Ten Best Articles
2016

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Children’s National Health Systems
Disclosures & Disclaimers

• I have no disclosures

• Selection is subjective

• Criteria
  – Most interesting to me
  – Most likely to impact PEM clinical practice
  – Most likely to address commonly presenting questions
  – Variety is good
• Gestational Age & Sedation Risk
• ALTE & BRUE
• Preventing Preschool Wheeze
• Appendicitis & Antibiotics
• Lumbar Puncture Positioning

• UTI & Renal Scarring
• Basilar Skull Fracture Outcomes
• Ibuprofen & Fracture Healing
• Energy Drinks
• Infant Fever
How long is prematurity a risk factor for sedation events?

Pediatrics, March 2016

Preterm Versus Term Children: Analysis of Sedation/Anesthesia Adverse Events and Longitudinal Risk

Jeana E. Havidich, MD, MS,a Michael Beach, MD, PhD,a Stephen F. Dierdorf, MD,b Tracy Onega, PhD, MS,a Gautham Suresh, MD, MS,a Joseph P. Cravero, MDc
Prematurity and Sedation Adverse Events

- Pediatric Sedation Research Consortium
- 57,628 cases from 41 hospitals
- Patients age 0 – 22 years
- 18% sedated by PEM provider
- Propofol most common medication

- Term = greater than 37 weeks gestational age
Prematurity and Sedation Adverse Events

- 2x increased odds of adverse event for preterm group
- Increased adjusted odds of desaturation, airway obstruction, aspiration, coughing, secretions, apnea, hypothermia, reversal agent, snoring

<table>
<thead>
<tr>
<th></th>
<th>Term</th>
<th>Preterm</th>
<th>Adjusted Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Events</td>
<td>8.5%</td>
<td>14.7%</td>
<td>1.9 (1.6 – 2.4)</td>
</tr>
<tr>
<td>Oxygen Desaturation</td>
<td>1.8%</td>
<td>4.5%</td>
<td>2.6 (1.8 – 3.8)</td>
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<tr>
<td>Airway Obstruction</td>
<td>2.0%</td>
<td>2.9%</td>
<td>1.6 (1.0 – 2.5)</td>
</tr>
<tr>
<td>Coughing</td>
<td>1.9%</td>
<td>3.4%</td>
<td>1.6 (1.0 – 2.4)</td>
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</tbody>
</table>
Locally Weighted Scatter Plot Regression of Adverse Sedation/Anesthesia Events
Comparison of Preterm and Term Categories

FIGURE 2
Prematurity and Sedation Adverse Events

- Mostly elective procedures, mostly propofol
- Limited assessment of comorbidities and degree of prematurity

- Prematurity remains a risk factor for adverse events into adulthood
- Overall risk of adverse events is low
- Infants and 10–13 year olds at highest risk
Should I admit this baby for ALTE?

Pediatrics, May 2016

Brief Resolved Unexplained Events (Formerly Apparent Life-Threatening Events) and Evaluation of Lower-Risk Infants

Joel S. Tieder, MD, MPH, FAAP, Joshua L. Bonkowsky, MD, PhD, FAAP, Ruth A. Etzel, MD, PhD, FAAP, Wayne H. Franklin, MD, MPH, MMM, FAAP, David A. Gremae, MD, FAAP, Bruce Herman, MD, FAAP, Elliot S. Katz, MD, FAAP, Leonard R. Krilov, MD, FAAP, J Lawrence Merritt II, MD, FAAP, Chuck Norlin, MD, FAAP, Jack Parcelay, MD, MPH, FAAP, Robert E. Sapien, MD, MMM, FAAP, Richard N. Shiffman, MD, MCIS, FAAP, Michael B.H. Smith, MB, FRCPCH, FAAP, for the SUBCOMMITTEE ON APPARENT LIFE THREATENING EVENTS
Brief Resolved Unexplained Event (BRUE)

