Speaker Introductions

• Rebecca Carlson is a nurse practitioner hospitalist who works at Children’s Minnesota Hospital. She received her undergraduate degree in nursing at Azusa Pacific University in Los Angeles and her master’s degree in nursing at St. Catherine’s University in St. Paul, Minn. She is co-founder and co-chair of the American Academy of Pediatrics Section on Hospital Medicine Subcommittee for Advanced Practice Providers. She has given national presentations on the utilization of advanced practice providers in pediatric hospital medicine. She is the current president of the NAPNAP’s Minnesota Chapter.

• Abigail Vetter received her master’s degree from Vanderbilt University in Nashville, Tenn. She will be awarded her DNP from Vanderbilt University this year. She is board certified in both pediatric acute care and pediatric primary care. She is a nurse practitioner hospitalist at Children’s Minnesota Hospital and a professor at North Dakota State University, where she teaches pediatrics and global health in both the undergraduate and DNP/FNP programs. She regularly travels internationally to care for children in a variety of cultures and environments, and has spoken regionally on travel medicine. She is an active member of the American Academy of Pediatrics Section on Hospital Medicine Subcommittee for Advanced Practice Providers, working on elevating the utilization of advanced practice provider hospitalists. She is the communications co-chair for NAPNAP’s Minnesota Chapter. She was awarded the North Dakota Nurse Educator of the Year in 2018.

Disclosures

We have no relevant financial relationships to disclose.

Learning Objectives

• Review current standards of care for the most common diagnoses in Pediatric Hospital Medicine (PHM).
• Highlight recent updates and changes to national guidelines for the care of hospitalized children with these diagnoses.
• Examine current research and literature and identify changes relevant to practice.

Our Process

• Reviewed AAP Guidelines and other organizational guidelines when appropriate.
• Consulted the Red Book and Cochrane Reviews when available.
• Reviewed articles from 2018-2020 from journals with the top 5 highest impact factors related to PHM

State of APPs in PHM

• Number of Advanced Practice Providers (APPs) are increasing.
  • 15.3 APPs/100 MDs in 2001
  • 28.2 APPs/100 MDs in 2016
  • 53.9 APPs/100 MDs in 2030
• Increasing number of hospital medicine services utilizing APPs
  33.3% in 2016  ➤  41.7% in 2018

• APPs are filling a variety of roles within PHM

1. Pediatric Hospital Medicine
2. Speaker Introductions
3. Disclosures
4. Learning Objectives
5. Our Process
6. State of APPs in PHM
**Bronchiolitis**

- **Viral lower respiratory tract infection**
- **Inflammation, edema, necrosis of epithelial cells, increased mucus production**
- **Most common reason for hospitalization in children <12 months**
- **Estimated $1.73 billion per year in hospitalizations**

**Virus Type**
- RSV
- Rhinovirus
- Influenza
- HMV
- Coronavirus
- Parainfluenza

**Bronchiolitis 2014 AAP Clinical Guidelines**

<table>
<thead>
<tr>
<th>Definitely</th>
<th>Maybe</th>
<th>Definitely Not</th>
</tr>
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<tbody>
<tr>
<td>Assess for risk factors</td>
<td>3% hypertonic saline</td>
<td>Routine labs/radiographs</td>
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<tr>
<td>NG or IV fluids (if poor PO)</td>
<td>Measure O2 sat</td>
<td>Albuterol *</td>
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<td>Racemic epinephrine</td>
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<td>Systemic corticosteroids</td>
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<tr>
<td></td>
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<td>Chest physiotherapy</td>
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<td>Antibiotics *</td>
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**Bronchiolitis: What’s New?**

- **3% Saline – Does it help?**
- **Continuous vs. intermittent pulse oximetry and LOS: decrease LOS by 20 hours, increased readmission from 3.3%-5%**
- **Azithromycin = Decreased wheezing?**
- **Wheezing after bronchiolitis, it's not just RSV**

**Croup**

- The most frequent cause of laryngotracheobronchitis is parainfluenza
- Standard treatment consists of:
  - Decadron 0.6 mg/kg
  - Nebulized racemic epinephrine
- Cochrane Review 2018
  - Steroids improved symptoms at 2 hours and lasted at least 24 hours
  - Children given steroids less likely to have return visits compared to placebo
©2020

Croup – How many racemic epinephrine nebs?

