Dear UT Family Practice Residents,

Hello and welcome to your Pediatric Inpatient experience. I hope it will help broaden and build upon your current pediatric knowledge and experience. While you are here, you will be part of a team that consists of an upper level Pediatric resident (PL-3) and 2 first year Pediatric interns (PL-1s), along with 2-3 third year medical students. You will be expected to attend the Pediatric morning reports and other teaching sessions that are given that month, as well as one Asthma Education class. You will be responsible for no more than 5 patients at a time, with emphasis being on the more common types of pediatric illnesses.

Your duties will include pre-rounding on your patients prior to Family Centered Rounds with your attending, presenting your patients with researched assessments and plans and following up on lab tests, procedures and communications with the family and their PCPs. Your duties will also include daily notes on the patients, check outs and discharge planning and summaries. You will also be expected to take a pre- and post-rotation multiple choice exam and self-assessment survey.

Included in this Blackboard course are multiple teaching tools, chosen to help you navigate the system during your 4 week rotation with us, broaden your pediatric knowledge base and serve as a reference tool as you encounter pediatric patients on your journey through medicine.

The first section contains outlines and templates of a pediatric H&P, admission and discharge orders and summaries, order sets for asthma and bronchiolitis, outlines of PBAR presentations and introduction to Family Centered Rounds. The second section is dedicated to “Pedi Reminders”, which serve to point out some of the nuances of the pediatric patient, and how your management of them will differ from that of the adult patients you care for. Also included are handouts on “Pediatric Drug Dosing”, “Choosing an Antibiotic” and an explanation/elaboration of “Family Centered Rounds and Presentations”. The last module consists of 5 topics and guidelines for commonly encountered inpatient pediatric illnesses, for which you will be responsible. I have also added a folder, “Asthma Info”, which contains many of the basic tools you will need to care for your asthmatic patients. Many of these materials will be discussed in the Asthma Education Class you will be attending during your rotation.

You will also be granted access to the UTHSCSA Pediatric Black Board course, which is an extensive resource of common pediatric topics.

I hope your time with us is enriching, and serves you well to help serve those in your care. If you should have any questions, or if problems arise, please feel free to contact me at (210)215-6591.

Sincerely,

Sandra Jo Ehlers, M.D.
Associate Professor of Pediatrics, Division of Inpatient Pediatrics
The University of Texas Health Science Center at San Antonio
ORIENTATION:
Welcome Letter
UT FP Curriculum Outline
Self-Assessment Survey

ORDER SETS and SAMPLE TEMPLATES:
Pediatric Admission Orders
Pediatric H&P and SOAP note
Discharge Summary
Asthma Admit and Transfer Orders
Asthma Discharge Orders
Bronchiolitis Orders
Family Centered Rounds Orientation
PBAR Presentation—New Patient
PBAR Presentation—Old Patient

HELPFUL HANDOUTS:
Pedi Reminders
Pediatric Drug Dosing
Choosing an Antibiotic
Family Centered Rounds and Presentations
Pediatric Growth Charts

REQUIRED READING:
AGE—Cincin. Children’s Practice Guidelines
Bronchiolitis Parent Handout
Bronchiolitis—Cincin. Children’s Highlights
Fever in Infants 0-2 months—Cincin. Children’s Practice Guidelines
Pneumonia—Cincin. Children’s Highlights
UTI—Cincin. Children’s Highlights

ASTHMA INFO:
Santa Rosa Asthma Program
Asthma Education Class
Asthma Admit Orders
Asthma Discharge Orders
Weaning Protocol
Asthma Action Plan
How to fill out an Asthma Action Plan
Peak Flow Norms
# Pediatric Inpatient Self Assessment

<table>
<thead>
<tr>
<th>Pediatric Inpatient Skills</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am comfortable identifying an acutely ill child, who needs immediate assistance.</td>
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<tr>
<td>2. I can determine when I need to consult a subspecialist in caring for a particular child.</td>
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<td>3. I am proficient in calculating drug dosages for my pediatric patients.</td>
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<td>4. I can formulate an asthma action plan for my asthmatic patients.</td>
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<tr>
<td>5. I feel comfortable managing an infant &lt; 2 months old with a fever of uncertain source.</td>
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<tr>
<td>6. I am able to perform a comprehensive history and physical exam of a child.</td>
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<td>7. I understand the unique differences/nuances between pediatric and adult drug dosing.</td>
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<tr>
<td>8. I am proficient in administering IV fluids to my pediatric patients.</td>
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<tr>
<td>9. I am efficient and thorough in my oral and written presentations of my patients.</td>
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<tr>
<td>10. I am comfortable managing an acutely ill infant with bronchiolitis.</td>
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</tr>
</tbody>
</table>
Admit Orders

- Admit to Service/Team____________  Attending________
- Diagnosis
- Condition: good, fair, guarded, poor, critical
- Activity:
- Vitals: (CR monitor, continuous pulse ox, q4h vitals etc)
- Allergies: medicine (reaction) or NKDA
- Nursing: strict I/Os, weight/ht/OFC on admission, call HO for: set parameters for temperature, HR, RR, SBP, DBP, MAP, UOP, mental status changes, increased O2 need, new O2 need, increased WOB, any other concerns
- Diet:
- IVF:
- Meds: name/amount/route/frequency
- Labs:
- Radiology:
- Special Studies:
- Consults:
- Respiratory Care (if indicated)

SOAP note

S (Subjective): What do you seen when you walk in the room? Parents at bedside? Talk to nurse, parents, read RN notes. Review new orders, new input from consultants, overnight events.

O (Objective): VS ranges
In: Total (IVF, PO, NG, TPN) +/- Fluid balance
Out: Total (UOP ml/kg/h, stool cc/kg/day or diaper count, NG, chest tube, JP etc)
PE: (focused)
Labs:
Radiology/Studies:

A/P: see Pediatric H+P
PEDIATRIC HISTORY AND PHYSICAL

CC: Why is the patient in the hospital? In the ER?

HPI: (modified for the hospitalized patient)
1) onset, duration, intensity, how often, modifying factors
2) If it’s a long term or chronic problem, document previous work up (such as at an outside hospital, PCP, subspecialists) and recent changes
3) How did the patient get to ER/hospital? (EMS, Airlife, private car etc)
4) EMS/ER course
5) PICU course
6) Clinic course

PMH:
1) Perinatal history (detailed in children under 12 months old)
   • pregnancy history: complications such as GDM, PIH, PTL, GBS status
   • birth history: term/preterm, NSVD, FAVD, C-S (why), maternal fever, maternal intrapartum antibiotics, aggressive resuscitation
   • nursery course: feeding problems, jaundice/treatment for unexplained hyperbilirubinemia, was the baby discharged from the hospital after the mother, NICU transfer, perinatal antibiotics
2) Chronic problems for which they are seeing a medical specialist
3) Previous admissions/hospitalizations
4) Surgeries
5) ER visits
6) Subspecialty needs
7) PCP
8) Medicines including acute/chronic/OTC/alternative and complementary medicine
9) Allergies (reaction)
10) Immunization status

Developmental history

FH: childhood illnesses/deaths

SH: Where does the family live? Who lives with the patient? Who is the child’s primary care taker? Siblings (ages, health status), pets, smoke exposure, recent travel or camping, sick contacts, HEADSS exam on all adolescents

ROS:
Constitutional (fever, weight loss, chills, malaise)
HEENT
Respiratory
Cardiac
GI—vomiting, diarrhea
Nutrition/Diet history
Hematologic
GU/Renal--UOP
Infections
Dermatologic: rashes etc

PE: VS: Ranges of Temp, RR, SaO2, HR, SBP/DBP (MAP) wt (%), ht (%), OFC (%)
Gen: level of alertness, good/appropriate/poor eye contact, level of distress
(mild/moderate/severe), ability to console with simple measures, well/ill/toxic-appearing
HEENT:
Neck:
CV:
Lungs/Chest
Cardiac: includes pulses
GU:
Extremities: includes capillary refill time, perfusion
Derm:
MSK: ROM, joints
Neuro:

Labs:
Radiology:

Assessment: age, gender, symptoms, ranked DDx, clinical status

Plan: (problem based for simple patients, organ based for complex patients)
1) RESP:
2) CV:
3) FEN/GI:
4) HEME:
5) ID:
6) NEURO:
7) SOCIAL: (remember to always update families regarding the plan)
8) DISPO/DISCHARGE PLANNING:
DISCHARGE SUMMARY

1. Identify the Patient: Patient’s name and hospital number
2. Date of Admission and Date of Discharge
3. Hospital Course: Briefly summarize the hospital stay, to include significant tests, procedures, treatments and outcomes.
4. Laboratory and X-ray results (pertinent)
5. Discharge Diagnosis
6. Condition of patient on Discharge
7. Discharge Instructions: special instructions or limitations, d/c medications, activity and diet, follow up appointments.
8. Copy of distribution of the report; please include the patient’s PCP.

SHORT STARY D/C SUMMARY

1. Admit Date
2. Discharge Date
3. Brief Hospital Course
4. Discharge Diagnoses
5. Patient’s Condition on D/C
6. Discharge Medications
7. Discharge Instructions and Follow Up appointments
List all known Allergies or NKA:
0049 HT: WT (Kgs):

For the safety of your patient, Write Legibly!
Print your name and a contact phone number to allow for call back.

Check those boxes and/or fill in the blanks (as appropriate) of those orders you wish to use.
If you do not want to use a particular order, draw a line through the entire order.

Date: ______/______/______ Time: __________

MM DD YY

Physician Signature_____________________________________MM/DD/YY___________
Nurse Signature _________________________________________MM/DD/YY____________

1. Admission:  □ Admit to _____ (nursing unit); Team: ________ ; Attending M.D. ________
   □ Full admission
   □ 23 hour Observation (patient expected to stay 23 hrs or less)
   □ Transfer to _____ (nursing unit); Team: ________ ; Attending M.D. ________

2. Diagnosis: Status Asthmaticus

3. Vital signs: Every 4 hours and prn with pulse oximetry spot checks.

4. Oxygen therapy: O₂ to keep saturation >90% per RT evaluation

5. Activity:  □ As tolerated
   □ Other (specify): ___________________________________________

6. Diet:  □ Regular
   □ Other (specify): ___________________________________________

7. IV:  □ None
   □ D5 / ½ NS with 20 mEq KCl per liter at _____________ ml/hr
   □ Saline lock
   □ Other (specify): __________________________________ at ___________ ml/hr

8. Nursing: Please have family call for follow-up appointment with PCP and document appointment on Asthma Action Plan.

9. Medications (consider continuing home medications):
   A. Systemic Steroid Therapy (select one):
      Dosing recommendations: Usual dose: 1-2 mg/kg/DAY divided every 12 hours
                              Usual Maximum dose = 60 mg/day (<12 yrs) or 80 mg/day (≥ 12 years)

      □ Prednisolone (e.g. Orapred® 15mg/5ml) _______ mg po every 12 hrs ( ____mg/kg/day)
      □ Prednisone _______ mg po every 12 hrs ( ____mg/kg/day)
      □ Methylprednisolone (e.g. Solu Medrol®) _____ mg IV every 12 hrs ( ____mg/kg/day)

   B. Split virus influenza vaccine before discharge between October-February & patient > 6 months of age)-
      □ N/A   □ Age 6-35 months: 0.25 ml IM  □ Age 3 years and above: 0.5 ml IM

   C. Other medications:
      ________________________________________________________________
      Physician Signature___________________________________________MM/DD/YY______
      Nurse Signature ______________________________________________MM/DD/YY_________

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CHRISTUS SANTA ROSA
Health Care

Asthma Admission / Transfer
Orders for Pediatrics

Dr. Wood/Debra Long  0028103 (04/10)
List all known Allergies or NKA:

0049 HT: WT (Kgs):

For the safety of your patient, Write Legibly!
Print your name and a contact phone number to allow for call back.

Check those boxes and/or fill in the blanks (as appropriate) of those orders you wish to use.
If you do not want to use a particular order, draw a line through the entire order.

Date: ______/______/_____

Time: __________

Physician Signature_____________________________________MM/DD/YY___________

Nurse Signature _______________________________________MM/DD/YY____________

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10. **Medications administered by Respiratory Therapy:**

**A. Albuterol**

- Adjust albuterol treatments according to weaning protocol.
  (Pediatric Asthma Score before each treatment.)

