOUND TO SUPPORT PRENATAL CARE AND OB IN A RURAL FAMILY PRACTICE

Charles McElmurray, MD[1,2], Sandy Kammermann, EdS[1,2], Victor V. Rao, MBBS, DMRD, RDMS[3], Duncan B. Howe, PhD[3], Richard Hoppmann, MD[3]
[1] John A Martin Primary Health Care Center, Winnsboro, SC ; [2] USC School of Medicine Department of Family Medicine; [3]USC School of Medicine Ultrasound Institute

Background: OB is rare in family practice for reasons of liability and access to affordable equipment and training. The Martin Center is an exception as it provides prenatal care and OB for most women in this rural county with no labor and delivery facility. The physician coordinates deliveries with USC SOM Family Medicine. Training in OB ultrasound was provided to him by the USC SOM Ultrasound Institute (USI). This report describes the physician's progress in learning point-of-care OB ultrasound as well as patient views on the utility of ultrasound.
Methods: Monthly training sessions over 19 months were conducted by the USI's radiologist/RDMS using AIUM practice guidelines. The physician purchased a laptop unit and was taught to acquire and interpret images that followed AIUM practice guidelines. His ability to perform exams in accordance with AIUM guidelines over time was monitored with a self assessment survey and an OSCE type exam that focused on technical accuracy as reflected in overall image quality and diagnostic accuracy. Patients were asked their opinions on whether ultrasound improved their quality of care and the effect of images on their self management of lifestyle choices and compliance with their physician's instructions.
Results: To date the physician has performed 71 supervised fetal wellness ultrasound exams, 39-1st trimester, 18-2nd trimester, and 14 -3rd trimester, in19 training sessions. In the last 6 training sessions on 23 fetal wellness procedures, the physician possessed a confidence level over 8 (10 very confident, 0 no confidence) in his ability to use the unit's controls to acquire quality images, in performance of AIUM practice guidelines, and to perform the exams independent of supervision. Determining gestational age was rated less than 7. This was mirrored in the objective exam in which technical accuracy and overall image quality was satisfactory, assessment of amniotic fluid, placenta location, and uterine condition was adequate, fetal heart rate was accurate, femur length was accurate but biparietal diameter was 17% lower than the standard. Patients strongly agreed that the explanation of the US exam was understandable (77%), they were satisfied with the way the procedure was done (81%), the exam improved their healthcare (74%), and after viewing their US images they better understood their self management responsibilities (72%) and were more likely to follow their physician's instructions (70%).
Discussion: Rural family medicine practices with OB can learn to use ultrasound to assess fetal wellness and use these procedures in patient management.

Contact information:
Duncan Howe, PhD
duncan.howe@uscmed.sc.edu
University of South Carolina School of Medicine
Columbia, South Carolina, United States