EVIDENCE BASED PEDIATRIC EMERGENCY MEDICINE: ARE YOU PRACTICING IT?

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Professor of Emergency Medicine and Pediatrics
Section Chief, Pediatric Emergency Services
Director, Pediatric Emergency Medicine Fellowship
Emeritus Director, Upstate Poison Control Center
Golisano Children’s Hospital, Syracuse, NY
• I have no pharmaceutical or industrial affiliations
OBJECTIVES

• Highlight some of the most common PEM complaints

• Present current standards of care
PEM JOB DESCRIPTION:
“A FRONT ROW SEAT TO THE END (OR BEGINNING) OF THE WORLD”
WHAT IS “EVIDENCE BASED MEDICINE?”

Evidence-based medicine is the conscientious explicit and judicious use of current best evidence in making decisions about the care of individual patients.

Evidence based medicine: what it is and what it isn’t BMJ 1996;312:71
HIERARCHIES OF EVIDENCE

Systematic review
Randomised controlled study or prospective cohort study
Pseudo-randomised controlled study
Cohort or case control study
A comparative study without controls
Case series or cross sectional study

I
II
III - 1
III - 2
III - 3
IV
Work Up of The Febrile Child
Bacteremia
Meningitis
Febrile Convulsions
THE FEBRILE NEONATE
A 3 week old presents with a temperature of 38.5°C for 1 day

- Normal birth history
- No sick contacts

Clinical choices:
- Viral testing only?
- Septic Work Up only?

- Admit if labs are abnormal
- Discharge if labs are normal
• **All infants less than 30 days** with a temperature greater than 38.3°C should receive a full septic workup and admission.

• Key concepts:
  • You can’t trust these kids clinically
  • Laboratory results may be unreliable
  • The stakes are very high if you’re wrong
Pediatric Infect Dis J 2010;29: 227–232

Predicting Severe Bacterial Infections in Well-Appearing Febrile Neonates

Laboratory Markers Accuracy and Duration of Fever

Silvia Bressan, MD, Barbara Andreola, MD, Francesca Cattelan, MD, Tiziana Zangardi, MD,
Giorgio Perilongo, MD, and Liviana Da Dalt, MD
OBJECTIVES

• To assess the diagnostic accuracy of
  • WBC
  • absolute neutrophil count (ANC)
  • C-reactive protein (CRP)

• in detecting severe bacterial infections (SBI) in well-appearing neonates with early onset fever without source (FWS)

• In relation to fever duration
• Observational study

• Previously healthy neonates 7 - 28 days of age, consecutively hospitalized for FWS for less than 12 hours to a tertiary care Pediatric Emergency Department, over a 4-year period

• Laboratory markers were obtained upon admission in all patients and repeated 6 to 12 hours after admission in those with normal values on initial determination
• 99 patients studied

• SBI documented in 25 (25.3%) neonates

• 62 patients presented had laboratory markers on initial determination
## RESULTS

<table>
<thead>
<tr>
<th></th>
<th>AROC Initially</th>
<th>AROC at 12 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRP</td>
<td>.78</td>
<td>.99</td>
</tr>
<tr>
<td>ANC</td>
<td>.77</td>
<td>.85</td>
</tr>
<tr>
<td>WBC</td>
<td>.59</td>
<td>.79</td>
</tr>
</tbody>
</table>
CONCLUSIONS

• In well-appearing neonates with early onset FWS, laboratory markers are more accurate and reliable predictors of SBI when performed after > 12 hours of fever duration.

• ANC and especially CRP resulted better markers than the traditionally recommended WBC.
PRESENT DAY
NEONATAL FEVER

- ALL infants should receive
  - CBC, electrolytes
  - Blood, urine and CSF cultures (including HSV)
  - IV Cefotaxime and Ampicillin
  - IV Acyclovir

- ALL are admitted
THE FEBRILE INFANT
Prevalence of Occult Bacteremia in Children Aged 3 to 36 Months Presenting to the Emergency Department with Fever in the Postpneumococcal Conjugate Vaccine Era

Matthew Wilkinson, MD, Blake Bulloch, MD, and Matthew Smith, MD
CLINICAL QUESTION

What is the prevalence of occult bacteremia (OB) in well-appearing, previously healthy children aged 3 to 36 months who present to the emergency department (ED) with fever without source in the post-pneumococcal conjugate vaccine (PCV) era?
METHODS

Retrospective study of children presenting to an urban PED over a 3 year period

Children were included if they were

- aged 3 to 36 months
- febrile
- had no source of infection
- had a blood culture drawn
- Discharged from the ED
RESULTS