- Albuterol via MDI with spacer _______ puffs every _______ hours
  [Metered Dose Inhaler (MDI) dosing guidelines: 2.5 mg nebulized Albuterol = 4-5 puffs by MDI]
  
  If initial albuterol dose is greater than 4 puffs, decrease dose to 4 puffs prior to
  weaning to every 4 hrs (per protocol)

- Albuterol nebulization _______ mg/dose every _______ hours.
  
  If initial albuterol dose is greater than 2.5 mg neb, decrease dose to 2.5 mg prior to
  weaning to every 4 hrs (per protocol)

  For patients 5 years and older: change to Albuterol MDI 4 puffs with spacer when reach Q4 hr
  interval (per protocol)

**B. Anti-Inflammatory Inhalation:**

- Budesonide (Pulmicort Respules®)  □ 0.25 mg □ 0.5 mg □ Daily □ bid via nebulizer

- Fluticasone (Flovent®) □ 44 mcg □ 110 mcg MDI ______ puffs bid with spacer

- Other (please specify): _______________________________________________________________

* Note: There is no evidence that continuation of combination long-term-control medications
  during acute exacerbations improves outcomes (e.g. Advair®; Symbicort®)

11. **Peak Expiratory Flow Monitoring:** Before and after each treatment (for patients > 5 years of age)

12. **Call to schedule for Asthma Education 4-2465 and pager# 220-7813:** □ in English □ in Spanish

13. **Consult:** Social work consult for financial concerns for patient care needs □ Yes □ No

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**Asthma Admission / Transfer**

**Orders for Pediatrics**

Dr. Wood/Debra Long 0028103 (04/10)
### Dosing Recommendations for Inhaled Corticosteroids

<table>
<thead>
<tr>
<th>Age</th>
<th>Steroid Dose</th>
<th>Fluticasone Flovent HFA 44® MDI</th>
<th>Fluticasone Flovent HFA 110® MDI</th>
<th>Budesonide Pulmicort® nebulization</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 years</td>
<td>Low</td>
<td>4 puffs/day</td>
<td></td>
<td>0.25-0.5mg per day</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td></td>
<td>2-3 puffs/day</td>
<td>&gt;0.5-1mg per day</td>
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<tr>
<td></td>
<td>High</td>
<td></td>
<td>&gt;3 puffs/day</td>
<td>&gt;1mg per day</td>
</tr>
<tr>
<td>5-11 years</td>
<td>Low</td>
<td>2-4 puffs/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td></td>
<td>2-3 puffs/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td></td>
<td>&gt;3 puffs/day</td>
<td></td>
</tr>
<tr>
<td>≥12 years</td>
<td>Low</td>
<td>2-6 puffs/day</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Medium</td>
<td></td>
<td>3-4 puffs/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td></td>
<td>&gt;4 puffs/day</td>
<td></td>
</tr>
</tbody>
</table>
List all known Allergies or NKA:

For the safety of your patient, Write Legibly!

Print your name and a contact phone number to allow for call back.

Check those boxes and/or fill in the blanks (as appropriate) of those orders you wish to use.
If you do not want to use a particular order, draw a line through the entire order.

Date: _____ / _____ / _____
Time ______

1. Anticipate Discharge on

2. Activity: [ ] Unrestricted [ ] Other (specify): __________________________

3. Diet: [ ] Regular [ ] Other (specify): __________________________

4. Discharge Planning:
   a. Arrange for home nebulizer and instruction (complete Title 19 form) [ ] Yes [ ] No
   b. RT to dispense additional: [ ] Spacer [ ] Spacer with facemask [ ] Peak flow meter
   c. Arrange for home health visits for asthma education [ ] Yes [ ] No
   d. Review “Completed” Asthma Action Plan [ ] Yes [ ] No

5. Medications (prior to discharge):
   [ ] Split virus influenza vaccine (patient must be more than 6 months of age) [Oct-Feb]
     [ ] 0.25 ml IM for patient 6-35 months of age
     [ ] 0.5 ml IM for patient 3 years of age or greater

6. Discharge Medications (Relabel current inpatient inhalers for outpatient use):
   a. Bronchodilator(s):
      [ ] Short Acting:
      [ ] Long Acting (only if already on inhaled steroid):
   b. Inhaled Corticosteroids: __________________________
   c. Oral Corticosteroids: __________________________
   d. Other (specify):
      __________________________________________________
      __________________________________________________
      __________________________________________________

7. Pulmonary (order through RT department):
   [ ] Peak flow meter- technique review
   [ ] MDI with spacer- technique review
   [ ] Dry powder inhaler- technique review

8. Schedule for asthma class if unable to attend during hospitalization [ ] Yes [ ] No
   Language preference: [ ] English [ ] Spanish
   (Leave message at 704-2465 and indicate family’s phone number and date they will attend classes)

9. Follow-up appointment [recommended within 1 week]:
   Physician: __________________________ Telephone: __________________________
   Date/Time: __________________________ Location: __________________________

Physician Signature __________________________ MM/DD/YY
Nurse Signature __________________________ MM/DD/YY

Page 1 of 1
List all known Allergies or NKA:  

For the safety of your patient, Write Legibly!  
Print your name and a contact phone number to allow for call back.

Check those boxes and/or fill in the blanks (as appropriate) of those orders you wish to use.  
If you do not want to use a particular order, draw a line through the entire order. 

Date: ______/_____/______  Time: __________ 

1. Admission:  
   - Admit to ______ (nursing unit); Team: ______ Attending M.D. ________ 
   - Full admission  23 hour Observation (patient expected to stay 23 hrs or less) 

2. Isolation:  
   Masks must be worn for all face to face contact, including suctioning, patient exams, respiratory treatments and any time you will be within 3 feet of the patient. The patient should wear a mask when being transported if possible. 
   - Contact Precautions (required if RSV positive) 

3. Diagnosis: Bronchiolitis 

4. Vitals/Monitoring: 
   Every 4 hours with pulse oximetry spot checks, BP once daily unless otherwise specified. (Continuous pulse oximetry should not be routinely used, although may be considered if patient is under 60 days of age) 

5. Oxygen therapy: O2 per nasal cannula to keep saturation >90%, please wean as tolerated. 

6. Activity:  
   - As tolerated  
   - Other (specify): ________________________________ 

7. Diet: 
   - Regular  
   - Other (specify): ________________________________ 

8. Notify House Officer for:  
   - New temperature ≥ 38 C (100.4 F) 
   - Respiratory Rate > __________ 
   - Heart Rate > _______________ 
   - Oxygen requirement > _______________ 
   - Respiratory Score ≥ 6 after suctioning and treatment 

9. IV:  
   - None  
   - Saline lock  
   - D5 ½ NS with 20 mEq KCl per liter at _________ ml/hr 
   - Other (specify): _______________________________ at _________ ml/hr 

10. Suction nares externally using white, mushroom tip suction catheter. Reserve deep suctioning for patients who fail to respond to external suctioning. 

   Physician Signature _______________________________ MM/DD/YY __________ 
   Nurse Signature ________________________________ MM/DD/YY __________ 

Page 1 of 2
11. **Initiate Respiratory Therapy Bronchiolitis Protocol:**
   - 1) Pediatric Bronchiolitis Score after nasal suctioning every 4 hrs.
   - 2) 3% saline at a volume of 4ccs nebulized every 4 hrs p.r.n. respiratory score > 3.
   - 3) Racemic epinephrine nebulized 0.5 mls p.r.n. every 4 hours if respiratory score > 3 and patient fails to improve with 3% saline and suctioning.

12. **Other Medications**
    - Acetaminophen _________ mg (15 mg/kg) p.o. every 4 hours prn fever or pain

13. **Patient Education:** Please provide parent with Bronchiolitis handout and instruct in external nasal suctioning.

14. **Consult:** Social work consult for financial concerns for patient care needs.

15. **Other Orders:**

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Physician Signature___________________________ MM/DD/YY________________

Nurse Signature____________________________ MM/DD/YY________________
FAMILY CENTERED ROUNDS (FCRs) ORIENTATION

- Refer to PDF facilitator guide from Cincinnati Children’s Medical Center
- Nursing, respiratory therapists, social workers and case management should be invited to participate.
- Patient presentations are done at the patient’s bedside while facing the patient and the family. No team member should have their backs towards the patient or family.
- Intern’s (or medical student) responsibilities
  - Ask the family if they want to participate.
  - Encourage the family to write down any questions they have so they can be answered by the team as a unit.
  - Use the patient’s name when referring to them.
  - Invite the patient’s nurse to participate.
  - Introduce each team member to the patient/family after we enter the room.
  - Invite the family to participate in the presentation. “Please feel free to make any additions as I tell the team about the patient.”
  - Use words the family can understand
  - Invite questions after the patient presentation.
  - Develop an evidenced-based assessment, DDx, and plan to present to the team and family.
- Resident’s responsibilities
  - Direct rounds to make sure that FCRs are done in an efficient and timely manner.
  - Invite the patient’s nurse to participate.
  - Bedside teaching
  - Model excellent bedside manner.
  - Contribute to the plan using EBM.
  - Answer questions for the family that the intern does not feel comfortable answering.
  - Write or delegate someone to write orders for the intern who is presenting.
  - Call or delegate someone to call in consults for the intern who is presenting.
  - Make sure the post-call intern leaves by 1pm.
  - Invite the attending to teach when appropriate.
  - Understand that sometimes attending-driven bedside teaching will occur.
Problem Representation: (Identify the Key Features and present the problem using abstract qualifiers/Brief overview of progression of pertinent events such as PICU/ED course that led to hospitalization)
AQ include: waxing/waning, acute/chronic/intermittent/insidious/progressive, high grade, low grade, etc
Hannah is an 8 y/o female with a h/o T1DM who presented last night to UHED via EMS with acute onset, waxing and waning altered mental status characterized by screaming, combativeness, inability to recognize her parents, GCS 12→10, in the context of BG of 72. Pt is amnestic to the event.

Background: (ROS, pertinent PFSH, pivotal PE/lab/radiologic data)
ROS: No fever/N/V/D/rashes.
Extensive w/u in ED including head CT, UDS, ASA/Tylenol levels, chemistry, LFTs, ammonia, lactic acid, and CBC were all reassuring.
Hannah was recently dx with T1DM. She is reportedly compliant with insulin regimen but has a h/o recent hypoglycemic episodes. Family lives in Houston and she is followed by TCH Endocrinology. She has a h/o night terrors but her mother reports this event is different.
Overnight, VSS, BG ranged 99-215, 1+ ketones in UA, PE remarkable for GCS 15, intact neurological findings, and was otherwise benign. Her father feels she is at baseline.

Analysis: (Most likely diagnosis/diagnoses. Compare and contrast diagnoses. Also give an assessment of clinical status.)
Hannah is an 8 y/o female with now resolved AMS. The most likely etiology is hypoglycemia. Dangerous etiologies such as intracranial mass, toxic ingestion, metabolic disturbance have been ruled out. Meningitis/encephalitis is unlikely in the absence of a fever.

Recommendations: (Management goals, discharge criteria, uncertainty is acceptable)
1) Discuss case with Pt’s endocrinologist, including presence of ketones.
2) Unless her endocrinologist says otherwise, continue current insulin regimen/CHO counting/sliding scale.
3) RTED precautions.
4) If she continues with baseline MS, good PO intake, stable BG, will d/c home today with close F/U with her PCP and endocrinologist.

REMEMBER: NO REPETITION!!
Problem Representation: (Identify the Key Features and present the problem using abstract qualifiers/Brief overview of progression of pertinent events such as PICU/ED course that led to hospitalization)
AQ include: waxing/waning, acute/chronic/intermittent/insidious/progressive, high grade, low grade, etc)
Jorge Luis is 14 year old patient who was admitted yesterday with transient HA and lethargy, intermittent HGF, and dysuria after I/O cath which is now resolved.

Background: (ROS, pertinent PFSH, pivotal PE/lab/radiologic data)
Overnight, VSS, balanced I/O, PE remarkable for stable neurological findings, and is otherwise benign. His mother feels he is at baseline.
Labs: Blood/Urine/CSF cx are pending, CSF profile was reassuring, flu was negative

Analysis: (Most likely diagnosis/diagnoses. Compare and contrast diagnoses. Also give an assessment of clinical status.)
Jorge Luis is a 14 y/o male who presented with improved HA/HGF/dysuria in the context of shunt-dependent hydrocephalus. This is most likely due to viral infection. UTI is also a possibility but we will not know until urine cx is resulted. Shunt infection is unlikely with normal CSF results.

