

## 4th World Congress on Emergency and Critical Care Medicine, Porto Alegre, Brazil, 5–8 March 2008

### ID 9

#### FEASIBILITY OF CORRELATING THE PULSE CHECK WITH FOCUSED ECHOCARDIOGRAPHIC ASSESSMENT IN RESUSCITATION DURING PEDIATRIC CARDIAC ARREST

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**Background:** Rapidly determining whether an unresponsive child is in cardiac arrest or in shock, and requiring cardiopulmonary resuscitation (CPR) can be problematic. The pulse check in children has been shown to be unreliable, not only for laypersons, but also for healthcare providers. The recommendation for checking the pulse in unresponsive children has been eliminated for laypersons in the latest edition of the Emergency Cardiovascular Care guidelines. Thus, the decision to initiate CPR in children, with the goal of delivering effective chest compressions, can be fraught with uncertainty. Outcomes for out-of-hospital pediatric cardiac arrest remain poor. The decision to end resuscitation in children, often an emotionally charged situation, can also be particularly difficult for physicians. Information from focused echocardiographic assessment in resuscitation (FEAR) examination that allows for correlation with the presence or absence of a pulse and real time assessment of resuscitation may help direct and optimize the delivery of resuscitative interventions. We report our preliminary clinical observations of using FEAR to correlate with the pulse check during resuscitation in a series of pediatric cardiac arrests.

**Methods:** Observations were obtained from a non-consecutive case series of FEAR exams performed during pediatric cardiac arrest.

**Results:** Between 1 January 2000 and 31 December 2006, 14 patients aged less than 19 years of age, experienced cardiac arrest on presentation to urban emergency departments or during their stay when the authors were on duty. Their clinical characteristics and echo observations are to be presented. We were able to visualize the heart in all patients using FEAR, and rapidly correlate cardiac activity with the presence or absence of a pulse without prolonged interruption of chest compressions. Two patients had return of spontaneous circulation and survived to hospital admission. Both of these patients survived to hospital discharge.

**Conclusions:** It is feasible to use the FEAR exam to correlate with the pulse check during pediatric resuscitation. Furthermore, focused echocardiography may provide additional information in the decision to initiate or terminate CPR and may also lead to more relevant decision-making in pediatric cardiac arrest.

### ID 27

#### NEUROGENIC SHOCK MONITORING THROUGH THE DIAMETER AND COLLAPSIBILITY OF INFERIOR VENA CAVA

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**Introduction:** The tissue perfusion monitoring allows the perfect balance between oxygen offers and reduces the chance of tissue disoxia. Neurogenic shock results from impairment of the descending sympathetic pathways. The case reported involves a patient victim of a perforation by a gunshot wound between C4 and C5, progressing with tetraplegia and refractory shock. The diameter and collapsibility viewed at the bedside ultrasound of inferior vena cava allowed the perfect attendance and oriented the use of amines and volume replacement to permit an adequate tissue perfusion.

**Objectives:** Report, analyze and compare the volume status and the tissue perfusion of the patient with neurogenic shock through the diameter and collapsibility of inferior vena cava by ultrasound. Approval of the Ethics and Research Committee of HMSA.

**Results:** V.S. 23 years old, female, reported that she felt a twinge in the neck and weakness in 4 members, while walking on the street. She was brought to the service of the Emergency and admitted UPG-CTI-Emergency. There were 2 spiked with bleeding injuries in the lower cervical region. Computed tomography of the cervical spine showed metallic fragment (bullet of a firearm) in the C4 with destruction of the medullar canal adjacent. In the hospital patient had CR = 98 and BP  $y = 100/60$  mmHg FR = 12 SatO<sub>2</sub> environment 93% agreed, oriented. Tetraplegia with stiffness in the limbs. There was a worsening of the neurological status: Glasgow Coma Score: ER2 MR1 VR2 = 5, and fall in saturation and BP = 80/40 mmHg. Tracheostomy was performed. She was admitting in UPG monitoring performed with deep venous access: SvcO<sub>2</sub> = 85%,  $\Delta$  pCO<sub>2</sub> = 4 mmHg diameter and continuous evaluation of the inferior vena cava by the USG = 23 ( $\pm 4$  mm) with collapsibility 17%. The infusion of norepinephrine was started with prompt response of the mean arterial pressure.

**Conclusions:** It was reported the case of the patient, with serious fire weapon perforation in the cervical zone, that evolved with neurogenic shock. The initial evaluation obtained with the ultrasound discarded others shock etiologies (cardiac tamponade, cardiogenic, hypovolemic,

hemorrhagic) and allowed an appropriate monitoring, since the indiscriminate use of a vasoactive amine in an hypovolemic patient would make the tissue perforation even worse, as well as that the volume infusion in a patient with a 20 mm inferior vena cava could take to a volume overload and the mean arterial pressure would not be restored.

