American Academy of Pediatrics, Section on Emergency Medicine, Scientific Abstract Presentations, AAP National Conference and Exhibition October 16, 2009 – Washington, DC

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ORAL PRESENTATIONS: EMERGENCY MEDICINE

RANDOMIZED CLINICAL TRIAL OF PACKING FOLLOWING INCISION AND DRAINAGE OF SUPERFICIAL SKIN ABSCESSES IN THE PEDIATRIC EMERGENCY DEPARTMENT

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Purpose: Skin and soft tissue infections are on the rise in the Emergency Department (ED), accounting for as many as 6% of all visits. However, there is surprisingly little evidence to support currently accepted practices such as wound packing.

We hypothesize that wound packing does not affect short-term failure rates or long-term recurrences after incision and drainage (I&D) of a simple abscess. We also hypothesize that wound packing will increase pain and visits to the ED.

Methods: This prospective randomized trial consecutively enrolled subjects age 12 months to 25 years from an urban Pediatric ED with superficial skin/soft tissue abscesses that were deemed by a physician to need an I&D. Patients were excluded if they were immunocompromised, had recurrence or treatment failure of a prior abscess, were spontaneously draining, required hospitalization or subspecialty management, or if the lesion was less than one centimeter, located on the face, genitalia or perianal area. After informed consent, patients were randomized to "packing" or "no packing" groups. A standardized I&D was performed and all subjects were discharged with prescriptions for pain medicine. Pain scores were assessed using color analogue scales before and after the procedure, and repeated at the 48 hour follow-up visit. Healing outcomes were assessed at a 48 hour follow-up visit by a blinded observer and via telephone interview at one week and one month. Failure was defined as needing any of the following at follow-up: repeat incision and drainage, re-exploration, packing, admission, or addition or change in antibiotics.

Results: These results are from a planned interim analysis for harm. Over 6 months 50 patients were screened for eligibility, 28 were excluded, 1 was missed and 1 refused consent. The rest (n = 20) were randomized and 3 were excluded from analysis due to missing data. Groups were similar with respect to age, gender, ethnicity, abscess duration, abscess size and methicillin resistant S. Aureus rates.

Failures were more common in the packing group: 8/9 (89%) versus 2/8 (25%) in the non-packed group, p = 0.015, difference 64% (95% confidence interval 27% to 100%). There was only one recurrence occurring in the non-packed group. Pain and visits to the ED were not significantly different between groups.

Conclusion: This interim analysis of a randomized controlled trial revealed that wound packing may significantly increase the failure rates after simple I&D. Further study is warranted to establish the reasons for this difference and test its validity.

ACUTE DIARRHEA AND THE RISK OF URINARY TRACT INFECTION IN FEBRILE CHILDREN 3–24 MONTHS PRESENTING TO A PEDIATRIC EMERGENCY DEPARTMENT

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Background: Acute diarrhea with associated fever accounts for many pediatric Emergency Department (ED) visits. The published literature for the evaluation of the febrile child 3–36 months of age does not consider diarrhea a source and the resulting standard of care includes evaluation for urine infection in these children.

Purpose: To compare the prevalence of UTI in febrile children aged 3 to 36 months with and without acute diarrhea presenting to Pediatric Hospital ED over a 2 and a half year period.

Methods: We performed a prospective comparative cross-sectional study of children aged 3 to 36 months evaluated in a pediatric emergecy department for temperature ≥102.2 °F (39 °C) by history or in the ED. Children were excluded if they had vomiting without diarrhea. We defined acute diarrhea as increased frequency of defecation (3 or more times per day or increased frequency and decreased consistency from baseline) lasting less than 14 days. We defined UTI as the growth of a single known pathogen with colony counts meeting ≥100 000 cfu/mL.

Results: The study included 231 subjects with temperatures 102.2 to 106.7 °F. There were 137 (59.3%) without and 94 (40.7%) with diarrhea (Table 1). Of those without diarrhea, 17 (12.4% 95% CI 7.4% to 19.1%) had a UTI while 8 (8.5%, 95% CI 3.8% to 16.1%) of those with diarrhea had a UTI (Table 2).

Conclusion: The frequency of UTI is similar in febrile children with and without diarrhea. Diarrhea should not be considered the source of fever without evaluation for urine infection in the ED setting.