Recommendations: (Management goals, discharge criteria, uncertainty is acceptable)
1) F/U urine culture, if + continue abx x 10 days, if negative, d/c abx
2) Stable to discharge home with close f/u with PCP at Brady-Green clinic as well as Neurosurgery and Urology. We will call to set up f/u appt and discuss case with PCP.
3) RTED precautions.

REMEMBER: NO REPETITION!!
PEDIC REMINDERS

PEDIATRIC DRUG DOSING---see sheet for more info

* medications are dosed by mg/kg
* many meds have minimum and maximum doses
* some doses are different IV vs po routes
* know if you are prescribing the liquid or the pill forms

RX WRITING---

* be sure to include the child’s weight and age on the prescription
* include the medication concentration you are prescribing
* always write in your name and telephone number

IVF---

* IVF boluses are usually given as 10cc/kg or 20cc/kg, depending on the degree of dehydration
  * Never give more than 40cc/kg without consulting your upper level or attending.
  * always use NS or LR for boluses
  * for maintainence fluids for children with normal electrolytes, use D5 ½ NS with 20meq KCl/liter
  * make adjustments as needed, based on chemistry results and clinical picture
  * flow rate, also adjusted according to chemistry results and clinical picture, can be started as:

  100cc/kg for 1st 10 kg
  50cc/kg for 2nd 10 kg
  20cc/kg for the remainder
  Divided by 24 hours

e.g. A 35 kg child is admitted to the hospital with vomiting and dehydration. In the ER, an IVF bolus was given. Pt now with nl chemistry and brisk cap refill, but with continued intolerance of po fluids. To figure out his maint. rate:

100cc x 10 kg $\rightarrow$ 1000
50cc x 10 kg $\rightarrow$ 500
20cc x 15 kg $\rightarrow$ 300
$\frac{1800cc/dav}{24\text{ hours}}$ $\rightarrow$ 75cc/hr
OR a quicker method, to figure out directly how much per HOUR: (for a 35 kg child)

- 1st 10 kgs → 4 x 10 = 40
- 2nd 10 kgs → 2 x 10 = 20
- Over 20 kgs → 1 x 15 = 15

75 cc/hr

GROWTH CHARTS---

*It is always helpful to plot the height, weight, and FOC (for infants) of newly admitted patients. This will help you in evaluating the overall health of the child. This is especially important when dealing with any child with failure to thrive (FTT), developmental issues or concerns for neglect. See link below for access to specific growth charts.

PEDIATRIC FLUIDS AND NUTRITION---

*maint. fluids as discussed above.
*when presenting or evaluating a patient’s ins and outs, you look at the number of ccs/kg/day for the input, and the number of ccs/kg/hour when looking at the output.
*For infants, it is also often important to give the number of kcal/kg/day.
*Healthy infants require 100 – 120 kcal/kg/day for normal growth; some special needs infants, such as those with failure to thrive or congenital heart defects, may require more, as their metabolic demands are greater.
*Most of the common infant formulas are 20kcal/ oz or 30cc. Some of the special formulas are 22 or 24 kcal/oz, and we often maximize an infant with FTT’s caloric intake by concentrating the formula, sometimes up to 30kcal/oz.
*We advocate breast feeding for all infants, unless there are contraindications. However, many infants are fed formulas, for a variety of reasons, and it is helpful to be familiar with some of the commonly seen formulas.
*Examples of commonly used formulas are listed below:
   -- Cow’s milk based formulas—used for most normal infants, are Similac, Enfamil, Good Start
   -- Soy based formulas—used for infants with cow’s milk allergy, galactosemia or lactose malabsorption, are Isomil, Prosobee
   --Elemental formulas (casein hydrolysate)—used for infants with food allergies, protein or fat malabsorption, are Alimentum, Nutramigen, Pregestimil
   -- Amino acid based formulas—used for infants with severe food allergies, fat malabsorption, are EleCare and Neocate
   --Formulas for premature infants—Similac Natural Care Advance, Enfamil Premature Lipil, Similac Special Care Advance
HELPFUL RESOURCES---

* UTHSCSA Pediatric Black Board
* UpToDate—link through UTHSCSA Library site
* Cincinnati Children’s website - www.cincinnatichildrens.org
* American Academy of Pediatrics website — www.aap.org
* Link to growth charts - http://www.cdc.gov/growthcharts
Specific to Pediatrics, drug dosing is often based on the patient’s weight. At times, age, renal function and other factors may also play a part. Of note, it is important to remember that for bigger children, there is usually a maximum dose that should be given.

Many children require the liquid form of medications, even if they are a little older. Many cannot swallow pills yet. Medications come in various forms, frequently in more than one concentration—pills and liquids, alike. It is important to know which concentration you are using when figuring out the dose. It is also very helpful to list all of this information, including the child’s weight on the order form (inpt) and prescription (outpt). For some medications, the IV and po dosing may differ, for others it will be the same.

Examples of pediatric dosing:

*****Clindamycin--- prescribed for a 4 year old who weighs 20 kg, and does not know how to swallow pills.

  Clindamycin is available as a suspension as 75mg/5ml; the dose is 10-30mg/kg/day, divided every 6-8 hours.

  30mg x 20kg = 600mg  600 divided TID = 200mg  200mg/X = 75mg/5ml

=13ml po every 8 hours.

*****Prednisone----prescribed for a 15 year old, secondary to an acute asthma exacerbation. The patient weighs 70 kg, and is able to swallow pills.

  Prednisone is available in tabs of 1, 2.5, 5, 10, 20 and 50 mg, as well as a suspension of 15mg/5ml; the usual dose for an acute asthma exacerbation is 1-2 mg/kg/day, given qd or divided bid.

  As with many other medications, there is a MAXIMUM dose for Prednisone—60mg/day for those <12 years of age and 80mg/day for those >12 years of age.

  Therefore, this patient should be given 80mg/day; either (4) 20mg tabs q day or (2) 20mg tabs bid.

  Prednisone----prescribed to a 3 year old, who weighs 15kg. As above, the strength of liquid Prednisone is 15mg/5ml.

  2mg x 15kg = 30mg/day  30mg/xml = 15mg/5ml  (30mg)(5ml) = (15mg)(xml)

  150 /15 = 10ml per day  either 10ml once a day or 5ml twice a day
Lasix----as an example of a medication whose dosing will be different, depending on whether it is given IV or po. The dose of Lasix given po is higher than the IV route, secondary to poor bioavailability if given po.

Phenobarbital----care must be taken when obtaining a medication history from a patient’s family. The family may know the dose of a drug by the amount in milligrams OR milliliters. Phenobarbital is a good example of a medication whose “dose” can be misinterpreted in a very dangerous manner, if one mistakes the amount in mgs as the amount in mls, and vice versa. The concentration of Phenobarbital is 20mg/5ml. Therefore, if a parent reports to you that the patient takes “5 mg”, but means 5 mls; you may underdose him and elicit seizures, if you do not take the time to scrutinize the dose. On the other hand, you may overdose a patient if you take their “dose” to mean milliliters, when in fact, they are referring to milligrams.
CHOOSING AN ANTIBIOTIC

*While it is imperative that one closely considers the choice of antibiotic for each individual patient, listed here are some frequently used antibiotics for common pediatric diagnoses.

*Be aware of, and utilize your institution’s profile for drug sensitivities of the organisms most prevalent in your community/hospital.

*Also, follow closely any culture results you may have available on your patient, and use these to narrow your antibiotic coverage accordingly.

Abscess/Cellulitis
--due to the high prevalence of MRSA, start with Clinda or Vancomycin, then adjust once culture results indicate the organism and its sensitivities.
--(Initial outpatient choices might include Cephalexin, but have a high suspicion for MRSA, and consider po Clinda or Bactrim.)

Bacterial Gastroenteritis
--Shigella-treat to decrease the duration of symptoms and spread.
  -IV Ceftriaxone
  -po Azithomycin or Cipro if over 17 years of age

--Salmonella-do NOT treat with antibiotics, as this will prolong the infection.

--E.coli 0157—do NOT treat with antibiotics, secondary to the increased risk of HUS (hemolytic uremic syndrome) with treatment.

Meningitis (bacterial)
--0-2 months of age—treat as ROS below

--3 months and older—Strep pneumo, Neisseria meningitidis, and H.flu—most common.
  --Cefotaxime or Ceftriaxone
  --add Vanc if concerned for resistant S. pneumo.

--Also add Acyclovir if concerned for possible HSV; TB meds (INH, Rifampin, Pyrazinamide and either Streptomycin or Ethambutol) if TB meningitis is suspected.
Osteomyelitis
--0-3 months---Staph aureus, gram negatives, GBS
  --Cefotaxime and Vanc or Nafcillin/Oxacillin (consider Vanc as first line, and change to naf/oxacillin if MSSA.

--older infant and child---Staph aureus and Group A strep
  --Clinda or Vanc
  --change to Oxacillin or Nafcillin if culture results show MSSA.

--if child has sickle cell disease, consider Salmonella as causative agent.

--if inoculation was via a penetrating wound through a tennis shoe, cover for pseudomonas (e.g. Zosyn, Ceftazidime).

Peritonsillar Abscess
--Group A Strep, Staph aureus, and respirator anaerobes
--Unasyn or Clinda
--Vanc or Clinda if concerned for MRSA

Pelvic Inflammatory Disease
--Neisseria gonorrhoeae, Chlamydia trachomatis, as well as streptococci, gram negative enteric bacilli and anaerobic organisms
  --Cefoxitin or Cefotetan plus Doxycycline, OR
  --Clinda plus Gent, OR
  --Unasyn plus Doxycycline
  --the oral form of Doxycycline is preferred if possible, because IV injection is very painful.

Pneumonia
--0-2 months—follow ROS/Fever below for bacterial causes.
  --Chlamydia—Azithromycin or Erythromycin
  --Pertussis—Azithromycin or Erythromycin; may use Bactrim if >2 months

--< 5 years of age—
  --most likely due to Strep pneumo; could also be secondary to Staph aureus, MRSA, Group A Strep, H.flu or Moraxella.
    -- treat with Cefotaxime or Cefuroxime or Ceftriaxone
    --consider with Clinda or Vanc if concerned for MRSA or resistant Strep pneumo.
---less likely causes in this age group are Mycoplasm and Chlamydia atypicals); but consider treatment with Azithromycin or Erythromycin.

■ > 5 years of age—
  --more likely to be atypical in this age group, Mycoplasm or Chlamydia.
  --treat with Macrolides—Azithro, Erythro; may use Doxycycline if > 8 years old.
  --MUST also consider the other etiologies of the pneumonia (Strep pneumo, Staph aureus, MRSA, etc.); especially if the child is ill appearing, and/or the CXR suggests a more aggressive pathogen.
  --the same drug choices are as above; Cephalosporin, followed closely by Clinda or Vanc if there is any concern for MRSA or a resistant strain of Strep pneumo.

  --(Initial outpatient management of a child with pneumonia, who does not fit the requirements for admission, would follow with the direction of the most likely organisms for the specific age group. For a child < 5 years of age, one might start with high dose Amoxicillin, with alternatives of Omnicef, or Clinda; with a macrolide as a second line. A child older than 5 years of age, might be started on a macrolide first line, with high dose Amoxicillin/Omnicef or Clinda as a second line. All decisions must be made individually and with their recent history/exposure, past history and physical exam all taken into account.)

Preseptal/Periorbital Cellulitis
  --Strep pneumo, Staph aureus, other streps; before 1990, H.flu was a big contender.
  --Vanc (secondary to MRSA) plus Unasyn (Amp-Sulbactam) OR Zosyn (Piper-tazobactam) OR Timentin (Ticar-clav)
  OR Cefotaxime OR Ceftriaxone
  --Change Vanc to Naf/Oxacillin if MSSA per culture results.