8,408 children

21 true-positives, yielding an OB rate of 0.25%

159 contaminant cultures - contaminant rate of 1.89%

ratio of 7.6 contaminants for each true-positive
• Given the current rate of OB in the post-PCV era, it may no longer be cost-effective to send blood cultures on well-appearing, previously healthy children aged 3 to 36 months who have fever without source.
WHAT IF YOU **DID** GET A WBC?
Does Extreme Leukocytosis Predict Serious Bacterial Infections in Infants in the Post-Pneumococcal Vaccine Era? The Experience of a Large, Tertiary Care Pediatric Hospital

Dana Danino, MD, * Ayelet Rimon, MD, * Dennis Scolnik, MB, ChB, † Galia Grisaru-Soen, MD, ‡ and Miguel Glatstein, MD*§
CONCLUSIONS

• All well-looking febrile infants with WBC greater than \textit{25,000/mm3 should undergo a chest radiograph} unless there are clear physical findings that indicate a different etiology

• \textit{Urine culture} should be considered in girls
Value of white cell count in predicting serious bacterial infection in febrile children under 5 years of age

Sukanya De,¹,² Gabrielle J Williams,¹,² Andrew Hayen,¹,³ Petra Macaskill,¹
Mary McCaskill,⁴ David Isaacs,⁵ Jonathan C Craig¹,²,⁶
## CONCLUSIONS

### What is already known

- The white blood cell and absolute neutrophil counts are frequently used in the initial evaluation of febrile children for suspected serious bacterial infections.
- Existing guidelines for evaluation of febrile children endorse the use of specific white cell count thresholds to guide management.
- Reports of the accuracy of these tests are contradictory, based on small studies limited in their design, conducted mostly in the pre-pneumococcal vaccine era.

### What this study adds

- The white blood cell and absolute neutrophil counts are inaccurate markers of serious bacterial infection in children less than 5 years old presenting with fever.
- **A white cell count threshold of $15 \times 10^9/L$ misses half of all serious bacterial infections while misclassifying a quarter of self-limiting illnesses.**
- Recommendations regarding white cell count testing for febrile children need careful re-evaluation.
THE ROAD TO HELL IS PAVED WITH........?
• A positive NP aspirate for RSV in a febrile young infant <2 months essentially rules out bacteremia/SBI

• Therefore, no further testing is necessary
Meta-analysis to Determine Risk for Serious Bacterial Infection in Febrile Outpatient Neonates With RSV Infection

William Bonadio, MD, Felix Huang, MD, Sithumaththi Natesan, MBBS, Chukwujekwu Okpalaji, MBBS, Alicia Kodsi, MD, Sabrina Sokolovsky, DO, and Peter Homel, PhD
OBJECTIVES

Determine whether there is a clinically significant association between viral study results and risk for serious bacterial infection.

Received sepsis evaluation and nasopharyngeal aspirate antigen testing (NPAT) for RSV infection.

Febrile neonates 28 days or younger.

Determine whether there is a clinically significant association between viral study results and risk for serious bacterial infection.
• Prevalence of + RSV in 387 febrile neonates was 6%
• 378 (98%) had both a sepsis evaluation and RSV NPAT

<table>
<thead>
<tr>
<th>POSITIVE SBI</th>
<th>POSITIVE RSV</th>
<th>4/22 (18.1%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSITIVE RSV</td>
<td>4/22 (18.1%)</td>
<td></td>
</tr>
<tr>
<td>NEGATIVE RSV</td>
<td>58/356 (16.2%)</td>
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</tr>
</tbody>
</table>
CONCLUSIONS

Respiratory viral infection status is not an accurate clinical determinant in distinguishing SBI risk in febrile neonates.

Rates of + SBI are not significantly different between febrile neonates 28 days or younger with and without + RSV.
Risk of Bacterial Coinfections in Febrile Infants 60 Days Old and Younger with Documented Viral Infections

Prashant Mahajan, MD, MPH, MBA1,*, Lorin R. Browne, DO2, Deborah A. Levine, MD3, Daniel M. Cohen, MD4, Rajender Gattu, MD5, James G. Linakis, MD, PhD6, Jennifer Anders, MD7, Dominic Borgialli, DO, MPH8, Melissa Vitale, MD9, Peter S. Dayan, MD, MSc10, T. Charles Casper, PhD11, Octavio Ramilo, MD12, Nathan Kuppermann, MD, MPH13, and the Febrile Infant Working Group of the Pediatric Emergency Care Applied Research Network (PECARN)14

J Pediatr 2018;203:86-91
• Compared patient demographics, clinical, and laboratory findings, and prevalence of SBIs between virus-positive and virus-negative infants
4778 ENROLLED INFANTS = 2945 VIRAL TESTED