Table 1. Comparison of Subjects With and Without Diarrhea

Characteristic	No Diarrhea (N = 137) Frequency (%)	Diarrhea (N = 94) Frequency (%)
Gender		
Male	61 (44.5)	34 (36.2)
Female	76 (55.5)	60 (63.8)
Age		
3–6 Months	42 (30.7)	24 (25.5)
7–12 Months	56 (40.9)	36 (38.3)
>12 Months	39 (28.5)	34 (36.2)

Table 1. *(Continued)*

Characteristic	No Diarrhea (N = 137) Frequency (%)	Diarrhea (N = 94) Frequency (%)
Race/Ethnicity		
Hispanic	81 (59.1)	66 (70.2)
Black	42 (30.7)	19 (20.2)
White	12 (8.8)	8 (8.5)
Other	2 (1.4)	1 (1.1)

TABLE 2. UTI Prevalence Stratified by Gender and Age

	No Diarrhea (N = 137) Frequency (%)	Diarrhea (N = 94) Frequency (%)
Male		
3–6 Months	6 (14.3)	3 (12.5)
7–12 Months	5 (8.9)	2 (5.6)
>12 Months	6 (15.4)	3 (8.8)
Female		
3–6 Months	4 (23.5)	3 (20.0)
7–12 Months	4 (13.3)	1 (5.3)
>12 Months	5 (17.2)	3 (11.5)

BEDSIDE ULTRASOUND EVALUATION OF DISTAL FOREARM FRACTURES IN THE PEDIATRIC EMERGENCY DEPARTMENT

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Purpose: Forearm fractures account for 40–50% of all pediatric fractures. Ultrasound (US) may be a useful tool for rapidly diagnosing non-angulated fractures in the distal forearm. Our objective was to determine accuracy of US as compared to radiographs (X-ray) in the diagnosis of non-angulated distal forearm fractures.

Methods: We performed a prospective single-blinded diagnostic test study. We enrolled a convenience sample of children (ages 1–17) with possible non-angulated distal forearm fractures. US of the distal forearm with a preliminary reading was completed at the bedside by a pediatric emergency medicine (PEM) physician prior to X-ray. A PEM physician with extensive US experience gave a second and final interpretation of the US images while blinded to both the clinical exam and X-ray results. Our primary outcome measure was the accuracy of the blinded reviewer US reading compared to the radiologist X-ray interpretation for the diagnosis of a distal forearm fracture. Our secondary outcomes included the comparison of FACES pain scores (range 0–5) during both procedures and the inter-rater reliability of the two US interpretations.

Results: Of 101 enrolled patients, 46 (45.5%) had a fracture diagnosed by the reference standard. Compared with X-ray, the final US interpretation had an overall congruency of 94.1% (95% CI: 88–99%), Sensitivity and specificity were 95.7% (95% CI: 85–99%) and 92.7% (95% CI: 82–98%) respectively. Positive Predictive Value was 91.7% and Negative Predictive Value was 96.2%. For the secondary outcome measure, mean FACES pain scores were higher following X-ray (1.7 +/−1.8) compared to beside US (1.2 +/−1.4) (p = 0.004, Wilcoxon signed rank test). Inter-rater reliability (kappa) was 0.57 (95% CI: 0.41–0.73).

Conclusions: For the diagnosis of distal forearm fractures in children, bedside US revealed a high congruency, sensitivity, and specificity when compared to X-ray. Pain associated with US of distal forearm injuries appeared no more painful than X-ray. Given US's advantage of lack of radiation, PEM physicians should consider becoming proficient with this application.

BEDSIDE ULTRASOUND DIAGNOSIS OF CLAVICLE FRACTURES IN THE PEDIATRIC EMERGENCY DEPARTMENT

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Purpose: Clavicle fractures are one of the most common orthopedic injuries in children. Diagnosis typically involves radiographs, which expose children to radiation and consume significant time and money. Our objective was to determine if bedside emergency department (ED) ultrasound is an accurate alternative to radiography.

Methods: We performed a prospective study of bedside ultrasound for diagnosing clavicle fractures. We enrolled a convenience sample of children ages 1–18 with any shoulder injury requiring radiographs. Bedside ultrasound and a preliminary interpretation were completed by a pediatric emergency medicine (PEM) physician prior to radiographs. A PEM attending physician with extensive ultrasound experience gave a final interpretation of the ultrasound images at a later date while blinded to both clinical and radiography outcomes. The reference standard was an attending radiologist's interpretation of radiographs. Our primary outcome was the accuracy of the final ultrasound interpretation for detecting clavicle fractures compared to the reference standard. Secondary outcome measures included the interrater reliability of the two PEM physician interpretations, and the FACES pain scores (range 0–5) for ultrasound and radiograph imaging.