Rule Out Sepsis/Fever of Unknown Etiology in 0-2 months
  --GBS, gram negatives (E.coli), H.flu, Listeria, Streptococcus, Staph aureus
  --Cefotaxime or Ceftriaxone
  --Ampicillin (to cover esp. for Listeria)
  --Acyclovir if concerned for Herpes Simplex (HSV)

UTI
  --E.coli (up to 80% in children), Klebsiella, Proteus, Enterobacter
  --Cefotaxime or Ceftriaxone
FAMILY CENTERED ROUNDS AND PRESENTATIONS

Family Centered Rounds, or FCRs, are being used on the Pediatric Inpatient wards at Santa Rosa. FCRs are an expanded and improved form of bedside rounds, in that they involve the patient, their family, the teaching team (to include the attending, resident, interns and medical students), as well as the nurse and any other available health care team member (i.e. Child Life, OT/PT/ST,…). The goal is to improve the communication with the patient, their family and the various team members and thereby improve the quality of care, as a result.

The concept, as well as the execution of FCRs, are well described in Dr. Noemi Adame’s Pediatric Grand Rounds, available through the Pediatric Blackboard.

Once the patient and their family have been instructed in FCRs and they agree to participate, the teaching team, nurse and any other available team member, enter the patient’s room. The intern caring for the patient presents the patient’s case, using the PBAR method (see below); the upper level resident and attending add any necessary input. The plan is discussed and any questions or concerns the patient or their family has, are addressed. It is important that we use terminology that the family understands and that the patient and their family are put at ease and encouraged to participate.

The PBAR method (Problem Presentation, Background, Analysis, and Recommendations) is used to facilitate efficiency in the rounding process—concentrating on pertinent information without repetition and summing it up with distinct recommendations. There are separate outlines for a new versus known patient. Please refer to the detailed outline of the PBAR in the “Forms” section.
Birth to 36 months: Girls
Head circumference-for-age and
Weight-for-length percentiles

NAME ____________________________
RECORD # ________________________

AGE (MONTHS)

Birth

Weight

Date

Length

Head Circ.

Comment

lb

in

cm

Available at http://www.nal.usda.gov/wicworks

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2002).
http://www.cdc.gov/growthcharts

WIC Makes A Difference
SAFER - HEALTHIER PEOPLE

http://www.cdc.gov/growthcharts

CMYK
cyan magenta yellow black

006012.ai   70.7107lpi   45°   2/27/2003, 3:55:38 PM
Birth to 36 months: Boys
Length-for-age and Weight-for-age percentiles

NAME ___________________________ RECORD # ____________

<table>
<thead>
<tr>
<th>AGE (MONTHS)</th>
<th>Birth</th>
<th>3</th>
<th>6</th>
<th>9</th>
<th>12</th>
<th>15</th>
<th>18</th>
<th>21</th>
<th>24</th>
<th>27</th>
<th>30</th>
<th>33</th>
<th>36</th>
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<td>-</td>
<td>41</td>
<td>40</td>
<td>39</td>
<td>38</td>
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<td>36</td>
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<tr>
<td>in</td>
<td>-</td>
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<td>150</td>
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</tbody>
</table>

Available at http://www.cdc.gov/growthcharts

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2002).
http://www.cdc.gov/growthcharts

WIC Makes A Difference SAFER • HEALTHIER • PEOPLE
2 to 5 years: Boys
Stature-for-age and Weight-for-age percentiles

NAME ________________________________ RECORD # __________

Available at http://www.nal.usda.gov/wicworks
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2002).
http://www.cdc.gov/growthcharts

WIC Makes A Difference SAFER HEALTHIER PEOPLE™
Evidence-Based Clinical Care Guideline

Acute Gastroenteritis (AGE)

In children aged 2 months through 5 years

Original Publication Date: November 1999
Revision Publication Dates: April 2001
October 31, 2005
New search May, 2006 (see Development Process section)

Target Population

Inclusions: These guidelines are intended primarily for use in children aged 2 months through 5 years of age with signs and symptoms of acute gastroenteritis (diarrhea of recent onset not caused by chronic disease) with or without accompanying nausea, vomiting, fever, or abdominal pain.

Exclusions: These guidelines do NOT address all considerations needed to manage those with the following:

- toxic appearance or requiring intensive care
- episodes of diarrhea lasting longer than 7 days
- previously diagnosed disorders including immunodeficiency or those affecting major organ systems
- vomiting with no accompanying diarrhea
- AGE accompanying failure to thrive
- diarrhea and/or vomiting accompanied by chronic metabolic disorders (e.g. diabetes, PKU)
- diagnosis of hyponatremic or hypernatremic dehydration

Target Users

Include but are not limited to (in alphabetical order):

- Clinicians caring for inpatients
- Community-based caregivers (e.g. daycare, school personnel)
- Emergency Medicine physicians
- Patient Care staff, including:
  - dietitians
  - nurses
- Patients and families
- Primary care providers
- Residents

Introduction

References in parentheses ( ) Evidence strengths in [ ] (See last page for definitions)

New evidence presented in this revision of the guideline:

a) role of diarrheagenic *Escherichia coli*
b) refined clinical measures for assessing dehydration
c) note about evidence on use of ondansetron
d) additional citations for the use of probiotics

Acute gastroenteritis (AGE) is a diarrheal disease of rapid onset, with or without accompanying symptoms and signs, such as nausea, vomiting, fever, or abdominal pain (*King 2003 [S,E], Guerrant 2001 [S,E]). In the United States, approximately 1.5 million outpatient visits, 200,000 hospitalizations and 300 deaths are recorded each year for children with gastroenteritis. Approximately one-third of all hospitalizations for diarrhea in children younger than 5 years are due to rotavirus, with an associated direct cost of $250 million annually (*King 2003 [S,E]).

Because most patients included in this guideline will have self-limited viral or bacterial diarrhea, dehydration caused by the disease is the focus of treatment in this guideline. Based on the most current and best scientific information, the following recommendations are intended to help practitioners at all levels of experience refine their knowledge and select among the options for evaluation and management. A 20% drop in emergency department (ED) visits for AGE was documented for the three year period following community-wide application of the original version of this guideline (*Perlstein 2002 [D]*).

Challenges in the management of AGE include:

- diagnosing degree of dehydration
- prevention of AGE
- determining the practical role of probiotics in treating and preventing AGE.

---

In the target population, the objectives of this guideline are to:

- improve the use of appropriate clinical and laboratory assessment
- increase the use of oral rehydration and early progression to usual diet
- improve parental involvement in decision making around the management of AGE
- improve prevention of transmission of AGE
- decrease use of ED services for management of mild cases
- reduce the number of hospitalizations
- reduce the length of stay.

**Etiology**

Infectious agents are the most common causes of AGE. Viruses, primarily rotavirus species, are responsible for 70 to 80% of infectious diarrhea cases in the developed world. Various bacterial pathogens account for another 10 to 20% of cases; as many as 10% may be attributable to diarrheagenic Escherichia coli (Cohen 2005 [C]).

Parasitic organisms such as Giardia species cause fewer than 10% of cases. See Table 1 for etiologic agents. Incidence is affected by climate and season. Other factors that increase the risk of AGE in children include attendance at day care centers and impoverished living conditions with poor sanitation (Burkhart 1999 [S]).

**Table 1: Etiologic Agents for Pediatric Infectious Gastroenteritis in the United States**

<table>
<thead>
<tr>
<th>Pathogens</th>
<th>Inflammatory Agents</th>
<th>Non-inflammatory Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viruses</td>
<td>Rotavirus enteric adenovirus</td>
<td>Norwalk Virus Calicivirus Astrovirus Parvovirus</td>
</tr>
<tr>
<td>70-80%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacteria</td>
<td>Salmonella Shigella Campylobacter jejuni Yersinia enterocolitica enterohemorrhagic E. coli (includes O157:H7) other diarrheagenic E. coli (Cohen 2005 [C]) *Clostridium difficile</td>
<td></td>
</tr>
<tr>
<td>10-20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parasites</td>
<td>Giardia lamblia Cryptosporidium</td>
<td></td>
</tr>
<tr>
<td>0-10%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*(Cohen 2005 [C], Northrup 1994 [S], Avery 1993 [S])

*In Cincinnati, other diarrheagenic E. coli are the largest percentage of bacterial pathogens.

---

**Guideline Recommendations**

**Assessment and Diagnosis**

**Clinical Assessment**

1. It is recommended that the history and physical examination be the primary basis for the diagnosis of AGE. See Figure and Appendix 1 (Local Expert Consensus 2005 [E]).

2. It is recommended that clinical assessment be initially performed for the presence and degree of dehydration (Steiner 2004 [M]). See Appendix 2 for physical parameters associated with degree of dehydration. See Table 2 and Table 3 for likelihood ratios of clinical signs.

   **Note 1**: Prolonged capillary refill time, abnormal skin turgor, and absent tears are the best individual examination measures (Steiner 2004 [M]) (see Table 2, Table 3, and Appendix 2).

   **Note 2**: Clinical diagnosis of dehydration has been shown to be imprecise and thus a general classification of a child’s dehydration status such as none, some (mild/moderate), or severe is suggested by the literature as a useful starting point in the management of the child at risk for dehydration (Steiner 2004 [M], King 2003 [S,E]).

   **Note 3**: Acute body weight change is considered the gold standard measure of dehydration in a child but is often impractical for the initial assessment due to lack of an accurate pre-illness weight measurement (Gorelick 1997 [C], Duggan 1996 [C]).
it a narrower confidence interval.

A larger sample size will generate more precise measurements, which we can be 95% sure that the true value lies. A study with a (precision) of a measured value; it is the range of values within

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Management Recommendations

Prevention of Dehydration

4. It is recommended that continued use of the child’s preferred, usual, and age appropriate diet be encouraged to prevent or limit dehydration (Brown 1994 [M], Fayad 1993 [A], Alarcon 1992 [A]). Regular diets are generally more effective than restricted and progressive diets, and in numerous trials have consistently produced a reduction in the duration of diarrhea (Alarcon 1991 [A], Margolis 1990 [B], Placzek 1984 [B], Khin 1985 [C]).

Note 1: The historical BRAT diet (consisting of bananas, rice, applesauce, and toast) is unnecessarily restrictive, but may be offered as part of the child’s usual diet (King 2003 [S,E]).

Note 2: Clear liquids are not recommended as a substitute for oral rehydration solutions (ORS) or regular diets in the prevention or therapy of dehydration (King 2003 [S,E]) (See Appendix 4).

Note 3: The vast majority of patients with AGE do not develop clinically important lactose intolerance. In selected patients with documented, persistent lactose intolerance, lactose-free formulas are recommended (Brown 1994 [M]).

Note 4: A meta-analysis of 16 studies found no significant clinical advantage to diluting milk or formula in the management of AGE (Brown 1994 [M]).

5. It is recommended that the vomiting child be offered frequent small feedings (every 10 to 60 minutes) of any tolerated foods or oral rehydration solutions (ORS) (Wan 1999 [A], Santosham 1985 [A]).

6. It is recommended that a child with recurrent vomiting but no signs of significant dehydration may be managed by frequent telephone follow up or by direct supervision in the office, emergency department, or in a hospital setting (see Appendix 1 for triage suggestions) (Local Expert Consensus 2005 [E]).

Rehydration


Labornatory Studies

3. It is recommended that laboratory tests not be routinely performed in children with signs and symptoms of AGE, including tests for specific pathogens, such as those for rotavirus, ova and parasites, bacteria, and fecal antigen tests for parasites (Northrup 1994 [S], Local Expert Consensus 2005 [E]).

Note: Serum electrolytes are sometimes useful in assessing children and who require intravenous (IV) or nasogastric (NG) fluids. A normal bicarbonate concentration may be useful in ruling out dehydration (Steiner 2004 [M]).