1200 (48.1%) were virus positive
- 44 of the 1200 had SBIs (3.6%)

1745 virus negative
- 222 had SBIs (12.7%)
RESULTS

• Rates of specific SBIs in the virus-positive group vs the virus-negative group were
  • UTIs (33 of 1200 = 2.8%); vs 186 of 1745 (10.7%)
  • Bacteremia (9 of 1199 (0.8%) vs 50 of 1743 (2.8%)

• Negative viral status was significantly associated with SBI in multivariable analysis
CONCLUSIONS

• Febrile infants ≤60 days of age with viral infections are at significantly lower, but non-negligible risk for SBIs, including bacteremia and bacterial meningitis
MENINGITIS
When performing a spinal tap, the infant should "kiss his toes" in the fetal position.
Positioning for Lumbar Puncture in Children Evaluated by Bedside Ultrasound

Pediatrics 2010; 125: e1149–e1153
CONCLUSIONS

• The interspinous space of the lumbar spine was maximally increased with children in the sitting position with flexed hips.

• In the lateral recumbent position, neck flexion does not increase the interspinous space and may increase morbidity.

![Diagram showing different spine positions and their effects on interspinous space.](image-url)
The Effect of Bedside Ultrasonographic Skin Marking on Infant Lumbar Puncture Success: A Randomized Controlled Trial

Jeffrey T. Neal, MD*; Summer L. Kaplan, MD; Ashley L. Woodford, BS; Krisha Desai, BS; Joseph J. Zorc, MD, MSCE; Aaron E. Chen, MD

METHODS

• Prospective, randomized, controlled trial in an academic pediatric emergency department (ED)

• Infants younger than 6 months

• The conus medullaris and most appropriate intervertebral space were identified and marked
Figure 1. Identification of anatomic landmarks with bedside ultrasonography. Longitudinal plane (left) vs transverse plane (right); dura (a), spinous process (b), cauda equina (c), transverse process (d), subarachnoid space (e); example of depth measurement (blue line).
Figure 2. Ultrasonographic skin marking. Clinicians performing the LP were handed a diagram that described the following skin markings: a large straight line marking the termination of the conus and a cross marking the intervertebral space and midline for the first attempt. The images above demonstrate these markings in A, the lateral decubitus; and B, sitting position.
• 128 patients enrolled

• The first-attempt success rate was higher for the ultrasonography arm (58%) versus the traditional arm (31%)

• Success within 3 attempts was also higher for the ultrasonography arm (75%) versus the traditional arm (44%)
• Ultrasonography-assisted site marking improved infant lumbar puncture success in a tertiary care pediatric teaching hospital

• This method has the potential to reduce unnecessary hospitalizations and exposures to antibiotics in this vulnerable population
The Sonographic Appearance of Spinal Fluid at Clinically Selected Interspaces in Sitting Versus Lateral Positions

Yaffa M. Vitberg, MD, Peggy Tseng, MD, and David O. Kessler, MD, MSc, RDMS
METHODS

- Infants < 3 months
- PEM physicians marked infants' backs at the level they would insert a needle using the landmark palpation technique
- A PEM sonologist imaged and measured the spinal fluid in 2 orthogonal planes at this marked level in lateral then sitting positions
- Fluid measurements were repeated by a second blinded PEM sonologist
• 46 infants enrolled

• Ultrasound verified the presence of fluid at the marked level as determined by the landmark palpation technique in 98% of cases

• Ultrasound identified additional suitable spaces 1 space higher (82%) and 2 spaces higher (41%)
FIGURE 3. Dorsal fluid pocket in lateral versus sitting positions for a representative subject.
FIGURE 2. Spinal fluid area measurements in lateral versus sitting positions for a representative subject.
CONCLUSIONS

• Ultrasound can verify the presence of fluid at interspaces determined by the landmark palpation technique and identify additional suitable spaces at higher levels

• *There were statistically greater fluid measurements in sitting versus lateral positions*
FEBRILE CONVULSIONS
All children who suffered a febrile convulsion should receive a:

- Full septic workup
- An EEG
- A CT scan
- Probable admission
CONCLUSIONS

• Clinicians evaluating infants or young children after a simple febrile seizure should **direct their attention toward identifying the cause of the child’s fever**

• Meningitis should be considered in the differential diagnosis

• For any infant between 6 and 12 months of age who presents with a seizure and fever, **a lumbar puncture is an option when the child is considered deficient in Haemophilus influenzae type b (Hib) or Streptococcus pneumoniae immunizations**
CONCLUSIONS

- A lumbar puncture is an option for children who are pretreated with antibiotics.