Results: Sixty-three patients were included in the study, of which 24 (38%) had clavicle fractures by radiography. The final ultrasound interpretation had 100% sensitivity (95% CI: 83–100%), and 95% specificity (95% CI: 81–99%). Its overall accuracy was 97%, with 61/63 congruent readings. Positive and negative predictive values were 92% and 100%, respectively. Interrater reliability (kappa) was 0.71 (95% CI: 0.54 – 0.88). Pain scores were available for the 54 subjects who were at least 5 years old. They averaged 0.94 during ultrasound and 1.31 during radiography (P = 0.09 by Wilcoxon).

Conclusion: Compared to radiographs, bedside ED ultrasound can accurately diagnose pediatric clavicle fractures, with equivalent pain scores. Given ultrasound's advantage of lack of radiation, PEM physicians should consider this application.

ACCURACY OF BEDSIDE LIMITED ECHOCARDIOGRAPHY BY EMERGENCY PHYSICIANS

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Purpose: Currently, there is limited data addressing the role of Bedside Limited-scope Echocardiography by Emergency Physicians (BLEEP). Our primary hypothesis was that with goal directed training, BLEEP performed in the acutely ill child in the emergency department (ED), can accurately assess (a) Left Ventricular (LV) systolic function by visual estimate (2) Presence of Pericardial Effusion and (3) Cardiac Preload by estimating Inferior Vena Cava (IVC) collapsibility during respiration.

Methods: Design: Prospective, cohort study.

Setting: Urban, tertiary level, free standing, pediatric facility with an annual census of 70,000 visits.

Population: Subjects between the ages of 0–18 yrs that met one or more of the following inclusion criteria were recruited: (1) Patients receiving a formal echocardiogram in the ED (2) Patients in shock and on vasoactive infusions (3) Undifferentiated cardiomegaly on chest radiography (4) cardiopulmonary arrest.

Protocol: All eligible patients underwent a BLEEP examination by one of two, trained pediatric ED physicians. Dynamic video clips were recorded and

independently assessed by a pediatric cardiologist who was unaware of the clinical status of the patient.

Results: Over a period of 18 months, 70 subjects were recruited. Diminished LV function was noted in 17/70, pericardial effusion in 16/70 and abnormal IVC collapsibility in 35/67 patients. There was good to excellent agreement between the investigators and cardiologist for all components of BLEEP. Kappa statistic for detection of LV function, IVC collapsibility and effusion was 0.87 (95% CI 0.73, 1.00), 0.73 (95% CI 0.59, 0.88) and 0.77 (95% CI 0.58, 0.95) respectively. The overall sensitivity and specificity of BLEEP as a screening tool was 95% & 83% respectively.

Conclusion: With goal directed training in point-of-care echocardiography by a pediatric cardiologist, ED physicians can accurately assess for significant LV systolic dysfunction, vascular filling and presence or absence of pericardial effusion. The model may be expanded to train other physicians in the use of BLEEP as a screening tool in the pediatric ED.

UTILITY OF PLAIN RADIOGRAPHS IN DETECTING TRAUMATIC INJURIES OF THE CERVICAL SPINE IN CHILDREN

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Background: The frequency of cervical spine injuries (CSI) after blunt trauma in children is very low. As a result, the usefulness of plain radiography to screen for c-spine injury has not been well studied in children.

Purpose: To determine the utility of plain radiographs in identifying bony or ligamentous CSI in children.

Methods: We identified a retrospective cohort of children <16 years of age with blunt-trauma related bony or ligamentous CSI evaluated between 2000 and 2005 at 17 emergency departments participating in PECARN. We included all children who had plain cervical spine (c-spine) radiographs with a dictated report on record at the study site. We excluded children who had injuries that are undetectable by plain radiograph (n = 88; isolated SCIWORA, rotary subluxation, and/or spinal cord injury) and those who had a single or undocumented number of radiographic views (n = 92). Using a modified Delphi approach, 4 study investigators reviewed the reports and assigned a classification for injury (definite, equivocal, or negative for CSI) as well as film adequacy (assumed adequate unless specifically noted in radiology report). A pediatric neurosurgeon, blinded to the classification of the radiology reports, reviewed complete case histories and assigned final CSI type.