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Table 2: Likelihood Ratios (LR) for Clinical Signs

<table>
<thead>
<tr>
<th>Presence of clinical sign</th>
<th>LR+ to rule-in ≥5% dehydration (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolonged capillary refill</td>
<td>4.1 (1.7 to 9.8)</td>
</tr>
<tr>
<td>Abnormal skin turgor</td>
<td>2.5 (1.5 to 4.2)</td>
</tr>
<tr>
<td>Absent tears</td>
<td>2.3 (0.9 to 5.8)</td>
</tr>
<tr>
<td>Abnormal respiratory pattern</td>
<td>2.0 (1.5 to 2.7)</td>
</tr>
<tr>
<td>Poor overall appearance</td>
<td>1.9 (0.97 to 3.8)</td>
</tr>
</tbody>
</table>

(Steiner 2004 [M])

<table>
<thead>
<tr>
<th>Presence of clinical sign</th>
<th>LR- to rule-out ≥5% dehydration (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormally low urine output</td>
<td>0.27 (0.14 to 0.51)</td>
</tr>
<tr>
<td>Dry mucous membranes</td>
<td>0.41 (0.21 to 0.79)</td>
</tr>
<tr>
<td>Poor overall appearance</td>
<td>0.46 (0.34 to 0.61)</td>
</tr>
<tr>
<td>Sunken eyes</td>
<td>0.49 (0.38 to 0.63)</td>
</tr>
<tr>
<td>Absent tears</td>
<td>0.54 (0.26 to 1.13)</td>
</tr>
<tr>
<td>Prolonged capillary refill</td>
<td>0.57 (0.39 to 0.82)</td>
</tr>
</tbody>
</table>

(Steiner 2004 [M])

Table 3: Likelihood Ratios (LR) for Clusters of Clinical Signs

<table>
<thead>
<tr>
<th>Presence of clinical sign</th>
<th>LR+ to rule-in ≥5% dehydration (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>At least 2 of the 4 following signs:</td>
<td>6.1 (3.8 to 9.8)</td>
</tr>
<tr>
<td>• capillary refill time</td>
<td></td>
</tr>
<tr>
<td>• dry mucous membranes</td>
<td></td>
</tr>
<tr>
<td>• absence of tears</td>
<td></td>
</tr>
<tr>
<td>• abnormal overall appearance</td>
<td></td>
</tr>
<tr>
<td>“Severe” rating from Appendix 2</td>
<td>3.4 (1.5 to 7.7)</td>
</tr>
<tr>
<td>“Mild to Mod” rating from Appendix 2</td>
<td>2.1 (0.9 to 4.8)</td>
</tr>
</tbody>
</table>

(Gorelick 1997 [C])
8. It is recommended,
   • when unable to replace the estimated fluid deficit and keep up with the on-going losses using oral feedings alone, and/or
   • for severely dehydrated children with obtundet mental status,
   that IV fluids or NG ORS be given for a period of 4 to 6 hours or until an adequate degree of rehydration is achieved. It is appropriate to involve the family in the decision regarding the method of fluid replacement (Cohen 1995 [A], Mackenzie 1991 [A], Santosham 1982 [A], Nager 2002 [B], Vesikari 1987 [B], Listernick 1986 [B], Tamer 1985 [C], King 2003 [S,E]).

Oral Feeding Following Rehydration
9. It is recommended that refeeding of the usual diet be started at the earliest opportunity after an adequate degree of rehydration is achieved (Cohen 1995 [A], Fayad 1993 [A], Santosham 1982 [A], Fox 1990 [B], Hjelt 1989 [B], Gazala 1988 [B], Walker-Smith 1997 [S,E]).

   Note 1: Following rehydration therapy in the child with mild to moderate dehydration, regular diets may be supplemented with oral rehydration solutions containing at least 45mEq Na+/L, and targeted to deliver 10ml/kg for each stool or emesis (Cohen 1995 [A]) (see Appendix 4).

   Note 2: It is advisable to reassess hydration status by phone or in the office when a child refuses ORS. Refusal may indicate an absence of salt craving, and, as such, the absence or resolution of dehydration (Local Expert Consensus 2005 [E]).

On-going IV or NG Fluids following Rehydration
10. It is recommended that maintenance IV fluids or NG ORS be given:
   • when unable to replace the estimated fluid deficit and keep up with the on-going losses using oral feedings alone, and/or
   • to severely dehydrated children with obtundet mental status,

Other Therapy
11. It is recommended that anti-diarrheal agents or antiemetics not be used in the routine management of children with AGE (King 2003 [S,E]).

   Note: Ondansetron may decrease vomiting and hospitalization rates in those patients who require IV or NG fluids (Reeves 2002 [A], Ramsook 2002 [B]).

12. It is recommended that antimicrobial therapies be used only for selected children with AGE who present with special risks or evidence of a serious bacterial infection (SBI) (Barbara 2000 [C]) (see Appendix 5).

   Note: Giardia lamblia and Cryptosporidium are common causes of persistent diarrhea and, if found, treatment is available with metronidazole or nitazoxanide (AAP 2003 [O]).

13. It is recommended that probiotics be considered as adjunctive therapy, as they have been shown to reduce the duration of diarrhea (Allen 2004 [M]). Family preference may be central to the decision to use probiotics. Parameters influencing the family’s decision may include cost, degree of potential benefit, availability and unverified effectiveness of commercial products.

   Note 1: A Cochrane meta-analysis of 23 randomized controlled trials found mild therapeutic benefit from probiotics that was generally reproducible regardless of organism, quality of study design, or outcome measure (Allen 2004 [M]). The following organisms/combinations showed benefit in one or more study (in alphabetical order):
   • Enterococcus LAB strain SF68
   • Lactobacillus acidophilus and Lactobacillus bifidus
   • Lactobacillus acidophilus LB strain (killed)
   • Lactobacillus casei strain GG
   • Lactobacillus reuteri

   Note 2: Probiotics may be more effective for rotavirus diarrhea, compared to all-cause diarrhea (Allen 2004 [M]).

   Note 3: The microorganisms used to culture yogurt, Streptococcus thermophilus and Lactobacillus bulgaricus, are not considered probiotics because they do not survive the acidity of the stomach to colonize the intestines. One study of malnourished infants found that yogurt, compared to milk was not effective in reducing the duration of diarrhea (Allen 2004 [M], Bhatnagar 1998 [B]).

Inpatient Management Considerations
14. It is recommended that those patients who are treated in the hospital setting and who are eligible for the AGE guideline be placed as Short Stay patients with a discharge goal of 23 hours or less (Browne 1996 [C], McConnochie 1999 [D]).
15. It is recommended that for children receiving care in a hospital setting, prompt discharge be considered when the following levels of recovery are reached:
   • sufficient rehydration achieved as indicated by weight gain and/or clinical status;
   • IV or NG fluids not required;
   • oral intake equals or exceeds losses;
   • adequate family teaching has occurred; and
   • medical follow up is available via telephone or office visit
   (Local Expert Consensus 2005 [E]).

   Education

16. It is recommended that return to school/daycare be discussed in the context of the following parameters:
   • consideration for controlling disease transmission
     o no vomiting for 24 hours
     o stools are able to be adequately contained
     o assurance that daycare/school adheres to appropriate handwashing policies
   • temperature less than 38.0°C (100.4°F)
   (Local Expert Consensus 2005 [E]).

17. It is recommended that risk factors and preventive activities be discussed with parents, including:
   • continue breastfeeding (Wan 1999 [A], Khin 1985 [C])
   and
   • handwashing.

Health Topics on CCHMC’s website:
   • Gastroenteritis
   • Acute Diarrhea
   • Vomiting

Future Research Agenda

1. In children with AGE, is ondansetron treatment, compared to placebo, cost effective?

2. In children with AGE, what is the ideal dosing protocol for probiotics, compared to placebo, in reducing the duration of symptoms?

3. Among young children attending daycare, is the use of prophylactic probiotics, compared to placebo, effective in reducing incidence of AGE?

---

4. In US children, will a rotavirus immunization program be cost-effective?
Algorithm for evaluation and management for Acute Gastroenteritis (AGE) in children aged 2 months through 5 years

Include: age 2 months through 5 years of age with diarrhea of recent onset

Exclude:
- toxic appearance or ICU required
- diarrhea > 7 days
- immunocompromised / other major disorders
- vomiting with no accompanying diarrhea
- failure to thrive
- chronic metabolic disorders
- hypo/hypernatremic

Start

Guideline eligible?

YES

Clinical assessment for dehydration status, by phone triage or by examination (See Table 2, Table 3 and Appendix 2)

Dehydration Status

NONE

Continue with child’s preferred, usual and age appropriate diet

If vomiting, offer frequent small feedings

Antibiotics (See App. 5)

YES

Risk or evidence of serious bacterial infection? (See App. 5)

NO

- Consider probiotics
- No other medications

Discharge education: discuss
- return to daycare/school
- risk factors
- preventive activities

End

NO

Not guideline eligible. Treat according to patient specific clinical condition.

SOME (mild / moderate)

ORS (See Appendix 4)

If vomiting, offer frequent small feedings

Sufficient oral intake for losses?

NO

- IV fluids or NG ORS
- Discuss choice with family

YES

Consider ondansetron if vomiting

SEVERE

Treat emergently

- IV fluids or NG ORS
- Discuss choice with family

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### Appendix 1 Model of form for phone triage for child with AGE

<table>
<thead>
<tr>
<th>Name:</th>
<th>Phone:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td>Phone:</td>
</tr>
<tr>
<td>Time:</td>
<td>Age:</td>
</tr>
<tr>
<td>Call Taken By:</td>
<td></td>
</tr>
</tbody>
</table>

#### Phone Triage for Acute Gastroenteritis in child 2 mo. to 5 years of age

**Note:** The decision to see a child in the office or the Emergency Department (ED) depends on condition and physician availability. If referred for ED evaluation it is recommended that the family not be given expectations for specific care in the ED until completion of a physical evaluation providing some estimate of the child's state of hydration. Management options can than be decided on and, when possible, following consultation between the ED and the patient's primary care provider, these options can be discussed with the family.

Any single criteria below is a possible indication for physical evaluation of child in office, or emergency department (ED)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Office</th>
<th>ED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No urine observed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Bilious emesis suspect</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3. Bilious emesis &gt;1 time</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4. Bloody emesis suspect</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5. Bloody emesis &gt;1 time</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6. Bloody stools suspect</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7. Bloody stools &gt;1 time</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>8. Lethargy</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>9. Inconsolable</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10. Unarousable</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>11. Unclear history</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>12. Parental preference</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>13. OTHER:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Disposition:**

---

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Appendix 2  Physical parameters associated with degree of dehydration

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Normal to Mild (&lt;6%)</th>
<th>Mild to Moderate (6 to 9%)</th>
<th>Severe (&gt;9%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUCOUS MEMBRANES</td>
<td>Slightly dry</td>
<td>Dry</td>
<td>Dry</td>
</tr>
<tr>
<td>EXTREMITIES</td>
<td>Warm, good refill</td>
<td>Delayed refill</td>
<td>Mottled, poor refill</td>
</tr>
<tr>
<td>TEARS</td>
<td>Normal</td>
<td>Normal to absent</td>
<td>Absent</td>
</tr>
<tr>
<td>MENTAL STATUS</td>
<td>Normal</td>
<td>Normal to listless</td>
<td>Normal to coma</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal/decrease</td>
</tr>
<tr>
<td>Pulse “quality”</td>
<td>Normal</td>
<td>Normal/ decrease</td>
<td>Moderate decrease</td>
</tr>
<tr>
<td>Heart rate</td>
<td>Normal</td>
<td>Increased</td>
<td>Increase or decrease</td>
</tr>
<tr>
<td>Skin turgor</td>
<td>Normal</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Fontanel</td>
<td>Normal</td>
<td>Sunken</td>
<td>Sunken</td>
</tr>
<tr>
<td>Eyes</td>
<td>Normal</td>
<td>Sunken</td>
<td>Deeply sunken</td>
</tr>
<tr>
<td>Urine output</td>
<td>Slight decrease</td>
<td>&lt; 1ml/kg/hr</td>
<td>&lt;&lt; 1ml/kg/hr</td>
</tr>
<tr>
<td>Thirst</td>
<td>Slight increase</td>
<td>Moderate increase</td>
<td>May be unresponsive</td>
</tr>
</tbody>
</table>

1. Acute body weight change
   a) Acute body weight change is considered the gold standard measure of dehydration in a child but is often impractical for the initial assessment due to lack of an accurate pre-illness weight measurement
   b) A weight loss of less than 3 to 5% can be difficult to discern clinically.
   c) Determining weight gain following rehydration is often the only way to assess the degree of actual dehydration that existed at onset of therapies.

2. Clinical diagnosis of dehydration has been shown to be imprecise and thus a general classification of a child’s dehydration status such as none, some (mild/moderate) or severe is suggested by the literature as a useful starting point in the management of the child at risk for dehydration (Steiner 2004 [M], King 2003 [S,E]).