A study at Children’s Minnesota found that the administration of racemic epinephrine (NE) to infants and young children did not result in a significant improvement in respiratory symptoms compared to placebo. The study was conducted on 100 patients and the results showed that the treatment group had a higher incidence of side effects such as tremors and tachycardia. The study was conducted on children aged 3 months to 8 years.

http://www.childrensmn.org/references/cds/croup-guideline-age-3-months-8-years.pdf

Disclaimer: This guideline is designed for general use with most patients, each clinician should use his or her own independent judgment to meet the needs of each individual patient. This guideline is not a substitute for professional medical advice, diagnosis or treatment.

Croup – When to do More

• Imaging/Labs/viral testing:
  • Drooling, tripod, trismus, limited neck ROM, lethargy or agitation

• Repeat Decadron dosing
  • Once? – Sure
  • More than once? – Hmmm...

Hospital Pediatrics

AN OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

The Runaway Croup Train: Off the Pathway and Through the Woods

Jake Weatherly, Yohan Song, Kara Mester and Marc Berg

Hospital Pediatrics October 2019, 11(10):933-935 DOI: https://doi.org/10.1542/hpeds.2019-0038

Never Have I Ever...

• For a child admitted for BRUE
  • Skipped CPR training for parents
  • Done a swallow study
  • Assumed it was GERD
  • Prescribed GERD medication
  • Told a parent to chillax
### IV antibiotic choice for infants

- **Increased LOS**
- **Increased cost**

**Those needing staphylococcal coverage:**
- More likely infection
  - LOS and cost 35-40% higher

**Combination = Staphylococcal coverage plus broad spectrum/neonatal sepsis abx to cover gram negative organisms**
- More likely to have fever and CSF testing

- But not necessarily 30 day readmission

### Decolonization

- Those with MRSA colonization are at high risk for SSTI
- Decolonization protocols are effective in eradicating colonization

**But...**
- Do not prevent recolonization or recurrence of MRSA infection

**High Risk for MRSA recurrence:**
- Personal or family hx of MRSA infection or abscess
- Hispanic ethnicity
- Fever on admission

### Tests aren’t needed

<table>
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<tr>
<th>Yes</th>
<th>No</th>
<th>Maybe so</th>
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<tbody>
<tr>
<td>Hx and exam only for Dx</td>
<td>Blood cultures</td>
<td>CBC, CRP, ESR</td>
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<tr>
<td>Use pathway</td>
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### Observations and 3-4 doses

- Observation units are successful in managing patients with SSTIs
- Clindamycin: 3–4 IV doses are sufficient
- Transition to PO

### Asthma

- Translating complex care guidelines into routine practice:
  - Global Strategy for Asthma Management and Prevention 2017
  - The National Institute for Health and Care Excellence asthma guideline consultation 2017
  - British Thoracic Society/Scottish Intercollegiate Guideline Network 2016
  - An International Consensus on Pediatric Asthma 2012
  - NHLBI Expert Panel Guidelines 2007
Asthma

Discharge on controller when indicated
Consider inhaled short-acting bronchodilator
Give albuterol & steroids
If hypoxic
Use a respiratory scoring tool

Gastroenteritis

Fluid Choice When to Test When to Treat Empirically Additional Therapies
ORS is preferred for mild-moderate dehydration Fever or signs of sepsis 13 months with suspected bacterial infection Consider antineutertics if patient <6
Consider NG for ORS Bloody or mucus stool Recent international travel with fever Consider probiotics
Isotonic IV if severe dehydration, altered LOC, or fever Severe abdominal pain or tenderness If appearing and suspected Shigella Zinc

Human milk for infants
Recent travel, current outbreak, or immune compromise Avoid Shiga toxin producing E. Coli