#### **ID 8 BEDSIDE ULTRASOUND FOR THE NONINVASIVE ESTIMATION OF CENTRAL VENOUS PRESSURE IN CRITICALLY-ILL ADULT EMERGENCY DEPARTMENT PATIENTS**

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**Objectives:** Among critically ill adult emergency department (ED) patients undergoing central venous cannulation (CVC), determine if a  $\geq 50\%$  decrease in their inferior vena cava (IVC) diameter predicts a low central venous pressure (CVP).

**Methods:** Critically ill adult ED patients at an academic medical center undergoing CVC via the internal jugular route were enrolled in a prospective, observational study. While patients were supine, their maximal inspiratory (IVCi) and expiratory (IVCe) diameters were measured 2–5 cm from the right atrial border in a long-axis/subxiphoid view by two-dimensional bedside ultrasound. ED physicians performing this measurement were blinded to the CVP determination, which was obtained afterwards by nursing staff. The caval index (CI) was calculated as the relative decrease in IVC diameter over one respiratory cycle ( $(IVCe - IVCi) / IVCi$ ). The correlations ( $\rho$ ) of CVP with IVCi and CI were calculated. The sensitivity, specificity, positive (PPV) and negative (NPV) predictive values and 95% confidence intervals of a  $CI \geq 50\%$  to predict a  $CVP < 8$  mmHg were estimated.

**Results:** Of 69 patients, the median age was 62 years and 58% were female. Mean time and fluid administered from ultrasound measurement to CVP determination was 6.6 min and 48 cc, respectively. Of the 69 participants, 27.5% had a CVP less than 8 mmHg, and 27.5% had a  $CI \geq 50\%$ . The mean and standard deviation ( $\sigma$ ) of IVCi, CI and CVP were 1.2 cm ( $\sigma = 0.67$ ), 33.5 ( $\sigma = 27.1$ ), and 10.9 mm Hg ( $\sigma = 4.5$ ), respectively. The correlation between IVCi and CVP was  $\rho = 0.75$ , and between CI and CVP was  $\rho = 0.67$ . The sensitivity of  $CI \geq 50\%$  to predict a  $CVP < 8$  mm Hg was 94% (83.5–98.7%), specificity was 84.2% (60.4–96.6%), the PPV was 94% (83.5–98.7%) and the NPV was 84.2% (60.4–96.6%).

**Conclusions:** ED physician bedside ultrasound measurement of  $CI \geq 50\%$  is a good noninvasive predictor of low CVP. Rapid, bedside measurements of IVCi and CI could be a useful guide in the resuscitative management of critically ill patients.

#### **ID 10 ULTRASOUND GUIDED FEMORAL NERVE BLOCKS IN ELDERLY PATIENTS WITH HIP FRACTURES**

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**Objectives:** We determine the feasibility of ultrasound guided femoral nerve blocks to provide analgesia to elderly patients with hip fractures in the emergency department.

**Methods:** This was a prospective study involving a convenience sample of nine patients presenting to the adult ED with hip fractures. Patients over the age of 65 with proximal femur neck, intertrochanteric, or subtrochanteric femur fractures during a 6-week period were eligible. Participants underwent a femoral nerve block performed by attending physicians and residents who had undergone a 1-h training session. Under direct ultrasonographic visualization, 25 ml of Bupivacaine was injected along the nerve sheath using a 22-gauge Whitacre<sup>TM</sup> spinal needle. During the injection, the patient was placed in trendelenberg position and distal pressure applied for 5 min to allow the anesthetic to track in the lumbar plexus sheath (3-in-1 block). Patients received additional parenteral analgesia per their treating physician. Numerical pain scores (NPS) were recorded prior to the procedure and at 15 min after, 30 min after, and then every hour for 4 h. Data are represented as mean  $\pm$  SD. Student's paired *t* test was used to analyze pain scores.

**Results:** The mean age of the subjects was 82 (range: 67–92); 6 of 9 subjects were female. The mean baseline NPS was  $8.3 \pm 2.6$ . Patients reported significant decreases in pain scores starting at 15 min post-block ( $3.7 \pm 2.2, p = 0.004$ ) through 4 h ( $3.2 \pm 2.4, p = 0.002$ ) when compared to baseline. Prior to the block patients received a mean of 3.6 mg ( $\pm 2.1$ ) morphine. Following the block only 2 of 9 patients required additional analgesia. Mean time to completion of the block was 8 min per patient. No complications or adverse events were reported.

**Conclusions:** Ultrasound guided femoral nerve blocks are feasible in the emergency department as a relatively quick procedure, resulting in significant pain reduction, when performed by physicians of varied levels of training. Randomized controlled trials are needed to further establish safety and efficacy.

#### **ID 14 ULTRASOUND-GUIDED CENTRAL VENOUS CANNULATION IN PEDIATRIC PATIENTS UNDERGOING CARDIAC SURGERY: ONE YEAR EXPERIENCE**

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**Background:** Central venous cannulation can be particularly difficult in pediatric patients, although it is an essential procedure for the anesthetic management of operations for congenital heart disease.

**Objectives:** Our aim was to evaluate the usefulness of ultrasonography in internal jugular vein cannulation in infants.