3. Any two of the first four parameters in this table predict dehydration of >5%, with an LR of 6.1 (Gorelick 1997 [C]).

4. As a single sign, delayed capillary refill has the highest predictive value with a LR of 4.1.

5. Absence of specific signs has high predictive value for no dehydration
   - absence of abnormally low urine output: LR = 0.16 (Porter 2003 [C])
     0.27 (Gorelick 1997 [C])
   - absence of dry mucous membranes 0.41 (Steiner 2004 [M])
   - absence of sunken eyes: 0.49 (Steiner 2004 [M])
Appendix 3  Definition of LIKELIHOOD RATIOS (LR)
in the context of evaluating signs and symptoms for the diagnosis of dehydration

A likelihood ratio (LR) is:

the likelihood of the presence of the sign or symptom in the child WITH dehydration, divided by
the likelihood of the presence of the sign or symptom in the child WITHOUT dehydration.

An LR value:
- greater than 10 is very helpful in increasing diagnostic certainty
  the presence of sign or symptom is 10 times more likely to be present in a child with dehydration than in a child without dehydration
- of 1 is not helpful
  the presence of sign or symptom is just as likely to be present in child with dehydration as in a child without dehydration
- less than 0.2 is very helpful in ruling out the condition
  the presence of sign or symptom is one-fifth as likely to be present in a child with dehydration as in a child without dehydration

For more information on LRs see: http://www.cebm.utoronto.ca/glossary/lrs.htm

Probability Worksheet for your own use

1. Based on  (Prior Factors Considered), my estimate of the pre-test probability is  % that this child is dehydrated.

2. The sign or symptom I found, , has an LR of  .

3. Using the nomogram, I calculate that the post-test
   probability is  % that this child is dehydrated.

4. Repeat steps 1 to 3, as desired, for each additional sign or symptom observed (shortcut: multiply LRs before starting).

5. The final post-test probability is  % that this child is dehydrated.

Probability Worksheet EXAMPLE

1. Based on this child's chief complaint for this visit, my uncalculated, but professional estimate of the pre-test probability is 20% that this child is dehydrated. "Pre-test" is defined as: "before I have had a chance to examine the child."

2. The sign or symptom I found, prolonged capillary refill has an LR of 4.1.

3. Using the nomogram, I calculate that the post-test probability is 50% that this child is dehydrated.

4. Repeating steps 1 to 3, for each additional sign or symptom observed (shortcut: multiply LRs before starting), I find abnormal skin turgor (LR = 2.5), and poor overall appearance (LR = 1.9).
   (4.1 X 2.5 X 1.9 = 19.5 = LR for the 3 signs together).

5. With no other significant findings, the final post-test probability is 80% that this child is dehydrated.
Appendix 4 Oral Rehydration Solutions

<table>
<thead>
<tr>
<th>Manufacturer/Brand Name</th>
<th>Product Description</th>
<th>CHO gm</th>
<th>Na+ mEq/liter</th>
<th>K+ mEq/liter</th>
<th>Osmolarity mOsmol/liter</th>
<th>CHO:Na ratio mmol/liter: mmol/liter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generic CVS Kroger/Comfort Walgreen’s</td>
<td>• liquid, in liter or 8 oz sizes (single or 4-pk)</td>
<td>25</td>
<td>45</td>
<td>20</td>
<td>330</td>
<td>1.2 : 1</td>
</tr>
<tr>
<td></td>
<td>• freezer pops, 2.1 oz, 16 per box*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 7 assorted flavors, varies by product</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ross Pedialyte®</td>
<td>• liquid, in liter or 8 oz sizes (4-pk)</td>
<td>22</td>
<td>45</td>
<td>20</td>
<td>270</td>
<td>3.1 : 1</td>
</tr>
<tr>
<td></td>
<td>• freezer pops, 2.1 oz, 16 per box*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 8 assorted flavors, varies by product</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gerber / LiquiLytes®</td>
<td>• powdered mix, 6 oz reconstituted, 6 pkgs</td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td>1.2 : 1</td>
</tr>
<tr>
<td></td>
<td>• liquid, 8 oz, 4-pack</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• fruit punch, apple or unflavored</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ReVital Blue’s Clues®</td>
<td>• liquid, 8 oz, 6-pack (Squeezers)</td>
<td>25</td>
<td>20</td>
<td>30</td>
<td>224</td>
<td>1.4 : 1</td>
</tr>
<tr>
<td></td>
<td>• freezer pops, 2.1 oz, 16 per box*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• gelatin (Jell Cups), 5 oz, 4-pack</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 5 assorted flavors, varies by product</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHO-ORS**</td>
<td>• standard ORS packet</td>
<td>20</td>
<td>90</td>
<td>20</td>
<td>330</td>
<td>1.2 : 1</td>
</tr>
<tr>
<td>WHO-ORS**</td>
<td>• hypo-osmolar ORS packet</td>
<td>15</td>
<td>60</td>
<td>30</td>
<td>224</td>
<td>1.4 : 1</td>
</tr>
</tbody>
</table>

Solutions not appropriate for rehydration***

<table>
<thead>
<tr>
<th></th>
<th>CHO gm</th>
<th>Na+ mEq/liter</th>
<th>K+ mEq/liter</th>
<th>Osmolarity mOsmol/liter</th>
<th>CHO:Na ratio mmol/liter: mmol/liter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cola</td>
<td>126</td>
<td>2</td>
<td>0.1</td>
<td>750</td>
<td>1944 : 1</td>
</tr>
<tr>
<td>Apple juice</td>
<td>125</td>
<td>3</td>
<td>32</td>
<td>730</td>
<td>1278 : 1</td>
</tr>
<tr>
<td>Chicken broth</td>
<td>0</td>
<td>250</td>
<td>8</td>
<td>500</td>
<td>0 : 1</td>
</tr>
<tr>
<td>Gatorade®, sports drink</td>
<td>59</td>
<td>20</td>
<td>3</td>
<td>330</td>
<td>62.5 : 1</td>
</tr>
</tbody>
</table>

*Labeled for children 1 year of age or older.
**WHO = World Health Organization
***Inappropriate and non-physiologic fluids are given for comparison only.

Adapted from (Kleinman 2004 [S]).

1. An effective rehydration solution:
   a. is hypotonic (osmolarity <~310 mOsm/liter),
   b. has enough sodium to replace loss,
   c. adequately replaces potassium and HCO₃ (as bicarbonate or citrate), and
   d. takes advantage of equimolar Na:glucose co-transport which is 1:1 and linear until about a concentration of 100 mmol/liter.

2. For non-cholera diarrhea, glucose:sodium ratios about 3 mmol/liter : 1 mmol/liter are effective in maintaining hydration.

3. In 2004, the World Health Organization (WHO) introduced a hypo-osmolar formulation ORS packet for non-cholera diarrhea. This formulation reduces stool volume, vomiting and need for IV therapy, and has also been shown to be safe and effective for children with cholera (CHOICE Study Group 2001 [A]). The WHO standard formula was originally developed to treat any acute gastroenteritis, including cholera in all age groups. WHO-ORS packets are not readily available in the U.S.

4. ORS products not available at pharmacies in the Cincinnati area may be obtained as noted below:
   a. CeraLyte® 50, CeraLyte® 70 and CeraLyte® 90, manufactured by Cera Products, Inc., are rice-based solutions with osmolarities of <225, 235 and 260 mOsm/liter, respectively. They may be purchased on the internet. All are available in lemon and unflavored powdered formulations; CeraLyte 50 is also available in a powder in berry flavor and a ready-to-drink form in lemon flavor. Cereal based solutions are as effective as, but more expensive than, glucose-based ORS plus early refeeding.
   b. RehydrateLyte®, manufactured by Ross, is a glucose-based solution with an osmolarity of 300 mOsm/liter, and is higher in sodium content. It may be used for rehydration but not for maintenance therapy, except when excessive stool losses of sodium are found. It is available for purchase on the internet.
   c. WHO-ORS (also known as WHO-ORT) packets are available from Jianis Brothers, 2533 Southwest Boulevard Kansas City, MO 64108-2395; (816) 421-2880, with a minimum order of 125 packets. They may be readily available over the counter to travelers in most developing countries.

(Kleinman 2004 [S])
Appendix 5
A decision tool for helping decide when to obtain stool cultures and when a child may benefit from antimicrobial therapies. Consider otherwise obtaining cultures on all children with significant fever.

### Stool Culture and consider empiric cephalosporin

**Grossly Bloody Stools, high fever, foreign travel, or specific pathogen community outbreak**

**Stool Culture**

- YES
- NO

**Supportive Care**

**Treat Specific Pathogen when indicated**

<table>
<thead>
<tr>
<th>Organism (in alphabetical order)</th>
<th>Indications for Antibiotic Use</th>
<th>Preferred Agent</th>
<th>Alternative Agent(s)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeromonas</td>
<td>• persistence of diarrhea</td>
<td>• TMP-SMX</td>
<td>• ciprofloxacin e</td>
<td>• self-limiting condition</td>
</tr>
<tr>
<td></td>
<td>• chloramphenicol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• aminoglycosides</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campylobacter</td>
<td>• persistence of diarrhea</td>
<td>• erythromycin</td>
<td>• tetracycline / doxycycline</td>
<td>• early treatment can shorten duration and prevent relapse</td>
</tr>
<tr>
<td></td>
<td>• azithromycin</td>
<td></td>
<td></td>
<td>self-limiting condition</td>
</tr>
<tr>
<td></td>
<td>• ciprofloxacin e</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clostridum difficile</td>
<td>• persistence of diarrhea after discontinuing antibiotics</td>
<td>• metronidazole</td>
<td></td>
<td>Discourage vancomycin due to promotion of vancomycin resistant organisms (AAP 2003 [O]).</td>
</tr>
<tr>
<td>enterohemorrhagic E. coli (O157:H7)</td>
<td>Antibiotics are contraindicated</td>
<td>None</td>
<td>None</td>
<td>Antibiotics increase likelihood of hemolytic uremic syndrome and are contraindicated (Wong 2000 [C]).</td>
</tr>
<tr>
<td>Salmonella</td>
<td>• bacteremia</td>
<td>• cefotaxime</td>
<td>• ampicillin</td>
<td>treatment plan is based on susceptibility testing</td>
</tr>
<tr>
<td></td>
<td>• invasive disease</td>
<td>• ceftriaxone</td>
<td>• TM P-SMX</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• those with risk factor(s) for invasive disease, including:</td>
<td></td>
<td>• ciprofloxacin e</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; age &lt;3 months</td>
<td></td>
<td>• chloramphenicol</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; functional or anatomical asplenia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; malignancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; AIDS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; chronic gastrointestinal tract disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; hemoglobinopathy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; immunosuppressive therapy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shigella</td>
<td>• disease control</td>
<td>• cefotaxime</td>
<td>• azithromycin</td>
<td>self-limiting condition</td>
</tr>
<tr>
<td></td>
<td>• persistence of diarrhea</td>
<td>• ceftriaxone</td>
<td>• TM P-SMX</td>
<td>treatment is based on local susceptibilities</td>
</tr>
<tr>
<td></td>
<td>• severe disease</td>
<td>• ciprofloxacin e</td>
<td>• ciprofloxacin e</td>
<td>&gt; See below for discussion about CCHMC rates of resistance ³</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• chloramphenicol</td>
<td>&gt; In the U.S., about 50% of these organisms are resistant to ampicillin and TM P-SMX (AAP 2003 [O]).</td>
</tr>
<tr>
<td>Vibrio cholerae (cholera)</td>
<td>• persistence of diarrhea</td>
<td>• tetracycline / doxycycline</td>
<td>• TM P-SMX</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• to decrease fluid requirements</td>
<td></td>
<td>• erythromycin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• disease control</td>
<td>• ciprofloxacin e</td>
<td>• ciprofloxacin e</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td>• immunoincompetent host</td>
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<td>• cefotaxime</td>
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Guideline Development Process

The process by which this guideline was developed is documented in the Guideline Development Process Manual; a Team Binder maintains minutes and other relevant development materials. The recommendations contained in this guideline were formulated by an interdisciplinary working group which performed systematic and critical literature reviews, using the grading scale that follows, and examined current local clinical practices.