- 2013 AAP multi-disciplinary subcommittee

- Replace Apparent Life Threatening Event (ALTE) with BRUE
- Identify patients at low risk for recurrence or serious underlying disorder
- Management guidelines for low-risk patients
- No advice for patients who are not low risk
Brief Resolved Unexplained Event

Brief (< 1 minute)

Resolved
• No signs/symptoms on exam
• No fever, breathing problems, vomiting, instability

Unexplained
• Not consistent with GER, choking, nasal congestion
• No history or physical findings concerning for abuse, airway abnormality, or other explanation
Brief Resolved Unexplained Event

Event Criteria
Infant less than 1 year

One or more of the following:
• Cyanosis or pallor
• Absent, decreased, or irregular breathing
• Marked change in tone (increased or decreased)
• Altered level of responsiveness
No concerns on history & physical

- No family history of sudden cardiac death
- No non-diagnostic social, feeding, respiratory problems

Low risk criteria

- Age > 60 days
- Born ≥ 32 wks
- CGA ≥ 45 week
- No CPR
- Duration < 1 min
- First event
### Low-Risk Management Recommendations

<table>
<thead>
<tr>
<th>SHOULD</th>
<th>MAY</th>
<th>SHOULD NOT</th>
</tr>
</thead>
</table>
| ▪ Educate caregivers  
▪ Engage in shared decision-making  
▪ Offer resources for caregiver CPR training | ▪ Obtain pertussis  
▪ Obtain 12-lead EKG  
▪ Briefly monitor patient with continuous pulse ox and serial observations | ▪ Obtain CBC, blood culture, CSF, electrolytes, ammonia, metabolic labs, CXR, echo, EEG, GER studies  
▪ Initiate home monitoring  
▪ Prescribe acid suppression, antiepileptics |

<table>
<thead>
<tr>
<th>SHOULD</th>
<th>MAY</th>
<th>SHOULD NOT</th>
</tr>
</thead>
</table>
| ▪ Obtain viral respiratory studies, urinalysis, blood glucose, serum bicarbonate, serum lactic acid, or neuroimaging  
▪ Admit solely for CR monitoring | | |
Summary

• Clearer definition of concerning events
• Removes choking, feeding, and viral URI from the definition
• Defines brief, low-risk events

• Discourages testing aside from EKG and pertussis
• Discourages admission for low-risk events
• Provides no guidance for events not meeting low-risk criteria
Should my patient be taking their flovent all the time or just when needed?

Pediatrics, June 2016

Preventing Exacerbations in Preschoolers With Recurrent Wheeze: A Meta-analysis

Sunitha V. Kaiser, MD, MSc, Tram Huynh, Leonard B. Bacharier, MD, Jennifer L. Rosenthal, MD, Leigh Anne Bakel, MD, Patricia C. Parkin, MD, FRCP, Michael D. Cabana, MD, MPH
Controllers for Preschool Wheeze

- Meta-analysis of studies to prevent wheezing exacerbations in children under 6 years

Strategies:
- Daily inhaled corticosteroids
- Intermittent inhaled corticosteroids started with onset of respiratory symptoms
- Daily and intermittent montelukast
<table>
<thead>
<tr>
<th>Strategy</th>
<th>Number of Studies</th>
<th>Number of Cases</th>
<th>Winner</th>
<th>Risk Ratio</th>
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</thead>
<tbody>
<tr>
<td><strong>Intermittent and Persistent Symptoms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily ICS vs. placebo</td>
<td>15</td>
<td>558</td>
<td>Daily ICS</td>
<td>0.7 (0.6–0.8)</td>
</tr>
<tr>
<td>Intermittent ICS vs. placebo</td>
<td>6</td>
<td>588</td>
<td>Intermittent ICS</td>
<td>0.6 (0.5–0.8)</td>
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<tr>
<td>Daily ICS vs. Intermittent ICS</td>
<td>2</td>
<td>498</td>
<td>Neither</td>
<td>0.9 (0.7–1.2)</td>
</tr>
<tr>
<td><strong>Intermittent or Viral–triggered Symptoms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermittent ICS vs. placebo</td>
<td>5</td>
<td>422</td>
<td>Intermittent ICS</td>
<td>0.7 (0.5–0.8)</td>
</tr>
<tr>
<td>Daily ICS vs. Intermittent ICS</td>
<td>1</td>
<td>278</td>
<td>Neither</td>
<td>0.8 (0.6–1.2)</td>
</tr>
</tbody>
</table>
Controllers for Preschool Wheeze