**Methods:** From January to December 2007, ultrasound-guided cannulation was performed in 38 elective pediatric cardiac patients. Catheters were placed using a handheld ultrasound (7.5 MHz, linear probe, GE Logic Book) with the Seldinger technique and the transducer covered by a sterile sheath. The right internal jugular vein was used as the primary site. All procedures were performed under general anesthesia and we recorded the rate of successful catheterizations, the number of attempts and the time from venipuncture to wire insertion. **Results:** Our success rate was 97.3% with no artery puncture. Cannulation in one case was unsuccessful because the child had previous dissection in both internal jugular veins. Internal jugular vein cannulation was successful at the first attempt in 65.8%, in second attempt 18.4%, in third attempt 10.5% and in fourth attempt 5.3%. The time from venipuncture to wire insertion in the first attempt was  $51.2 \pm 16.4$  s,  $128.4 \pm 41.4$  s for second attempt,  $154.9 \pm 95.3$  s for third attempt and  $296.4 \pm 96.8$  s for fourth attempt.

**Conclusion:** Internal jugular vein cannulation guided by ultrasonography is an efficacious approach that can be performed safely, minimizing risks and maximizing success in pediatric patients.

## ID 5 ULTRASOUND UTILIZATION FOR DIFFICULT INTRAVENOUS CANNULATION BY GROUND ADVANCED LIFE SUPPORT (ALS) UNITS

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**Introduction:** Patients with poor vasculature are occasionally unable to receive peripheral intravenous access by pre-hospital providers. In some cases, vascular access may require advanced techniques by physicians in the emergency department. Ultrasonography has been used as a method to achieve vasculature access. This study seeks to establish the ability of paramedics to learn ultrasonography during a brief educational session, and subsequently perform ultrasound-guided IV cannulation on patients with difficult vasculature on ground ALS units.

**Methods:** Paramedics were trained in ultrasonography during a 10-min session, consisting of watching an ultrasound-guided cannulation video, learning to identify arteries versus veins, and practicing cannulation using a gel-wax model. Following this presentation, paramedics became qualified to attempt peripheral IV access using ultrasonography. A portable Sonosite MicroMaxx ultrasound machine was used when paramedics were unable to obtain IV access after one unsuccessful conventional attempt. Data for each IV attempt was collected, including time to vasculature access and outcome. Finally, paramedics completed a survey about usefulness and practicality of ultrasound guidance.

**Results:** Thirteen paramedics participated in the study during their regularly scheduled shifts. After the education session, 100% of the paramedics successfully cannulated the gel-wax model vein using ultrasonography, drawing fluid on their first attempts. When scanning live models, each paramedic was able to distinguish vein from artery. Over 115 h in our busy inner city EMS system only 20 incidents occurred where paramedics were unable to obtain IV access. Of these attempts, only five cases were deemed that the patient was sick enough so IV access was imperative. In all of the difficult access patients, no blood flash was achieved using conventional access methods. Using ultrasound guidance, blood flash was achieved 80% of the time. Of four successful blood flashes, one patient was successfully cannulated.

**Conclusion:** Paramedics presently rely on traditional methods to obtain peripheral intravenous access. After a brief training session, paramedics became proficient using ultrasonography to identify peripheral vasculature for IV insertion. The incidence of difficult IV access is extremely rare in our system and in most of these patients, it was decided that need for second attempt was not required. Although paramedi-

obtain venous access are more common in patients with obesity, COPD and coagulation disturbances. In the past years, the Agency of Healthcare Research and Quality (USA) and the National Institute of Clinical Excellence (UK) recommended the use of US for guidance IJV catheterization. Critical care and emergency physicians acquire expertise in central venous catheterization in the years of residence training (four and three, respectively). The training necessary for acquiring proficiency in US guided central venous catheterization are diverse in the literature. We report successful acquisition of hability for obtaining ultrasound-guided internal jugular catheterization, during the resident training. Residents with a large experience in central venous catheterization were submitted to a brief explanation of US and the machine and anatomy review (1 h). The equipment utilized was a portable echo machine, with linear probe, no Doppler. Initially, the jugular vein (compressible, no pulse, no thrombus) and carotid artery were identified, and the patient positioned. The procedures were performed under standard aseptic conditions. After the preparation of anesthetic, catheter and drapes, the probe with gel was involved in a sterile plastic bag (same used for laparoscopic). Using the transverse view and one hand (solo) technique, after the three to five proctored IJV catheterizations, were followed by a sequence of five to ten procedures observed per resident. There were no accidental carotid punctures, pneumothorax or failure to access the vein. Given the benefits and recommendations of NICE and AHRQ, the US-guided IJV catheterization will become the standard of care. We report the feasibility of acquiring the proficiency during the resident training. We suggest that for operators with large experience in CVC, three to five proctored procedures with posterior positive evaluation of the next five to ten procedures are reasonable in acquiring proficiency in US guided IJV catheterization.