To select evidence for critical appraisal by the group for the update of this guideline, the Medline, EmBase and the Cochrane databases were searched for dates of January, 2000 to March, 2003 to generate an unrefined, “combined evidence” database using a search strategy focused on answering clinical questions relevant to AGE and employing a combination of Boolean searching on human-indexed thesaurus terms (MeSH headings using an OVID Medline interface) and “natural language” searching on searching on human-indexed thesaurus terms (MeSH headings using an OVID Medline interface) and “natural language” searching on words in the title, abstract, and indexing terms. The citations were reduced by: eliminating duplicates, review articles, non-English articles, and adult articles. The resulting abstracts were reviewed by a methodologist to eliminate low quality and irrelevant citations. During the course of the guideline development, additional clinical questions were generated and subjected to the search process, and some relevant review articles were identified. December, 1999 was the last date for which literature was reviewed for the previous version of this guideline. The details of that review strategy are not documented. However, all previous citations were reviewed for appropriateness to this revision.

A search using the above criteria was conducted for dates of January, 2004 through May, 2006. Thirty-three relevant articles were selected as potential future citations for the guideline. However, none of these references were determined to require changes to the 2005 version of the recommendations.

Appropriate companion documents have been developed to assist in the effective dissemination and implementation of the guideline. Experience with the implementation of earlier publications of this guideline has provided learnings which have been incorporated into this revision (Perlstein 2002 [D]).

Once the guideline has been in place for three years, the development team reconvenes to explore the continued validity of the guideline. This phase can be initiated at any point that evidence indicates a critical change is needed.

Recommendations have been formulated by a consensus process directed by best evidence, patient and family preference and clinical expertise. During formulation of these recommendations, the team members have remained cognizant of controversies and disagreements over the management of these patients. They have tried to resolve controversial issues by consensus where possible and, when not possible, to offer optional approaches to care in the form of information that includes best supporting evidence of efficacy for alternative choices.

The guidelines have been reviewed and approved by clinical experts not involved in the development process, senior management, Risk Management & Corporate Compliance, other appropriate hospital
committees, and other individuals as appropriate to their intended purposes. The guideline was developed without external funding. All Team Members and Clinical Effectiveness support staff listed have declared whether they have any conflict of interest and none were identified. Copies of this EBCG are available online and may be distributed by any organization for the global purpose of improving child health outcomes. Website address: http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/ev-based/default.htm Examples of approved uses of the EBCG include the following:

- copies may be provided to anyone involved in the organization’s process for developing and implementing evidence-based care guidelines;
- hyperlinks to the CCHMC website may be placed on the organization’s website;
- the EBCG may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
- copies may be provided to patients and the clinicians who manage their care.

Notification of CCHMC at HPCEInfo@cchmc.org for any EBCG adopted, adapted, implemented or hyperlinked by the organization is appreciated.

NOTE: These recommendations result from review of literature and practices current at the time of their formulations. This protocol does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the guidelines to meet the specific and unique requirements of individual patients. Adherence to this pathway is voluntary. The physician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

For more information about these guidelines, their supporting evidences and the guideline development process, contact the Health Policy & Clinical Effectiveness office at: 513-636-2501 or HPCEInfo@cchmc.org.
Evidence-Based Care Guideline for Children with Acute Gastroenteritis (AGE) Guideline 5

References


Evidence-Based Care Guideline for Children with Acute Gastroenteritis (AGE)  
Guideline 5


What is bronchiolitis?
Bronchiolitis is a viral infection of the lungs that usually affects infants. There is swelling in the smaller airways or bronchioles of the lung, which causes coughing and wheezing. Bronchiolitis is the most common reason for children under 1 year old to be admitted to the hospital.

What are the symptoms of bronchiolitis?
The following are the most common symptoms of bronchiolitis. However, each child may experience symptoms differently. Symptoms
may include:

- Common cold symptoms, including:
  - Runny nose.
  - Congestion.
  - Fever.
  - Cough (the cough may become more severe as the condition progresses).
- Changes in breathing patterns (the child may be breathing fast or hard; you may hear wheezing, or a high-pitched sound).
- Decreased appetite (infants may not eat well).
- Irritability.
- Vomiting.

The symptoms of bronchiolitis may resemble other conditions or medical problems. Always consult your child's physician for a diagnosis.

**What causes bronchiolitis?**

The most common cause of bronchiolitis is a virus, most frequently the respiratory syncytial virus (RSV). However, many other viruses have been involved, including:

- Parainfluenza virus.
- Adenovirus.
- Rhinovirus.
- Human metapneumovirus.

Initially, the virus causes an infection in the upper respiratory tract, and then spreads downward into the lower tract. The virus causes inflammation and even death of the cells inside the respiratory tract. This leads to obstruction of airflow in and out of the child's lungs.

**How is bronchiolitis diagnosed?**

Bronchiolitis is usually diagnosed solely on the history and physical examination of the child. Some tests may be ordered to rule out other diseases, such as pneumonia or asthma.

**Treatment for bronchiolitis:**

Because there is no cure for the disease, the goal of treatment is supportive of the symptoms. Antibiotics are ineffective in the
treatment of bronchiolitis. While in the hospital, treatment may include:

- Intravenous (IV) fluids if your child is unable to drink well.
- Oxygen therapy.
- Frequent suctioning of your child's nose and mouth (to help get rid of thick secretions).
- Breathing treatments, as ordered by your child's physician.

When your child's physician feels your child is stable enough to be treated at home, the following treatment is recommended:

- Increased fluid intake.
- Frequent suctioning (with a bulb syringe) of your child's nose and mouth (to help get rid of thick secretions).
- Elevation of the child's head while sleeping.

**What to watch for at home:**

Bronchiolitis can last for up to two weeks and there is no treatment which can shorten the duration of cough. Cough medicines generally do not work or are not safe for children. Your child should get better slowly on his or her own, but there is a small chance of worsening.

If you notice any of these things, seek medical evaluation immediately:

- Signs of dehydration like: dry mouth and cracked lips, urinating less than usual, crying without tears
- Bluish color to lips or nails
- Working too hard to breathe
- Breathing too fast (generally more than 60 breaths per minute is too fast.)
### Guideline Highlights

**Bronchiolitis**

**Focus Population:** Less than 12 months of age presenting for a first time episode of bronchiolitis

**Exclude:** Cystic fibrosis, BPD, immunodeficiencies, ventilator care, ICU need, or other severe comorbid condition

**Goal:** Patient is clinically stable, well oxygenated and hydrated

**General**

1. Bronchiolitis is usually due to RSV and is self-limiting.
2. Otherwise healthy infants with bronchiolitis who are less than 3 months of age or who were born prematurely are at particular risk for hospitalization and significant morbidity.

**Recommendations**

1. Respiratory contact precautions are recommended for hospitalized infants to prevent nosocomial infections.
2. Bronchiolitis is a clinical diagnosis, based on the clinician’s interpretation of findings from the clinical history and physical examination.
3. Routine diagnostic studies are not recommended.
4. Start supplemental oxygen if oximetry spot checks are consistently below 91% at rest on room air.
5. Scheduled or serial albuterol are not recommended for routine use.
6. A single administration trial of albuterol or epinephrine may be considered; repeat or continue only if clinical improvement is documented.
7. Other medications or routine respiratory care therapies are not recommended.
8. Nasal suctioning is important before feeding, before inhalation treatments, and PRN.
9. Monitoring is an important aspect of management, including:
   - frequent clinical assessment for respiratory status and hydration
   - consider cardiac and respiratory rate monitoring in the acutely ill hospitalized infant
   - scheduled spot checks of pulse oximetry (continuous monitoring is associated with increased LOS)
10. Educate the family about nasal suctioning, signs and symptoms of worsening hydration and respiratory conditions, and the expected clinical course.
11. Educate the family about prevention of respiratory infections in infants.

**Discharge Criteria**

1. Respiratory rate usually < 70/min, and no clinical evidence of increased work of breathing.
2. Room air or eligible for stable home oxygen therapy.
3. Taking oral feedings adequately to prevent dehydration.
4. Family understands course of disease, is competent in care (including bulb suctioning), and is able to assess clinical status.
5. Follow-up appointment scheduled.

See complete Evidence Based Guideline for details and supporting evidences. Adherence to guidelines is voluntary. Ultimate judgement regarding priority of any specific procedure must be made by the clinician in light of the specific circumstances presented by the patient.

Original 12/96; Revised 11/01, 11/05
FEVER OF UNCERTAIN SOURCE in infants 60 days of age or less

Original Publication Date: May 15, 1998
Revision Publication Date: June, 2003
New search Sept, 2006 (see Development Process section)

Target Population

Inclusion:
- Infants, 60 days of age or less, presenting as outpatients with a fever of uncertain source.

Exclusion:
- Patients with underlying disorders that affect their immunity or might otherwise increase their risk for serious bacterial or viral infections.
- Child on current antibiotic therapy
- Child given DTaP immunization within 48 hours
- Child presenting with seizures
- Child requiring intensive care management

Target Users

Includes but is not limited to (in alphabetical order):
- Attending inpatient physicians
- Community physicians and practitioners
- Emergency Department physicians
- Patient / family (informational only)
- Patient Care staff
- Residents

Introduction

See Table 1 for definitions used in this guideline.

Fever of uncertain source (FUS) is defined as an acute febrile illness in which the etiology of the fever is not certain after a thorough history and physical examination.

The management of febrile illness in young infants is challenging because of the relatively high prevalence of serious bacterial infection (SBI) in this age group and the clinician’s inability to distinguish it from viral illnesses.

The prevalence of SBI in children in this age group varies between reports because of inconsistencies in the population studied, initial evaluation, selective referral to hospital care by parents and private physicians, and the likelihood of diagnostic testing by the clinician--especially obtaining blood cultures or performing spinal taps and urine cultures. Because the clinical exam alone is unable to reliably predict SBI and culture results are not available immediately, clinicians must often approach management of these infants by relying on a combination of physical examination findings and diagnostic screening tests.

In the target population, the objectives of this guideline are to improve: the use of appropriate laboratory studies; the use of appropriate antibiotic therapy; the efficiency of care; and parental satisfaction and understanding of family-centered care.

Etiology

Systemic viral infections are the most common cause of FUS, followed by bacterial infections of the urinary tract, the upper and lower respiratory tracts, and the middle ear (Long 1997 [S]).

Several studies offer estimates of the prevalence of SBI in infants with FUS. For the infant less than one month of age, prevalence has been reported at rates of 8.8% to 13.7% (Bachur 2001 [D], Kadish 2000 [D], Baker 1999 [D]). For the infant between one and two months of age, prevalence has been reported at rates of 5% to 8.7% (Baker 1993 [A], Bonadio 1991 [C], Bachur 2001 [D]). Cincinnati Children’s Hospital Medical Center (CCHMC) data show a two-year prevalence of 9% for infants less than one month of age, and 8% for the one to two month age group.

Note: Among infants with SBI, the most common bacteria isolated are Escherichia coli (39%), Klebsiella (11%), Group B streptococcus (8%), Enterococcus (6%), Enterobacter cloacae (6%) and Listeria monocytogenes (6%) (Baker 1999 [D]).

There are several important viral pathogens that require consideration.

1. As many as 50% of infants evaluated between the months of August and October for FUS will have documented enteroviral infection (Byington 1999 [C], Robart 1999 [C]).
2. Evidence of HHV-6 infection has been reported in 10% of febrile infants ≤ 90 days of age (Byington 2002 [C]).
3. Neonatal herpes simplex virus (HSV) infection is a rare disease. Incidence is about
Evidence Based Clinical Practice Guideline for Fever of Uncertain Source in infants 60 days of age or less

Guideline 2

30/100,000 live births (Koskiniemi 1989 [D], Sullivan-Bolyai 1986 [D]); only 7% - 14% of these present with FUS (Filippine 2001 [D], Koskiniemi 1989 [D], Sullivan-Bolyai 1986 [D]). Still, it is an important infection to consider because early initiation of therapy improves outcome (Kimberlin 2001 [C], Kimberlin 1996 [C], Whitley 1991 [C]).

Guideline Recommendations

Clinical Assessment

1. It is recommended that rectal temperatures are preferred to axillary or other temperature measures (Center for Reviews and Dissemination Reviewers 2002 [M], Hooker 1993 [C], Reisinger 1979 [C]).