Results: We identified 210 children who met inclusion criteria. The median age was 12 years (IQR 7–14 years) with 133 (63%) male. Definite or equivocal CSI were identified by plain radiograph in 170 children (81% of study patients). Of the 40 children with negative studies, 21 were considered to have films of inadequate quality. Of the 189 children with adequate c-spine radiographs, 90% had positive or equivocal radiographic readings (170/189; 95% CI 86–94%). C-spine radiographs did not identify the following CSI: fracture only (10 children), ligamentous injury alone (4), and both fracture and ligamentous injury (5). Ten of these children presented with one or more of the following: endotracheal intubation (4 children), altered mental status (5), or focal neurologic findings (6).

Conclusions: Plain radiographs identified most of the cervical spine injuries in our cohort. Among children with missed injuries, half had either altered mental status or focal neurological findings. Further prospective study is needed to determine which children at risk for CSI will benefit from advanced imaging.

RAPID MEDICAL ASSESSMENT: IMPROVED PATIENT FLOW AND LEFT WITHOUT BEING SEEN RATES

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Purpose: To study the impact of implementation of a rapid medical assessment (RMA) program on patient flow and left without being seen rates in an urban pediatric emergency department. A rapid assessment program was designed to see uncomplicated patients and discharge them or initiate orders for lab tests, radiographs, and treatments before they were place in a room. Before initiation of our RMA program, all patients were triaged, then seen on the basis of the time of arrival and their triage acuity on a 1–5 scale, with 1 being of highest acuity.

Methods: A RMA program was initiated in January 1, 2008, active for 16 hours each day. A specialty trained nurse practitioner or physician's assistant was assigned to the RMA area (immediately adjacent to triage) from 1000 to 0200. We compared 6 months of data from January 1 to June 30 2007 (before RMA) to January 1 to June 30, 2008 (after RMA). We compared the total length of stay in minutes, the time to see a provider, and the left without being seen rate. The data was entered into SPSS and the t-test was used to compare time results and a chi-square was used to compare the left without being seen rates. No other significant changes in staffing or operations occurred during this period. The data was obtained from a tracking board system where times of triage, room placement, provider evaluation, and discharge are recorded in real time.

Results: There were 28360 patients seen in 2007 and 32053 in 2008. During the study period in 2008, 23% of all patients were seen in RMA. The mean triage to discharge time in 2007 was 239 (median = 220) minutes compared to 181 (median = 162) minutes in 2008. The t-test comparison showed a difference of 58 minutes (95% confidence interval 56 to 60 minutes). Door to provider mean time was 80 (median = 57) minutes in 2007 and 53 (median = 39) minutes in 2008. The t-test comparison showed a difference of 27 minutes (95% confidence interval 25 to 28 minutes). The most dramatic improvements were seen in the level 4 and 5 patients (lowest acuity). There were 2.5 times as many level 4 and 5 acuity patients triaged and discharged in less than 90 minutes in 2008 (30%) compared to 2007 (12%). The left without being seen rate decreased from 9% in 2007 to 3% in 2008 (chi square p < .001).

Conclusion: RMA is an effective way to improve patient flow and reduce patients leaving without being seen. By seeing patients at both ends of the waiting queue (patients with chief complaints that are quickly resolved and those with more complicated chief complaints), patient flow and left without being seen rates can be improved.

PREDICTORS OF VENTRICULAR SHUNT INFECTIONS IN CHILDREN

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Purpose: Data regarding clinical predictors of ventricular shunt infection in children are limited, and no data exist regarding optimal management strategies for children who present to the emergency department (ED) with concern of a shunt infection. Among a population of children with a ventricular shunt presenting to a pediatric ED, and in whom CSF was obtained, we sought to: 1) determine the rate of positive CSF bacterial culture, and 2) identify clinical predictors of ventricular shunt infection.

Methods: We performed a retrospective cohort study of children 3 months to 21 years of age evaluated in a single pediatric tertiary ED between 1995–2008 for possible ventricular shunt infection. All included children had cerebrospinal fluid (CSF) obtained within 24 hours of presentation to the ED. Clinical and laboratory information were abstracted from the medical record. A shunt infection was defined by growth of bacteria in the CSF of a child who underwent shunt removal or externalization due to concern of shunt infection. Multivariate logistic regression was performed to identify clinical predictors of ventricular shunt infection.

Results: 773 children met inclusion criteria; median age was 7.0 years (IQR 2.1, 13.7). 101 (13.1%) patients with a ventricular shunt had growth of