- In general, a simple febrile seizure does not usually require further evaluation, specifically electroencephalography, blood studies, or neuroimaging.
UTI’s
Timing of Cultures
Methods of Sampling
A WORD ABOUT ...... UTI’S
Duration of Fever Affects the Likelihood of a Positive Bag Urinalysis or Catheter Culture in Young Children

J Pediatr 2010;156:629-33
Prospective study of 818 infants and children age 3-36 months with documented fever without source

Following the documentation of fever from < 1 to > 5 days, bag specimens were collected for urinalysis

The primary outcome was the yield of positive bag dipsticks by day, defined as positive for nitrates or more than trace leukocyte esterase

The secondary outcome was positive catheter cultures on each day of fever
RESULTS

Positive bag urinalyses increased with duration of fever
14.8% (35/237) on day 1
26.4% (43/163) on day 3

Positive catheter cultures increased in the same fashion
4.8% (11/229) on day 1
12.6% (20/159) on day 3
CONCLUSIONS

• The yield of positive bag urinalyses and catheter cultures increased significantly in children with fever of 3 days or longer duration.
Evaluation of a New Strategy for Clean-Catch Urine in Infants

Mélanie Labrosse, MD, PhD, Arielle Levy, MD, MEd, Julie Autrizguine, MD, MSc, Jocelyn Gravel, MD, MSc
A prospective cohort study among infants <6 months needing a urine sample

CCU samples were collected using a standardized stimulation technique. Invasive technique was performed after CCU for three specific conditions

Determined associations between successful urine samples and 4 predictive factors (age, sex, low oral intake, and recent voiding)
TAPPING THE SUPRAPUBIC AREA
MASSAGING THE LUMBOSACRAL AREA
RESULTS

- 126 infants included (64 boys, median age: 55 days)

- CCU procedure was effective in 62 infants (49%; median time: 45 seconds)

- Infants 0 to 29 days; 30 to 59 days, and 60 to 89 days had more successful procedures, compared with infants >89 days

- Contamination proportion 16% in the CCU group
  - not statistically different compared with the invasive method group
UTI PRESENT DAY

• **Recommended** culture candidates
  - FWLS females under age 2
  - FWLS males under 6 months
  - FWLS uncircumcised males under 1 year

• Debatable worth in *first 24* hours of fever
  - **Definitely** more indicated after 3 days

• Remember a culture positive UTI in an child less than 2 years is a **PYELONEPHRITIS**, not a simple cystitis
Respiratory Issues
Pneumonia
Bronchiolitis
TIRED OF COUGHING INFANTS AND CHILDREN?
Executive Summary: The Management of Community-Acquired Pneumonia in Infants and Children Older Than 3 Months of Age: Clinical Practice Guidelines by the Pediatric Infectious Diseases Society and the Infectious Diseases Society of America

John S. Bradley,¹,ⁿ Carrie L. Byington,²,ⁿ Samir S. Shah,³,ⁿ Brian Alverson,⁴ Edward R. Carter,⁵ Christopher Harrison,⁶ Sheldon L. Kaplan,⁷ Sharon E. Mace,⁸ George H. McCracken Jr,⁹ Matthew R. Moore,¹⁰ Shawn D. St Peter,¹¹ Jana A. Stockwell,¹² and Jack T. Swanson¹³
WHO SHOULD BE HOSPITALIZED?

- Children and infants who have respiratory distress and hypoxemia
- Infants less than 3–6 months of age with suspected bacterial CAP
- Children and infants with suspected or documented CAP caused by a pathogen with increased virulence, such as community-associated methicillin-resistant Staphylococcus aureus (CA-MRSA)
• Blood cultures should not be routinely performed in nontoxic, fully immunized children with CAP managed in the outpatient setting.

• Sensitive and specific tests for the rapid diagnosis of influenza virus and other respiratory viruses should be used in the evaluation of children with CAP.

• Antibacterial therapy is not necessary for children, either outpatients or inpatients, with a positive test for influenza virus in the absence of clinical, laboratory, or radiographic findings that suggest bacterial coinfection.
• **Routine measurement of the complete blood cell count is not necessary in all children with suspected CAP managed in the outpatient setting**, but in those with more serious disease it may provide useful information for clinical management in the context of the clinical examination and other laboratory and imaging studies.

• **Acute-phase reactants**, such as the erythrocyte sedimentation rate (ESR), C-reactive protein (CRP) concentration, or serum procalcitonin concentration, **cannot be used as the sole determinant to distinguish between viral and bacterial causes of CAP**
• **Routine chest radiographs are not necessary** for the confirmation of suspected CAP in patients well enough to be treated in the outpatient setting (after evaluation in the office, clinic, or emergency department setting).
Anti-infective Treatment

Antimicrobial therapy is not routinely required for **preschool-aged children with CAP**, because viral pathogens are responsible for the great majority of clinical disease.