### Suggested readings

1. Ultrasound-Guided Internal Jugular Access. A Proposed Standardized Approach and Implications for Training and Practice. Feller-Kopman D. CHEST,123,1,July 2007
2. Central Venous catheterization. Taylor RW, Palagiri AV, Crit Care Med, 135, 5, 1390–1396
3. Ultrasound imaging

## ID 11 DIAGNOSTIC EFFECTIVENESS OF LOWER EXTREMITIES COMPRESSION ULTRASOUND IN A EMERGENCY DEPARTMENT IN THE DIAGNOSE PROCESS OF DEEP VEIN THROMBOSIS

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**Objectives:** To assess the agreement between CUS performed in the ED and a Doppler ultrasonography (DU) in the radiology department (RD) for the detection of DVT of the legs. To assess the effectiveness of an integrated algorithm including ultrasonography, clinical characteristics and laboratory test in the detection of DVT. To describe the characteristics of the patients which were included in the study.

**Materials and methods:** Descriptive study, we included consecutive patients with symptoms and signs suggestive of DVT, who consulted the emergency department of our hospital. We excluded patients with a previous DVT diagnose in the same leg. These patients underwent an integrated diagnose process including: physical examination, D-dimer serum detection by latex aggregation, Wells score and CUS

## ID 26 TRAINING OF CRITICAL CARE AND EMERGENCY RESIDENTS IN ULTRASOUND-GUIDED INTERNAL JUGUGAL VEIN ACCESS. REPORT OF A EXPERIENCE IN A SURGICAL ICU IN PORTO ALEGRE—BRAZIL

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Central venous catheterization is a common procedure in ICU and ED. The estimated rate of mechanical complications associated with this procedure is 15%. Mechanical complications and failure to

performed by an emergency physician. Patients with suspected DVT at ED were anticoagulated at hospital and underwent DU at RD. Patients with high and medium probability, positive D-dimer with negative CUS at ED were discharged without treatment and underwent a new DU at RD 1 week later. Patients with negative CUS were reevaluated looking for thromboembolic disease in 3 months. Data were analyzed in STATA 9.0. We calculated descriptive statistics: proportions, means standard deviation and kappa coefficient. To calculate sensibility, specificity and predictive values, we included all RD CUS.

**Results:** 37 patients were enrolled, since April 2007 to December 2007. 45.95% (28.54–63.35) were men and 54.05% (36.65–71.46) were women. 14 patients were diagnosed with DVT. 13 of them at ED and another 1 week later at RD. 9 patients 24.324% (9.15–39.50) were in low probability of DVT by the Wells score 10 had medium probability 27.03% (11.37–42.69) and 18 had high probability 48.65% (31.19–66.10). D dimer assay had no significant relationship neither with the result of CUS in ED nor the result of DU in RD. Kappa coefficient for CUS in ED compared with DU in RD was 1. Using the RD DU as gold standard, sensibility of CUS in ED was 100% (96.15–100) specificity was 91.67% (71.86–100), positive predictive value was 92.86% (75.8–100) and negative predictive value was 100% (95.45–100).

**Conclusions:** Isolated D-dimer cannot be used as a test to discharge patients with suspected DVT. Wells score should be used to assess the risk of DVT in outpatients. Our algorithm is a valid and useful tool to assess the risk of DVT. The concordance of CUS in ED is very high.

### ID 13

#### CAROTID PLAQUE: US-GUIDED LOCALIZATION PRIOR TO CANNULATION OF THE INTERNAL JUGULAR VEIN—CASE REPORT

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**Background:** The right internal jugular vein cannulation is a commonly used route for access to the central venous system. Although this approach has several advantages, a small but definite number of unsuccessful vein punctures and/or of complications have been reported. Sonographic imaging of the jugular vein can significantly improve the safety of the procedure.

**Objective:** The aim of this report is to present a case of carotid plaque localization prior to right jugular vein cannulation.

**Case summary:** A 68-year-old man with squamous cell carcinoma of the lower third of the esophagus was scheduled for an esophagectomy via laparotomy and right thoracotomy. Combined general and continuous epidural anesthesia was selected for his anesthetic management. After induction of general anesthesia the patient was prepared to right jugular vein cannulation under ultrasound-guided technique (7.5 MHz, linear probe, GE Logic Book). Ultrasonographic examination performed before the puncture showed a small calcified plaque on the posterior side of the right common carotid artery. Left common carotid artery examination was normal and we chose left jugular vein cannulation. Catheter was placed successfully at the first attempt with the Seldinger technique in left jugular vein. His post-operative course was good and the patient was informed about the existence of the carotid plaque.

**Conclusion:** Ultrasound guided cannulation of the internal jugular vein allows safer procedure when access problems are anticipated.

### ID 3

#### SURGEON-PERFORMED ULTRASOUND FOR DIAGNOSIS AND MANAGEMENT OF THE ACUTE ABDOMEN

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**Introduction:** Abdominal pain is a common reason for attending emergency departments all over the world. Abdominal ultrasound, used by surgeons at the bedside, is becoming more and more common. There are studies evaluating the use of bedside ultrasound in the trauma situation as well as for the management of the acute abdomen. This study is the first randomized study evaluating the benefits of surgeon-performed ultrasound when a patient presents at the emergency department with abdominal pain.