• Strong evidence for daily ICS to prevent exacerbations in children with wheeze
• Evidence based on studies in children with persistent wheeze
• Strong evidence for intermittent ICS to prevent exacerbations in children with intermittent or viral-induced wheezing
What antibiotic should I give to my patients with appendicitis?

Pediatrics, July 2016

Extended- Versus Narrower-Spectrum Antibiotics for Appendicitis

Matthew P. Kronman, MD, MSCE, Assaf P. Oron, PhD, Rachael K. Ross, MPH, Adam L. Hersh, MD, PhD, Jason G. Newland, MD, Adam Goldin, MD, Shawn J. Rangel, MD, MSCE, Scott J. Weissman, MD, Danielle M. Zerr, MD, MPH, Jeffrey S. Gerber, MD, PhD
Perioperative Antibiotics in Appendicitis

• Children age 3–18 years with appendectomy at 23 children’s hospitals in the Pediatric Health Information System database

• Extended spectrum – Ceftazidime, Cefepime, Zosyn, Ertapenem
  – Coverage of resistant gram–negatives (Pseudomonas)

• Narrow spectrum – Cefoxitin, Cefotetan, Cefazolin

• Outcome – 30 day readmission
• Analyses to address confounding by illness severity & hospital
Perioperative Antibiotics in Appendicitis

• 71% of 24,984 patients had uncomplicated appendicitis
  – 33% with extended spectrum antibiotics
  – 1.1% with treatment failure
  – No significant association between antibiotic & treatment failure

• 29% with complicated appendicitis
  – 66% with extended spectrum antibiotics
  – 6.4% with treatment failure
  – Extended-spectrum antibiotics associated with treatment failure
Perioperative Antibiotics in Appendicitis

• 6/23 hospitals almost always used extended spectrum
• 6/23 hospitals almost never used extended spectrum

• No observed benefit to extended spectrum antibiotics in complicated or uncomplicated appendicitis
• Antibiotic selection mostly institutional practice
Should an infant be in the sitting or lateral decubitus position for LP?

Pediatric Emergency Care, August 2016

A Randomized Controlled Trial of Positioning for Lumbar Puncture in Young Infants

Amy L. Hanson, MD, * Jeff E. Schunk, MD, † Howard M. Corneli, MD, † and Joyce V. Soprano, MD †
Infant Lumbar Puncture Positioning

• 167 infants age 1–90 days randomized to sitting or lateral position
• Ultrasound suggests increased interspinous distance when sitting
• Outcome – CSF with <10,000 RBC within 2 attempts
• Provider experience, stylet removal, and analgesia similar in both groups

• Difference in success rate 77% lateral vs. 72% sitting (difference 5.1%, 95% CI -8.2% to 18.3%)
• No differences in success on first attempt or complication rates
Infant Lumbar Puncture Positioning

• Not powered to detect a small (<15%) difference
• Providers probably more comfortable with lateral position

• No compelling reason to change to sitting position
• Provider experience and patient comfort (analgesia) higher priority
What’s the risk of delaying urine testing in a febrile infant with possible UTI?