**Amoxicillin** should be used as first-line therapy for previously healthy, appropriately immunized infants and preschool children with mild to moderate CAP suspected to be of bacterial origin.

**Macrolide** antibiotics should be prescribed for treatment of children (primarily school-aged children and adolescents) evaluated in an outpatient setting with findings compatible with CAP caused by atypical pathogens.
• Treatment courses of 10 days have been best studied, although shorter courses may be just as effective, particularly for more mild disease managed on an outpatient basis.
Clinical Practice Guideline: The Diagnosis, Management, and Prevention of Bronchiolitis
• When clinicians diagnose bronchiolitis on the basis of history and physical examination, radiographic or laboratory studies should not be obtained routinely.
• Clinicians should not administer albuterol (or salbutamol) to infants and children with a diagnosis of bronchiolitis

• Clinicians should not administer epinephrine to infants and children with a diagnosis of bronchiolitis

• Nebulized hypertonic saline should not be administered to infants with a diagnosis of bronchiolitis in the emergency department
REAL LIFE TREATMENT DECISIONS

• Beta 2 Agonists

  • SOME WILL RESPOND----“no one ever died from one albuterol treatment”

  • Will help the infant with beta 2 agonist reversible bronchospasm

• Epinephrine (nebulized)
  • May stave off intubation
Clinicians should not administer systemic corticosteroids to infants with a diagnosis of bronchiolitis in any setting.
Viral Gastroenteritis

Anti Emetics
Management Protocols
TREATMENT OF VIRAL GASTROENTERITIS
ONCE UPON A TIME

- Antiemetics were contraindicated in the treatment of viral gastroenteritis
  - Compazine
  - Phenergan
  - Atropine

THEN ALONG CAME ONDANSETRON
Ondansetron Use in the Pediatric Emergency Room for Diagnoses Other Than Acute Gastroenteritis

Jesse J. Sturm, MD, MPH, Amanda Pierzchala, MD, Harold K. Simon, MD, and Daniel A. Hirsh, MD

Pediatric Emergency Care 2012 28:247
During the study period, 32,971 patients received ondansetron in the PED, **12,620 (38%) were non-GE patients**

- The non-GE patients
  - older (8.3 years versus 4.3 years, $p < 0.001$)
  - had a higher average initial triage level
  - 79% received ondansetron enterally
  - 71% were discharged home
  - 37% of the discharged patients received a prescription for ondansetron
RESULTS

- fever (15%)
- abdominal pain (13%)
- head injury (7%)
- pharyngitis (6%)
- viral infection (6%)
- migraine variants (5%)
- otitis media (5%)
RESULTS

Admission Diagnosis

- appendicitis (11%)
- asthma (6%)
- pneumonia (4%)
- diabetes (4%)
DON’T FORGET THE ULTIMATE ANTIEMETIC

Positive Cheetos Sign
The Use of a Triage-Based Protocol for Oral Rehydration in a Pediatric Emergency Department

Marissa A. Hendrickson, MD,*† Jennifer Zaremba, DNP, RN, PCNS-BC,† Andrew R. Wey, PhD,‡ Philippe R. Gaillard, PhD,§ and Anupam B. Kharbanda, MD, MPH||

Pediatr Emer Care 2018;34:227–232

ZO PO GO
• Evaluated a protocol prompting triage nurses to assess dehydration in gastroenteritis patients and initiate ondansetron and ORT if indicated

• Otherwise well patients aged 6 months to 5 years with symptoms of gastroenteritis were eligible
RESULTS

- 128 (81 postintervention and 47 preintervention) patients were analyzed; average age was 2.1 years

- **Ondansetron use increased from 36% to 75%**

- **Time to ondansetron decreased from 60 minutes to 30 minutes**

- Documented ORT increased from 51% to 100%
• Blood testing decreased from 37% to 21%

• Intravenous fluid decreased from 23% to 9%

• There were no significant changes in ED length of stay, admissions, or unscheduled return to care
A triage nurse initiated protocol for early use of oral ondansetron and ORT in children with evidence of gastroenteritis is associated with increased and earlier use of ondansetron and ORT and decreased use of IV fluids and blood testing without lengthening ED stays or increasing rates of admission or unscheduled return to care.
DON’T FORGET THE ULTIMATE ANTIEMETIC

Positive Cheetos Sign
Abdominal Issues

Pyloric Stenosis
Intussusception
ABDOMINAL CRISES OF INFANCY
ONCE UPON A TIME

- All infants with pyloric stenosis
  - Had classic signs (i.e. “the olive”)
  - Had metabolic alkalosis
  - Necessitated a barium swallow