**Objective:** The aim of this study was to evaluate how surgeon-performed ultrasound at the bedside impacts on diagnostic accuracy and further management of the acute abdomen.

**Material and methods:** We randomized 800 patients who attended the emergency department at Stockholm South General Hospital, Sweden, for abdominal pain, to either receive or not receive a surgeon-performed ultrasound examination as a complement to routine management. Primary outcome measure was the proportion of correct diagnoses set at the emergency department. Secondary outcome measures included the number of complementary investigations, admission rate, frequency of operations and time for surgery. The preliminary diagnosis set by the surgeon, with or without ultrasound, was compared to the final diagnosis set by a senior surgeon 6–8 weeks later. Complementary investigations ordered at the emergency department, hospital admissions and decision about surgery was recorded in the protocol.

**Results:** Diagnostic accuracy was significantly higher in the group examined with ultrasound, 64.7% compared with 56.8% ( $p = 0.03$ ). The number of complementary ultrasound examinations was considerably higher in the group who did not receive bedside ultrasound, 27.5% compared with 8.7% ( $p < 0.001$ ). The number of ordered Computer Tomography examinations were slightly higher in the group not receiving ultrasound, 10% compared to 7.9% ( $p = 0.31$ ). The admission rate was lower in the ultrasound group, 42.9% compared to 50.1% ( $p = 0.04$ ) and the proportion of patients requiring surgery submitted for surgery directly from the emergency department was higher in the ultrasound group, 34.5% compared to 16.0% ( $p = 0.01$ ).

**Conclusion:** Surgeon-performed ultrasound is a useful diagnostic tool in the emergency department setting and has impact on the management of the patient. On the basis of our results we recommend the method to be implemented in the emergency departments.

### ID 20

#### EARLY DIAGNOSIS OF RENAL TRAUMA THROUGH ULTRASOUND IN THE EMERGENCY ROOM: IT MAKES THE DIFFERENCE!

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**Introduction:** The diagnosis and early intervention on the critical patient is decisive for prognosis. In the Emergency Room (ER) and

Intensive Care Unit (ICU) the ultrasound (USG) has fundamental importance on the evaluation of the patient due to its accuracy, accessibility and speed. The case reported involves a patient victim of a perforation by cutting weapon (CW), which evolved to respiratory distress and shock, without clinical conditions that enabled a tomographic scan (TC). The USG discarded a hemoperitoneum and demonstrated a hemothorax and renal trauma, thus, allowing the most adequate treatment.

**Objectives:** Report and analyze a case after recent implementation of USG in the ER and UPG. To raise recent scientific evidence about the early diagnosis of such a problem.

**Material and methods:** Survey of medical records and case report of ICU patient at a large public emergency hospital with the approval of the Ethics and Research Committee of the HMSA.

**Results:** V.C., 22-year-old, female, arrived through helicopter from an island on Guanabara Bay, victim of CW (knife) 3 h prior. When admitted, was in a torporous state, anemic, acianotic, RR = 25 ipm, CR = 110, BP = 90/60 mmHg, satO<sub>2</sub> = 92%, and T = 36.2°C. Knife wound on thoracic and left dorsal regions (L). Cardiac exam had no abnormalities. Lungs with respiratory sounds abolished from L hemithorax. The abdomen showed no abnormalities. The HMSA USG exam protocol was applied. Cardiac and pericardial trauma were discarded, as well as fluid in the peritoneal cavity. USG demonstrated absence of lung sliding, fluid in pleural cavity and trauma to the L kidney's cortex with a peri-capsular hematoma. Intubation was performed, followed by thorax drainage and admittance to the UPG. Only after stable respiratory and hemodynamic parameters, was as thoracic and abdominal contrasted CT performed, which demonstrated laminar hemothorax, renal trauma stage 3, without contrast overflow. The patient was sent home on the 6th day of hospitalization.

**Conclusions:** In a pioneer way amongst State Public Emergency Units, the evaluation of a critical patient is done through USG. USG in the ER was decisive and identified in a quicker, more accurate and less invasive manner, the cause of the problem, as well as it did allow to follow the evolution on bedside, without exposing the patient to further procedures or delays in treatment. Studies already show that USG in the ER is safe and improves the prognosis of the critical patient.

### ID 23 ULTRASONOGRAPHY AS A DIAGNOSTIC METHOD IN MULTIPLE TRAUMATIZED PATIENTS ADMISSION

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**Introduction:** The multiple traumatized patients' service can be divided into initial and sequential. In the first, is necessary to recognize the presence of injuries which may cause imminent risks of life taking the Trauma's ABC. It is in this first step that the ultrasonography has the most important role. By the reason it is easy and can be rapidly taken at the bed, it comes being more and more used. Its finality, in that moment, is essentially to detect free fluid in the peritoneal cavity, whatever is the cause. The greatest advantages are the low cost, the speed, as well as the possibility of repetition as much as necessary, and allows the research of the pleural and pericardial liquid.