JAMA Pediatrics, September 2016

Early Antibiotic Treatment for Pediatric Febrile Urinary Tract Infection and Renal Scarring

Nader Shaikh, MD, MPH; Tej K. Mattoo, MD; Ron Keren, MD; Anastasia Ivanova, PhD; Gang Cui, MPH; Marva Moxey-Mims, MD; Massoud Majd, MD; Harvey A. Ziessman, MD; Alejandro Hoberman, MD
UTI & Renal Scarring

• Combined data from RIVUR and CUTIE studies
• 482 febrile children age 0–6 years (median 11 months) with UTI
• DMSA scan at baseline and 2–year follow-up
• Parents asked about duration of fever prior to antibiotics

• 35 children (7.2%) had new scarring
• Delay in initiation of antibiotics associated with new scarring
• Each hour delay increased odds of scarring by about 1%
Figure. Percentage of Children With New Renal Scarring According to Delay in the Initiation of Antimicrobial Therapy
UTI & Renal Scarring

- Significance for patient outcomes unclear
- Unable to show relationship between degree of scarring and duration of fever before antibiotics

- Consider urine testing for febrile children early
- Especially girls < 2 yo, children with higher fevers, and children with risk factors (previous UTI, bowel/bladder dysfunction, VUR)
Can I discharge a patient with a basilar skull fracture?

Annals of Emergency Medicine, October 2016

Clinical Presentations and Outcomes of Children With Basilar Skull Fractures After Blunt Head Trauma

Michael G. Tunik, MD*; Elizabeth C. Powell, MD, MPH; Prashant Mahajan, MD, MPH; Jeff E. Schunk, MD; Elizabeth Jacobs, MD; Michelle Miskin, MS; Sally Jo Zuspan, RN, MSN; Sandra Wootton-Gorges, MD; Shireen M. Atabaki, MD, MPH; John D. Hoyle, Jr, MD; James F. Holmes, Jr, MD, MPH; Peter S. Dayan, MD, MSc; Nathan Kuppermann, MD, MPH; for the Pediatric Emergency Care Applied Research Network (PECARN)†
Basilar Skull Fractures

- Secondary analysis of Pediatric Emergency Care Applied Research Network closed head injury prospective cohort
- 42,958 patients age 0 – 18 years in 25 centers

- 1.3% basilar skull fracture on exam (hemotympanum, CSF rhinorrhea/otorrhea, periorbital/retroauricular ecchymoses) or CT
- 52% exam findings only, 31% CT findings only, 20% both
525 BSF

- 269 other ICI (51%)
- 256 isolated BSF (49%)
- 152 discharged from ED (59%)
Basilar Skull Fracture

- Children with isolated basilar skull fracture (no other intracranial injury on CT), normal neurologic exam and normal GCS had no adverse outcomes
- Consider discharge from the ED with good followup

- CT does not exclude basilar skull fracture
- BSF findings suggest need for CT for other intracranial injury
Should I recommend ibuprofen for pain control in higher-risk fractures?

Journal of Emergency Medicine, October 2016

DOES THE USE OF IBUPROFEN IN CHILDREN WITH EXTREMITY FRACTURES INCREASE THEIR RISK FOR BONE HEALING COMPLICATIONS?

Kerrin C. DePeter, MD, Stephen M. Blumberg, MD, Sarah Dienstag Becker, and James A. Meltzer, MD

*Department of Pediatrics, Division of Emergency Medicine, Jacobi Medical Center, Bronx, New York and †Albert Einstein College of Medicine, Bronx, New York
Ibuprofen and Fractures

• Retrospective review of 808 patients age 6 months – 17 years
• Fracture of tibia, femur, humerus, scaphoid, or 5th metatarsal

• 42% given or prescribed ibuprofen
• 1% had nonunion, 2% re-displacement
• 3% complications in the ibuprofen group, 4% for no ibuprofen
• No association between ibuprofen and healing complication
• Power to detect 5% difference in healing
• Hard to know who really took ibuprofen & how long
Should I ask my teenage patients about caffeine intake?