- Infants with intussusception
  - Had currant jelly stools
  - Had profound vomiting
The Changing Clinical Presentation of Hypertrophic Pyloric Stenosis: The Experience of a Large, Tertiary Care Pediatric Hospital

Miguel Glatstein, MD¹, Gary Carbell, Sirisha Kusuma Boddu, MD¹, Annalucia Bernardini, MD¹, and Dennis Scolnik, MB, ChB¹
STUDY CONCLUSIONS

- Reviewed the clinical and laboratory data from cases of hypertrophic pyloric stenosis (HPS) diagnosed at their institution from 2006 – 2008

- A total of 118 patients were included in this study

- An “olive” was palpated in only 13.6% of cases
This is in contrast to older studies, where more than 50% of the patients were reported to have a palpable “olive” depending on when the study was conducted.

In patients from this institution, hypochloremia was present in 23% and alkalosis in 14.4%, which are less frequent than the incidence of these abnormalities in older studies.

The reason for this change appears to be the frequent use of ultrasound.
Original Article

Intussusception
Clinical Presentations and Imaging Characteristics

Katherine Mandeville, MD,* Ming Chien, MD,* F. Anthony Willyerd, MD,* Gerald Mandell, MD,†
Mark A. Hostetler, MD,* and Blake Bulloch, MD*

Pediatric Emergency Care 2012 28: 842
## TABLE 1. Characteristics of Children With Intussusception

<table>
<thead>
<tr>
<th>Signs/Symptoms</th>
<th>&lt;12 mo</th>
<th>12–36 mo</th>
<th>&gt;36 mo</th>
<th>All Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal pain (n = 189)</td>
<td>90%</td>
<td>96%</td>
<td>97%</td>
<td>93% (P &lt; 0.041)</td>
</tr>
<tr>
<td>Emesis (n = 214)</td>
<td>94%</td>
<td>79%</td>
<td>64%</td>
<td>85% (P &lt; 0.001)</td>
</tr>
<tr>
<td>Guaiac-positive stool (n = 98)</td>
<td>83%</td>
<td>60%</td>
<td>67%</td>
<td>76% (P = 0.027)</td>
</tr>
<tr>
<td>Grossly bloody stools (n = 185)</td>
<td>83%</td>
<td>41%</td>
<td>37%</td>
<td>65% (P &lt; 0.001)</td>
</tr>
<tr>
<td>Irritability (n = 196)</td>
<td>71%</td>
<td>51%</td>
<td>14%</td>
<td>58% (P &lt; 0.001)</td>
</tr>
<tr>
<td>Bilious emesis (n = 187)</td>
<td>48%</td>
<td>24%</td>
<td>31%</td>
<td>39% (P = 0.004)</td>
</tr>
<tr>
<td>Lethargy (n = 199)</td>
<td>47%</td>
<td>26%</td>
<td>13%</td>
<td>36% (P &lt; 0.001)</td>
</tr>
<tr>
<td>Diarrhea (n = 193)</td>
<td>38%</td>
<td>34%</td>
<td>41%</td>
<td>37% (NS)</td>
</tr>
<tr>
<td>Constipation (n = 167)</td>
<td>13%</td>
<td>24%</td>
<td>25%</td>
<td>18% (NS)</td>
</tr>
<tr>
<td>Temperature &gt;38.5°C (n = 216)</td>
<td>8%</td>
<td>10%</td>
<td>6%</td>
<td>8.3% (NS)</td>
</tr>
<tr>
<td>Abdominal tenderness (n = 211)</td>
<td>36%</td>
<td>48%</td>
<td>61%</td>
<td>43% (P = 0.017)</td>
</tr>
<tr>
<td>Abdominal mass (n = 212)</td>
<td>33%</td>
<td>23%</td>
<td>22%</td>
<td>28% (NS)</td>
</tr>
<tr>
<td>Abdominal distention (n = 209)</td>
<td>25%</td>
<td>18%</td>
<td>21%</td>
<td>23% (NS)</td>
</tr>
</tbody>
</table>
Neurologic Problems

Headache
Closed Head Injury
Clinical Characterization of Idiopathic Intracranial Hypertension in Children Presenting to the Emergency Department
The Experience of a Large Tertiary Care Pediatric Hospital

Miguel M. Glatstein, MD,* Asaf Oren, MD,† Gil Amarilvio, MD,† Dennis Scolnik, MB, ChB,‡§ Amir Ben Tov, MD,† Aiala Yahav, MD,† Arik Alper, MD,† and Shimon Reif, MD†
RESULTS

There were no significant differences between the 2 age groups in proportions of children in the 3 predefined weight categories.