**Purpose:** To assess the got results with the use of ultrasound as a diagnostic method primary screening in multiple traumatized patient evaluation to detect free fluid in the abdominal cavity, and as a method to track the abdominal injuries, at the first moment.

**Materials and methods:** We retrospectively analysed all patients admitted in the Santa Cruz Hospital Emergency Service. We analyzed, retrospectively, fourteen (14) cases of multiple traumatized patients with possible blunt abdominal trauma, where were made ultrasound on admission in the period of January to December 2007. These patients represent 0.95% of the trauma cases attended in the Santa Cruz Hospital Emergency Service, in Santa Cruz do Sul City, Rio Grande do Sul, Brazil. We analyzed the levels of sensibility and specificity to detect free fluid and as well as the specificity of into abdominal organs injury.

**Results:** In the Santa Cruz Hospital Emergency Service, were attended seven thousand, five hundred and six (17.506) patients on the year 2007. Of these, one thousand four hundred and sixty-nine (1.469) were victim of trauma, of which, fourteen (14) had blunt abdominal trauma. In these fourteen patients was made ultrasound on their admission. The sensibility to free fluid in the peritoneal was 100%. The sensibility in the injury was perfect in the cases of spleen and liver injuries. There were two cases of pancreas injuries whose ultrasonography founds was suggestive. There two cases with normal ultrasonography founds. In all cases, the ultrasound showed themselves effective to definition therapy.

**Conclusion:** The ultrasonography is largely useful in the first stage of the trauma, making clear whether is necessary or not, immediate intervention, being possible the non-detection of injuries that don't cause hemodynamic repercussions at the initial moment. The initial ultrasound service of multiple traumatized patients in the emergency of Santa Cruz Hospital showed a sensibility of 100% in the detection of free fluid. In all cases of spleen and liver injuries, it was specific to detect these injuries. The ultrasonography showed itself important on the diagnostic and therapeutic behavior, becoming possible efficiency and quickness.

### ID 24 ACCURACY OF POINT-OF-CARE ULTRASOUND FOR THE DIAGNOSIS OF FRACTURES IN THE PEDIATRIC EMERGENCY DEPARTMENT

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**Introduction:** Previous studies support Point-of-Care Ultrasound (PoCUS) for fracture (Fx) diagnosis in adults, but studies in pediatrics are limited. PoCUS screening for Fx can benefit patients in: pre-hospital care, triage, developing countries, and remote locations without access to Xray or CT scan (XR/CT). Previous PoCUS studies had a higher Fx rate (35–65%) than commonly observed in a Pediatric Emergency Department (PED), and included predominantly long bones. There are no existing pediatric PoCUS studies that: (1) Include a typical fracture rate seen in a PED (2) Include a high proportion of non-long bones; (3) Assess accuracy of PoCUS performed by sonologists with limited ultrasound training.

**Objective:** To determine the test performance characteristics of PoCUS compared to XR/CT for the diagnosis of Fx in patients presenting to the PED.

**Materials and methods:** Prospective cohort, convenience sample of patients. Pediatric Emergency Medicine physicians (PEM MDs) initially underwent 1 h of PoCUS training, then performed PoCUS on eligible patients. Eligible patients were 0–25 years of age presenting to the PED with a musculoskeletal injury requiring XR/CT. Eligible bones had an identifiable linear cortex on PoCUS (Skull, Mandible, Clavicle, Rib,

Humerus, Elbow/Fat Pad, Radius, Ulna, Metacarpal, Phalange, Femur, Patella, Tibia, Fibula, Metatarsal). Grossly angulated deformities were excluded to maintain diagnostic uncertainty. Bones were identified as positive or negative for Fx based on PoCUS. Results of the PoCUS were compared to radiologist readings of XR (or CT for skull Fx and mandible Fx). PEM MDs were blinded to XR/CT results during PoCUS screening. **Results:** PoCUS was performed on 149 children/young adults with 252 suspected fractures. Median age was 13 years (IQR 11), 54% were male. Median time to perform PoCUS was 4 min (IQR 5). A high proportion of included bones were non-long bones (35%). Fx rate based on XR/CT was 21%.

**PoCUS test characteristics:** Sensitivity 72% (CI 58–83%), Specificity 92% (CI 88–96%), PPV 72% (CI 58–83%), NPV 92% (CI 88–96%), LR Positive 9.5 (CI 5.7–15.9), LR Negative 0.3 (CI 0.19–0.46).

**Conclusions:** Pediatric Emergency Medicine physicians, with limited Point-of-Care Ultrasound training, accurately identified fractures in children and young adults. The observed study fracture rate and bone distribution are representative of the typical injury spectrum seen in a Pediatric Emergency Department.

## ID 29

### EFFECT OF BEDSIDE ULTRASONOGRAPHY ON MANAGEMENT OF PEDIATRIC SOFT TISSUE INFECTION

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**Objectives:** Determine the effect of soft tissue evaluations by bedside ultrasound (BUS) on the clinical diagnosis and management of pediatric soft tissue infection.