Pediatric Emergency Care, November 2016

Clinical Symptoms and Adverse Effects Associated With Energy Drink Consumption in Adolescents

Dalia Bashir, MD,* Essie Reed-Schrader, BS,† Robert P. Olympia, MD,‡ Jodi Brady, MD,§ Ruby Rivera, MD,‖ Theresa Serra, MD,¶ and Christopher Weber, BS†
<table>
<thead>
<tr>
<th>Amount Per Serving</th>
<th>% Daily Value</th>
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</thead>
<tbody>
<tr>
<td><strong>Calories</strong></td>
<td>100</td>
</tr>
<tr>
<td><strong>Total Carb</strong></td>
<td>27g</td>
</tr>
<tr>
<td><strong>Sugars</strong></td>
<td>27g</td>
</tr>
<tr>
<td><strong>Riboflavin Vit B2</strong></td>
<td>1.7mg</td>
</tr>
<tr>
<td><strong>Niacin Vit B3</strong></td>
<td>20mg</td>
</tr>
<tr>
<td><strong>Vitamin B6</strong></td>
<td>2mg</td>
</tr>
<tr>
<td><strong>Vitamin B12</strong></td>
<td>6mcg</td>
</tr>
<tr>
<td><strong>Sodium</strong></td>
<td>180mg</td>
</tr>
<tr>
<td><strong>Taurine</strong></td>
<td>1000mg</td>
</tr>
<tr>
<td><strong>Panax Ginseng</strong></td>
<td>200mg</td>
</tr>
<tr>
<td><strong>Energy Blend</strong></td>
<td>2500mg</td>
</tr>
</tbody>
</table>

*L-Carnitine, Glucose, Caffeine, Guarana, Inositol, Glucuronolactone, Maltodextrin

*Percent Daily Values are based on a 2000 calorie diet. † Daily Value not established.
Energy Drinks

- 612 prospective questionnaires for adolescents 12 – 18 years
- 387 Penn State Hershey, 225 Montefiore, Bronx NY

- 202 (33%) with frequent consumption = at least once a month
- Frequent consumers more likely to have high risk behaviors (smoking, alcohol, physical fights, sexual activity, consume coffee & soda)
- Asked about headache, abdominal pain, chest pain, palpitations, anger, weakness, tremors, difficulty breathing, anxiety, increased urination, dehydration, sleep disturbance
Energy Drinks

- 5x increased odds of medical attention for headache
- 4x increased odds of reporting anger symptoms
- 2x increased odds of medical attention for breathing

<table>
<thead>
<tr>
<th>Symptom</th>
<th>At Least 1 drink/month</th>
<th>&lt; 1 drink/month</th>
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<tbody>
<tr>
<td>Headache</td>
<td>41% (35–48)</td>
<td>12% (9–16)</td>
</tr>
<tr>
<td>Anger</td>
<td>47% (40–54)</td>
<td>32% (27–36)</td>
</tr>
<tr>
<td>Difficulty breathing</td>
<td>22% (17–28)</td>
<td>12% (9–16)</td>
</tr>
<tr>
<td>Increased Urination</td>
<td>24% (18–30)</td>
<td>13% (10–16)</td>
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</tbody>
</table>
Energy Drinks

- Retrospective, recall may be inaccurate
- No detailed look at frequency of use
- Possible confounders with other behaviors, sports, life stressors

- Energy drinks may contribute to ED utilization including headaches and breathing problems
- Risks may be underappreciated and use may be underreported
Does this baby with fever need testing?

Pediatrics, December 2016

Management and Outcomes of Previously Healthy, Full-Term, Febrile Infants Ages 7 to 90 Days

Tara L. Greenhow, MD,† Yun-Yi Hung, PhD,§ Robert H. Pentecost, MD,∥
Infant Fever

- 96,156 healthy, full term infants in Kaiser N California
- 1.4% presenting with fever between 7 – 90 days old
- 13.2% UTI, 2.6% bacteremia, 0.3% meningitis
- Infection in 19% neonates, 14% 1mo, 11% 2mo
- 20% got oral antibiotics close to febrile episode
Infant Fever

- 41% had no cultures sent
- 24% of neonates (7 – 28 days) had no cultures sent
- Older infants, lower temps less likely to have cultures
- Cultures 5x more likely to be sent from ED vs. clinic
- 1% returned with UTI, no missed bacteremia/meningitis

- Reasons for no cultures included “did not believe” temperature for neonates and viral symptoms and recent immunization in older infants
Infant Fever

- Bacterial infection is rare
- Many infants do not receive a full evaluation
- Very few cases of bacterial infection are missed