Ages ranged from 2 - 16.5 years

30 males (46.8%) and 33 females (53.2%) were identified

| 30 prepubertal with a male-female ratio of 1:0.56 | 33 pubertal with a male-female ratio of 1:2 |

There were no significant differences between the 2 age groups in proportions of children in the 3 predefined weight categories.
CONCLUSIONS

• IIH should be considered in any child with new-onset headache or visual disturbance, irrespective of age, sex, weight, or the presence of known predisposing factors.

• When IIH is suspected, neuroimaging should be performed promptly to exclude secondary causes of this condition because IIH in children remains a diagnosis of exclusion.
Clinical Pathway: Assessment And Management Of Acute Pediatric Headaches

Acute recurrent headache with typical pain pattern for this child?

- Yes
  - Individualized care coordinated with the child and family based on past history of successful pain control strategies. (Class I)

- No
  - Fever, shaking chills, or other evidence of acute infection?
    - Yes
      - Suspected immune suppression?
        - Yes
          - History of HIV with CD4 < 200 or unknown
          - Prior history of opportunistic infection
          - Significant HIV risk factors (maternal)
          - Recurrent bacterial infections
          - Sickle cell disease
          - Head CT positive findings?
            - Yes
              - Perform lumbar puncture
            - No
              - Findings suggestive of infection?
                - Yes
                  - Treat for meningitis. (Class I)
                - No
                  - Increased intracranial pressure?
                    - Yes
                      - Findings suggestive of subarachnoid hemorrhage?
                        - Yes
                          - Coordinate plan to possibly include further imaging. (Class II)
                        - No
                          - Treat for idiopathic intracranial hypertension in coordination with a pediatric neurologist. (Class II)
                    - No
                      - Consider alternative diagnoses and treat accordingly. (Class III)
                        1. Upper respiratory tract infection
                        2. Sinusitis
                        3. Pharyngitis (especially strep) (Class II)
                        4. Other systemic illnesses
Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study

A QUICK AND DIRTY BATTLE YOU NEED TO WIN
THE CHILD WITH A CHI REFERRED FOR A CT SCAN

• These kids always arrive at the busiest times

• The children (and parents) are tired and hungry

• Your Hx and PE take all of 10 minutes

• Regardless of what you tell them, THEY WANT A CT SCAN
THE CHILD WITH A CHI REFERRED FOR A CT SCAN

• What to say to these parents

• “There have been large multicenter studies which provide guidelines for the evaluation of CHI in infants and children”
• “This child does NOT meet criteria for a CT Scan”
• “Radiation is harmful”
• “The child will more than likely grow up to necessitate CT scanning in the future”
• “You will probably have to sedate the child to do the study”
If All Else Fails, And They Demand An MRI.....
General Issues

Afebrile Irritability
THE IRRITABLE INFANT

• You all know the checklist:
  • Intracranial mishaps
  • Meningitis/Subdurals
  • Corneal Abrasion
  • Rib Injuries
  • Hernias
  • Hair Tourniquets

WHAT ELSE?
The Crying Infant: Diagnostic Testing and Frequency of Serious Underlying Disease

Stephen B. Freedman, MDCM, MSc, FRCPC, Nesrin Al-Harthy, MD, Jennifer Thull-Freedman, MD, MSc
Of the 574 tests performed, 81 (14.1%) were positive.

12 (5.1%) children had serious underlying etiologies with *urinary tract infections being most prevalent* (n = 3)

237 patients
RESULTS

Among children <1 month of age, the positive rate of urine cultures performed was 10%
CONCLUSIONS

• History and physical examination remains the *cornerstone* of the evaluation of the crying infant and should drive investigation selection

• Afebrile infants in the first few months of life should undergo *urine evaluation*

• Other investigations should be performed on the basis of clinical findings
Procedures

Nursemaid's
Nasal FB
SVT
COOL NEW SIGNS AND PROCEDURES
Handstands: a treatment for supraventricular tachycardia?

Michelle Hare, Shammi Ramlakhan
Figure 1  Initial rhythm strip (paper speed 25 mm/s). Regular narrow complex tachycardia. Rate 250 bpm with rate-related ST depression. Negative retrograde p waves suggest an underlying atrioventricular re-entrant tachycardia.

Figure 2  Posthandstand rhythm strip. Sinus tachycardia at a rate of 125 bpm.
Nasal Foreign Body Removal in Children

James R. Kiger, MD, Timothy E. Brenkert, MD, and Joseph D. Losek, MD

Pediatric Emergency Care 24: 785 2008
FOLEY EXTRACTOR TECHNIQUE

1. Bypass Obstruction
2. Inflate Balloon
3. Withdraw
Is Pronation Less Painful and More Effective Than Supination for Reduction of a Radial Head Subluxation?