**Methods:** Prospective observational study at two urban academic pediatric emergency departments from February through December 2007. Eligible patients were a convenience sampling of children less than 18 years presenting with a soft tissue infection. Exclusion criteria were signs of obvious abscess such as palpable fluctuance or purulent drainage. Via a pre-test questionnaire, treating physicians were asked to assess the likelihood of subcutaneous fluid collection by Likert scale (range 0–5), and whether further treatment would be medical management (MM) or invasive management (IM). BUS imaging of the lesion(s) was then performed by an ultrasound trained emergency medicine physician. A post-test questionnaire assessed whether the physician changed the initial management plan based on the BUS.

**Results:** We assessed 50 patients with a soft tissue infection. After initial clinical assessment, 40% of patients were designated to receive IM, while the remaining 60% were designated to receive MM. Bedside ultrasound changed management in 22% of cases. A management change occurred in 30% of the invasive group, with four moving to MM. In the medical group, 16% of patients changed management, with four requiring IM. BUS had a sensitivity of 90% (95% CI: 71–100%) and specificity of 62% (95% CI: 44–80%) in detecting fluid collections that required IM, while clinical suspicion had a sensitivity of 70% (95% CI: 50–90%) and specificity of 79% (95% CI: 64–94%).

**Conclusions:** BUS evaluations of soft tissue infections in children may be a useful clinical adjunct for the emergency physician. In this study it changed the management in 22% of cases by aiding in the detection of subclinical abscesses, or avoiding unnecessary invasive procedures.

## ID 25

### GLOBUS STUDY—PHASE 1. ULTRASOUND EXAM PERFORMED BY NURSES IN EMERGENCY ROOM TO DETECT URINE IN BLADDER

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**Introduction:** Bladder catheterization performed in emergency room is time-consuming, invasive and can cause complications. Unnecessary catheterizations could be avoided if bladder vacuity could be quickly, easily and non-invasively diagnosed. Most emergency departments currently have ultrasound devices that could be usefully used for such exam.

**Objective:** To test feasibility of ultrasound bladder exam performed by no-ultrasound-trained nurses.

**Methods:** Nurses had handle ultrasound device (i-Look, Sonosite®) and an explicative document with 3 pictures (Figure): (1) to switch the device on, (2) to locate the probe (3) picture of a full bladder. Exam was performed before each bladder catheterization. Answers were collected as: (1) empty bladder or (2) presence of urines. The answer was correlated with the volume of urines obtained after catheterization.

**Results:** 30 patient included, 11 female (37%) and 19 males (63%), median age: 73 (47–81) years, 4 un-exploitable dossiers. No urine was detected in 4 patients (15%); catheterization showed 7 (0–36) ml of urine (maximum 100 ml). Urine was detected in 22 patients (75%); catheterization showed 600 (300–1000) ml of urine ( $p < 0.01$ ).

For a threshold value of de 100 ml of urine: 1 false positive; sensitivity = positive and negative predictive values = 100% and specificity = 80%.

**Conclusion:** Echographic bladder exam performed by no-ultrasound-trained nurses was sure. More large validation of such practice could contribute to reduce unnecessary bladder catheterization and related risks.

## ID 21

### PARAMEDIC PREHOSPITAL ULTRASOUND TRAINING EVALUATION

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**Objective:** Prehospital ultrasound (US) has not been evaluated in the US but has been shown to be useful in Europe. We present a program geared toward prehospital, paramedic level personnel to train them in this skill and evaluate the program effectiveness. This program trains prehospital, paramedic personnel to be competent in using point of care ultrasound for the FAST and abdominal aortic exams.

**Methods:** Four Advanced Life Support (ALS) sites across the country are included in this multi-center project. Personnel were trained through lecture, written pre/post exams and Objective Structured Clinical Examination (OSCE) format. OSCE evaluates clinical skill through standardized simulation of patient encounters and has been used in physician training with success. At 3 months post training, an OSCE occurs. A minimum OSCE score of 70% is required to pass. The OSCE also tested if the personnel could correctly identify various

FAST and abdominal aortic images. All exam and OSCE scores were tabulated for comparison.

**Results:** Ninety-three paramedics from four ALS sites were trained. Pre-training exams showed a mean score of  $44.5 \pm 12.2\%$ , [95% CI 42.0–47.0]. After the training course, the mean post-training score was  $67.7 \pm 10.0$ , [95% CI 65.7–69.8]. The mean difference in test scores was  $23.3 \pm 12.5\%$  [range 10–52.3]. Using a Wilcoxon Signed Rank test to compare the pre and post exams, a significant difference was detected ( $p < 0.001$ ). 34 paramedics have completed their post 3 month OSCE training. 100% of the 34 paramedics passed the practical portion of the OSCE. 91% identified at least 5 of 7 FAST exam images correctly and 76.6% correctly identified all aortic abdominal exam images.

**Conclusion:** The 6-h FAST and abdominal aortic ultrasound course we developed to train paramedics is effective based on written and practical evaluations. The project is ongoing and will continue to examine training metrics and outcome measurements in prehospital ultrasound.