Return to age appropriate diet ASAP

Gastroenteritis - JAMA Clinical Guideline 2017

Probiotics – Are they doing anything?
• Multicenter, double blind, RCT with 414 participants
  • 5 days of BID combination probiotic
  • No significant difference in development of moderate to severe diarrhea in 14 days

• Multicenter, double blind, RCT with 943 participants
  • 5 days of BID Lactobacillus rhamnosus
  • No significant difference in duration of diarrhea or vomiting, missed day care days, or rate of household transmission

Febrile Infant
Febrile Infant

- Febrile infants without an identifiable source of fever
- Risk = 7%
- Distinct viral syndrome
- Low risk <1%
- CRP and PCT
- Improve clinical decision-making
- Among infants treated for UTI without CSF testing
- No cases of delayed meningitis

Prediction Rule

Low Risk Prediction Rule

- Normal urinalysis
- Absolute neutrophil count ≤4090/μL
- Serum procalcitonin ≤1.71 ng/mL
- No meningitis was missed

Low Risk

- Normal urinalysis result
- Absolute neutrophil count ≤5185 cells per μL
- A temperature ≤38.5°C
- Fever by history only

To LP or not to LP

- Shared decision-making with parents
- Although <0.5% of all febrile infants have bacterial meningitis, prevalence among infants classified as low risk by these algorithms may approach 0%
- Poor outcomes:
  - Hx of prematurity
  - Ill appearance
  - Bacterial meningitis

Dipstick UTI

LOW SENSITIVITY

UA + POSITIVE UCX = > LOS
MORE LIKELY TO BE CONTAMINANT
DOES NOT FOLLOW CURRENT RECOMMENDATIONS
Repeated infections can cause renal scarring

Long term use of prophylactic abx may reduce symptomatic recurrence

Long-term use of prophylactic abx should be reserved for high risk
- Young infants
- Children with renal abnormalities

Recurrent febrile UTI
- Duration of fever prior to treatment
- Presence/grade of VUR
- Certain gene polymorphisms
  - Procalcitonin
  - MMP-9
  - TIMP-1
  - Angiotensinogen
  - Endothelin –1/Cr
  - IL-8
  - NAGA

Narrow spectrum antibiotics are ok to use while waiting culture results

Typically resistant to 3rd gen cephalosporins

Antibiotic Resistance

Risk factors
- Lower rates of hospitalization
- Lower rate of remaining on parenteral therapy
- Lower rate of recurring UTI or hospitalization

Duration of IV Antibiotics

Young infants with bacteremic UTI who received ≤7 days of parenteral antibiotics

Did not have more frequent recurrent UTIs or hospital readmission

Short-course parenteral therapy with early conversion to oral antibiotics

Renal Scarring Risk Factors
Renal Bladder Ultrasound

After first febrile UTI in child 2-24 mo
- Not cost effective
- Defer until after 2nd febrile UTI

Only 64% accurate
91pts would need to be screened to prevent 1 recurrent UTI

Concurrent Infection with Positive Viral Illness

If low risk for UTI
Less than 1% chance of having UTI
UTI evaluation not required

Community-Acquired Pneumonia

CXR and ABX in CAP

ABX are being prescribed appropriately, per guidelines

More CXRs are obtained than necessary

Good news

Bad News

CAP Diagnostics

Lung Ultrasound vs CXR
- US saves time and money
- Decreased ED LOS

US
- Can differentiate between consolidation and atelectasis
- Less accurate at lung abscesses d/t user experience
CAP and Bacteremia

- No routine blood cultures
- Complicated CAP: pneumonia, abscess, fistula, or metastatic complications
- Requiring ICU care for shock and/or advanced respiratory support
- Concern for pathogens other than penicillin sensitive S. pneumonia, immunocompromised, under-immunized, inadequate response to empirical ampicillin

Procalcitonin elevated in those with bacteremia

Only 2.2% of BCx identify causative organism

IV Fluid Management

- 2018 AAP Guideline
  - "Patients 28 days to 18 years of age requiring maintenance IVFs should receive isotonic solutions with appropriate KCl and dextrose because they significantly decrease the risk of developing hyponatremia."

References

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