EBEM Commentators
Tracie Potis, MD
Heather Merrill, MD

Central Michigan University College of Medicine
Department of Emergency Medicine
Saginaw, MI

OLD SCHOOL               NEW SCHOOL

[Diagram of children playing]

[Diagram showing hyperpronation]
Day To Day Issues
CHANGING PHILOSOPHIES
Parent Presence During Complex Invasive Procedures and Cardiopulmonary Resuscitation: A Systematic Review of the Literature

R. Scott Dingeman, MD\textsuperscript{a,b}, Elizabeth A. Mitchell, BS\textsuperscript{c}, Elaine C. Meyer, RN, PhD\textsuperscript{d,e}, Martha A. Q. Curley, RN, PhD, FAAN\textsuperscript{c,f}
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PUTTING AN END TO PEDIATRIC PAINFUL PROCEDURES
Who Owns Deep Sedation?

Steven M. Green, MD, Baruch Krauss, MD, EdM

From the Department of Emergency Medicine, Loma Linda University Medical Center & Children’s Hospital, Loma Linda, CA (Green); and the Division of Emergency Medicine, Children’s Hospital Boston and Department of Pediatrics, Harvard Medical School, Boston, MA (Krauss).
THE GOAL: “PAINLESS” PEDIATRIC EMERGENCY MEDICINE

An Evidence-Based Approach To Pediatric Procedural Sedation

Abstract

Children present a unique challenge when it comes to procedural sedation in the emergency department. For pediatric patients, sedation may be required to facilitate cooperation during a procedure that would not typically require sedation in an adult patient. The amnesic, anxiolytic, and analgesic properties of procedural sedation agents must be weighed against their potential side-effect profiles. The ideal agent should have a favorable safety profile, be quick and easy to administer, provide adequate length and depth of sedation, and result in a relatively rapid return to baseline. An evidence-based evaluation of various agents of procedural sedation is presented in this review.

Case Presentation

A 3-year-old girl with a history of reactive airway disease is brought into the ED by her father. She has sustained a fall that resulted in a small frontal hemotoma and a deep, jagged laceration. The father states that there was no loss of consciousness and no vomiting at the time of the event, which was 1 hour prior to her arrival to the ED. The father is concerned about her head injury and also inquires about the repair of the cut. Your examination reveals a very anxious child with a chin laceration that is fairly deep and may require extensive repair. You begin to consider sedation. You inquire about her last meal, and the father states that she had a light dinner about 4
TAKE HOME POINTS

• Neonates with fever still deserve a **full work up and admission**
• WBC counts are **NOT** helpful in older infants
• Positive RSV testing **does not rule out SBI in young infants**
• SFC deserve **no advanced testing**
• Positive urine cultures **increase with each day of fever**
• There are standardized treatment protocols for pneumonia and RSV available in print
• No one ever died from and albuterol treatment
• Zofran is everywhere (so are Cheetos!)
• Lethargy and Vomiting = Intussusception
• Afebrile irritable young infants deserve urine testing
• All children deserve high quality pain management
LIFE IS STRANGER THAN FICTION

SANTA CLAUS

1836 - 2000
“BELIEVE ME, I COULDN’T MAKE THIS STUFF UP!”
MOST INTERESTING CHIEF COMPLAINTS

Needs a circumcision because his tonsils and adenoids are so big

Placed tooth under pillow, now lodged in right ear

Can’t find baby’s birthmark
Problem with his *manlihood*

“I need a swine flu test: I haven’t been to Mexico but I always eat at TacoBell!”

Baby is *afraid of his hands*

Needs *anus muscles checked – has been straining*
SUSPICIOUS SOUNDED CHIEF COMPLAINTS

Fell out of infancy

Romantic fever

Lump down in his tentacle

Needs a mental extraction
SUSPICIOUS SOUNDED CHIEF COMPLAINTS

- Cereal Palsy
- Sick as hell anemia
- Sixty-five brewster
- Swollen asteroids
- Scrap throat
Hello. Is it busy? I would like to schedule an emergency.

May I speak to Dr. Zithromax?

Do you carry breast milk?
My baby stopped breathing a few times today. What time can I bring her in?

Is there such a thing as a birth control vibrator?

Is it all right for a two month old to fly if he’s constipated?
I was beating my daughter with a belt and got my fingers caught in the buckle and they're hurting, they are bleeding. What can I do?

Should a five year old child be wiping his own butt?

Do children born with microcephaly have headaches from their heads being so small?
THANKS!