## ID 7

### HOW TO ASSESS TRAINEES' COMPETENCE IN VISUAL DIAGNOSES? THE EMERGENCY ECHOCARDIOGRAPHY SIMULATION TEST (EMECHOSIMTEST)

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**Introduction:** The new AHA/ERC/ILCOR 2005 guidelines recommended the identification and treatment of potentially reversible causes of cardiac arrest. We introduced an ALS-conformed algorithm on focused echocardiography to be applied in a limited time frame within peri-resuscitation care [1]. This algorithm is related to ten important diagnoses. Therefore, it is a comprehensive training including the training of visual perceptive skills and visual diagnoses. Therefore, we developed the EmEchoSimTest™ and tested if intensive care (INT) or emergency physicians (EP) can interpret trans-thoracic echocardiograms (TTE) in a time sensitive-manner.

**Methods:** An automated computer program "Emergency Echocardiography Simulation Test" (Die Infographin, Frankfurt/Main, Germany) built with Macromedia Director (Adobe Systems, USA) with QuickTime (Apple Computer, USA) was developed. This program contained 16 echocardiography.mpeg movie clips on a 5-in. screen with ten distinct differential diagnoses [1] including normal and pathologic findings such as pericardial effusion, reduced ventricular function, cardiac arrest, pulseless electrical activity, and hypovolemia. Each test block consisted of one clip lasting at most 60 s, a free text box (FTB) to type in the suspected diagnosis and a multiple choice question (MCQ). Test blocks were included randomly into the program. Physicians could view the loops only once. There was no "back", "pause" or "stop" function. We prospectively defined test responders as those who scored more than 50% of the combined FTB and MCQ answers. Time consumption and percentage of right answers in were measured on occasion of an EACTA 2 days course program on TEE in English.

**Results:**  $N = 71$  EP/INT passed the test and  $n = 44$  were test responders. Mean scores of correctly interpreted echocardiograms were: MCQ  $10.9 (68.0 \pm 12.3\%)$ , FTB  $10.5 (65.8 \pm 18.7\%)$  for responders and MCQ  $8.9 (55.6 \pm 13.7\%)$ , FTB  $2.2 (13.9 \pm 13.5\%)$  for non-responders (numbers indicate positive answers and percentage with SD, respectively). The best-detected pathologic findings of  $n = 71$  trainees were: Severely reduced LV-Function  $77.46\%$  (mean time elapsed  $23.11 \pm 13.8$  s), pericardial effusion  $66.3 \pm 5.9\%$  ( $31.42 \pm 17.5$  s) and pleural effusion  $65.3\%$  ( $18.37 \pm 12.99$  s).

**Conclusions:** This EmEchoSimTest™ demonstrated to be a valuable tool to assess the EP/INTs individual knowledge patterns. It can also differentiate their TTE recognition skills and the duration to obtain a visual diagnosis. It may be of interest as (a) level 1 trainee competency assessment on focused echocardiography in Critical Care Medicine and (b) for the assessment of educational programs as quality assurance if they sufficiently submit such basic knowledge.

## Reference

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## ID 28

### MEDICAL STUDENTS AND ULTRASOUND IN THE ICU: IMPROVING FUTURE MEDICAL PRACTICE

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**Introduction:** Medical knowledge grows exponentially in extent and depth. The period during medical school should contain the essential training for a competent and responsible practice. Ultrasound examination (USG) is accessible, minimally invasive, improves doctor-patient relations and allows for an accurate and in real time view of the patient's clinical status. An account is given on the introduction of USG to medical students during their internship in Critical Care Medicine.

**Objectives:** Report and analyze the introduction of USG in the evaluation of the critical patient during medical school.

**Materials and methods:** Fifth-year medical students who go through their 3-month rotation in an ICU of a large public emergency hospital. Ultrasonography seminars and training during the rotation. Approval of the Ethics and Research Committee of HMSA.

**Results:** Since implementation, starting January 2006 and ending December 2007, 183 students (8 classes) completed their rotation. None of them demonstrated any experience or previous abilities, with the exception of 3 who were trainees at an echocardiography clinic. Diagnosis through Imaging is an elective (not mandatory) in the curriculum. During the 3 months of their rotation, all of the patients examined and discussed by the students, under supervision, were submitted to USG. The seminars on USG included discussion on anatomy, protocols being followed and certain syndromes: shock, respiratory failure, polytraumatized, thoracic contusion, brain trauma and evaluation of the critical patient's perfusion.

**Conclusions:** An account was made on the introduction of USG in the evaluation of the critical patient, during a medical student's formation in Emergency and Intensive Care Medicine. It did not involve extra apparel monitoring the patient, but, a fundamental exam for diagnosis and treatment follow-up. USG enabled better interaction between the patient and the medical student and allowed for a more accurate view, within context, and in actual time of the clinical status. Furthermore, USG better illustrated the clinical syndromes (practice-learning) and helped in the development of the student's motor skills: necessary abilities for the future practice of medicine. "The accurate assessment of critical disease states and the safe guidance of interventional procedures is likely to be routinely performed by critical and intensive care physicians using USG" (Luca Neri).