   Note 1: A parental report of fever detected only by touch is likely to be accurate (sensitivity 82-89%, specificity 76-86%) (Graneto 1996 [C], Hooker 1996 [C], Singhi 1990 [C]).

   Note 2: The magnitude of fever may not be useful for predicting illness source or severity (Bonadio 1991 [C], Kluger 1992 [S]).

2. It is recommended and essential that a thorough history and physical examination be performed. In the history and the physical examination it is important to elicit high risk clinical elements. See Table 1 for points of consideration.

Laboratory Studies

1. It is recommended that the following five laboratory tests be performed in all infants with FUS (Klassen 1992 [M], Jaskiewicz 1994 [C], Dagan 1988 [C], Dagan 1985 [C], Kadish 2000 [D], Baraff 1993 [E]).

Table 1: Definitions (Baraff 1993 [E]) unless otherwise specified

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Fever</td>
<td>Rectal temperature ≥ 38° C (100.4° F) (Bonadio 1994 [D])</td>
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<tr>
<td>Fever of uncertain source (FUS)</td>
<td>An acute febrile illness in which the etiology of the fever is not apparent after a thorough history and physical exam</td>
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<tr>
<td>Serious bacterial infection (SBI)</td>
<td>Meningitis, Bone and joint infections, Soft tissue infections (cellulitis), Pneumonia, Urinary tract infections (UTI), Sepsis/bacteremia, Enteritis</td>
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<tr>
<td>Toxic appearance “Yale Observation Scale”*</td>
<td>Lethargy, Poor or absent eye contact, Failure of child to recognize parents or failure to interact with persons or objects in the environment, Poor perfusion of the extremities, Acrocyanosis, Mottling, Slow capillary refill time of &gt; 2 seconds in “warm” environment (Gorelick 1993 [C], Schriger 1988 [C]), Hyperventilation or marked hypoventilation or cyanosis</td>
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<tr>
<td>Low risk for SBI “Rochester Criteria” (see also (Baker 1993 [A], Jaskiewicz 1994 [C], McCarthy 1982 [C]))</td>
<td>Prior history of being healthy, • born at term (≥ 37 weeks gestation), • has not been previously hospitalized, • has no chronic or underlying illness, • was not hospitalized longer than mother, • was not treated for unexplained hyperbilirubinemia, • has not received and was not receiving antimicrobial agents, • no intrapartum history of mother for fever, Group B streptococcus, nor antibiotic treatment, No focal bacterial infection on physical exam, No evidence of purulent otitis media, skin or soft tissue infection, or bone or joint skeletal infection, Negative laboratory screen</td>
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</table>
Evidence Based Clinical Practice Guideline for Fever of Uncertain Source in infants 60 days of age or less

A. **CBC with differential**
   
   **Note 1:** An abnormal CBC is defined as:
   - WBC >15,000/µl or < 5,000/µl;
   - WBC band forms > 1,500/µl
   (Dagan 1988 [C], Dagan 1985 [C], Bonadio 1992 [D]).
   
   **Note 2:** WBC lab values have no predictive value in determining the risk of meningitis (Bonsu 2003 [Q]).
   
   **Note 3:** A band-to-neutrophil ratio < 0.2 improves the negative predictive value for SBI to 98% or greater when added to the screening criteria (Baker 1993 [A]).

B. **Blood culture**

C. **Urinalysis** (Herr 2001 [D])
   
   **Note 1:** Abnormal microscopy defined as spun urine > 10 WBC/hpf.
   
   **Note 2:** Gram stain of sample for organisms is more sensitive (94%), and specific (92%) than simple urinalysis or "dip sticks" as quick indicator of infection (Lockhart 1995 [C]).

D. **Urine culture**
   
   It is recommended that urine samples be collected by catheter, as they are less likely to be contaminated than "clean catch" urine samples (Weinberg 1991 [D]).

E. **Lumbar puncture (LP)**
   
   a. **Exception:** In infants 31-60 days AND with the presence of all of the following, delaying or omitting a lumbar puncture may be considered (Jaskiewicz 1994 [C], Dagan 1988 [C], Local Expert Consensus [E]):
      - low risk as identified with strict screening criteria utilizing both clinical assessment and diagnostic testing (see Table 1);
      - available reliable follow-up in 12-24 hours;
      - healthcare provider(s) confident that parent will use appropriate observational and follow-up skills;
      - primary care physician (PCP) and family agree with plan of care;
      - antibiotic therapy will not be initiated.
   
   b. **Enterovirus (summer and fall).** At present, test results are available within 24 hours.

2. It is recommended that the following also be considered:
   - Stool culture (if child has diarrhea)
   - Viral cultures in selected patients and as appropriate to season
   - Chest x-ray (if respiratory signs)

3. A. For infants 0-30 days with FUS, it is recommended that a laboratory evaluation for neonatal HSV infections be considered:
   - if risk factor(s) are present (see Appendix), or
   - if the patient is not improving on antibiotic therapy (Local Expert Consensus [E]).
   
   The following laboratory tests are recommended if an evaluation for neonatal HSV infection is performed.
   - Blood viral culture
   - CSF viral culture
   - CSF PCR
   - Conjunctiva viral culture
   - Skin lesion viral culture
   - Nasopharyngeal (NP) viral culture
   - Rectal viral culture
   - Also consider
     - chest x-ray
     - liver function studies

B. For infants 31-60 days with FUS, it is recommended that laboratory evaluation for neonatal HSV infections be reserved primarily for those with clinical findings suggestive of an HSV infection or a prior history of HSV.
   
   **Note:** In the infant beyond one month of age there is a considerably reduced risk for neonatal HSV infection; 95% - 98% present prior to 22 days of age (Koskiniemi 1989 [D], Sullivan-Bolyai 1986 [D]).
   
   See Appendix for information which may help when deciding on the appropriateness of evaluating for and treating neonatal HSV infections.

4. It is recommended that the following laboratory tests be considered selectively in non-low-risk infants:
   - PCR. A positive PCR does not rule out SBI. Consider applicable specificity, sensitivity and turnaround time for specific PCR at the time of testing (Local Expert Consensus [E]).
     a. Enterovirus (summer and fall). At present, test results are available within 24 hours.
Note 1: CSF and blood sources for PCR are the most sensitive for diagnosis of EV infection (Byington 1999 [C], Rotbart 1999 [C]).

Note 2: PCR is more sensitive than viral culture in detecting enterovirus (Rotbart 1999 [C]).

2. Recommendations for treatment of infants 31-60 with FUS vary depending on laboratory and clinical findings.
   a. It is recommended that the first line treatment for this group is intravenous 3rd generation cephalosporin alone (Byington 2003 [D], Sadow 1999 [D]).
   b. It is recommended that intravenous ampicillin be considered as an addition to the antibiotic regimen for febrile infants 31-60 days in severely ill infants or with findings suggestive of urinary tract infection (UTI) to assure coverage for rare organisms such as *Listeria monocytogenes*, gram-positive cocci or *enterococcus* (Brown 2002 [M], Byington 2003 [D], Sadow 1999 [D]).

Note 1: About 527 infants 31-60 with FUS need to be treated with ampicillin to prevent one case of *L. monocytogenes* or enterococcal infection (number needed to treat [NNT] = 527) (Brown 2002 [M]).

Admission Criteria

1. It is recommended that all infants 0-30 days of age with FUS be hospitalized (Kadish 2000 [D]).
   Note: 3.2% - 3.5% of febrile infants 0-30 days identified as low-risk [by the Philadelphia or Boston protocols] will have SBI (Kadish 2000 [D]).

2. It is recommended that any infant 31-60 days of age with FUS identified as high-risk clinically or by laboratory data be hospitalized (Baraff 1993 [E]).

3. It is recommended that low-risk infants 31-60 days may be managed as outpatients or inpatients (Baker 1993 [A], Baker 1999 [C], Baskin 1992 [C], Dagan 1988 [C], Wasserman 1990 [D]). This decision must take into consideration:
   - the needs of the family
   - the judgment of the primary care physician
   - excellent outpatient follow-up
   - excellent communication with care provider as an outpatient assured.

   Note: Low-risk infants may be identified using strict screening criteria utilizing both clinical assessment and diagnostic testing. Use of these criteria has 98.9-100% negative predictive value for SBI (Baker 1993 [A], Jaskiewicz 1994 [C], Herr 2001 [D]).

Medications

Antibiotics

1. It is recommended that all infants 0-30 days with FUS be treated with intravenous ampicillin plus a 3rd generation cephalosporin or gentamicin.

   Note 1: About 138 such infants need to be treated with ampicillin to prevent one case of *L. monocytogenes* or enterococcal infection (number needed to treat [NNT] = 138) (Brown 2002 [M]).

   Note 2: In blood cultures of infants 0-6 months, mean time to positivity for true pathogens is about 17.5 hours and for contaminants is about 27.9 hours (McGowan 2000 [C]). Median time to positivity for urine and CSF cultures are 16 and 18 hours, respectively, in febrile infants 28-90 days (Kaplan 2000 [D]).
Table 2 Antimicrobial doses for febrile infants age 0- 60 days

<table>
<thead>
<tr>
<th>Antimicrobial</th>
<th>Dose</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Inpatient antibiotics for presumed SBI</td>
<td></td>
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<tr>
<td>Ampicillin sodium</td>
<td>50 mg/kg IV every 6 hours, non-CNS or meningitis 50 mg/kg IV every 12 hours for &lt; 7 days of age</td>
<td>See (Brown 2002 [M]).</td>
</tr>
<tr>
<td>Cefotaxime (Claforan)</td>
<td>50 mg/kg IV every 8 hours for bacteremia. 50 mg/kg IV every 6 hours for meningitis Note: every 12 hours for &lt; 7 days of age</td>
<td></td>
</tr>
<tr>
<td>Ceftriaxone (Rocephin)</td>
<td>50 mg/kg IV or IM every 24 hours for bacteremia. 100 mg/kg IV or IM every 24 hours for meningitis. Use with caution if infant is jaundiced.</td>
<td></td>
</tr>
<tr>
<td>Gentamicin</td>
<td>0-30 days: 3 mg/kg IV every 24 hours. 31-60 days: 2.5 mg/kg IV every 12 hours.</td>
<td></td>
</tr>
<tr>
<td>Nafcillin</td>
<td>25 – 50 mg/kg IV every 6 hours. Use instead of ampicillin if staphylococcal infection suspected.</td>
<td></td>
</tr>
<tr>
<td>Outpatient antibiotic for presumed SBI (same as above if home IV therapy preferred)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceftriaxone (Rocephin)</td>
<td>50 mg/kg IM or IV every 24 hours</td>
<td>See (Baskin 1992 [C]).</td>
</tr>
</tbody>
</table>

Antiviral

1. It is recommended that acyclovir not be added routinely to standard antimicrobial therapy for infants with FUS. Benefit is moderated by the rarity of neonatal HSV infection, especially with an FUS presentation, and drug therapy is not without risk (Local Expert Consensus [E]).

2. Acyclovir is recommended when the decision is made to initiate therapy for the treatment of possible neonatal HSV infection. Appropriate diagnostic specimens must be collected before therapy is initiated (Kimberlin 2001 [C]). See Table 2 for summary of recommended dose.

Nutrition

1. Diet for age as tolerated.

2. Supplemental hydration as required. This is especially recommended for < 1 week old breast-feeding infant with decreased urine output if on drugs (e.g. acyclovir) which are dependent on good renal function for excretion.

Infection Control

Follow infection control precautions (droplet, contact or standard) as appropriate to presumptive diagnosis.

Consults and Referrals

Consider consult with Infectious Diseases if:

1. diagnosis or clinical course of infection is unusual,
2. there are questions regarding continuation or discontinuation of acyclovir in situations where neither the cultures nor the PCR are positive for HSV, or
3. HSV culture or HSV PCR results are positive.

Education

Family education and review is recommended on the following topics.

A. fever:
   - observing signs, including taking an accurate temperature measurement
   - causes
   - therapies

B. indications to call their physician

C. anticipated course of the illness (O'Neill-Murphy 2001 [O])
DISCHARGE CRITERIA
(NOTE: Begin discharge planning on admission)

1. Well-appearing.
2. Eating well.
3. Antimicrobial therapies complete or can be continued in the home environment.
4. Culture results negative when checked after a true minimum incubation period of 36 hours (which begins when the inoculated culture is placed in the incubator).
5. Hospitalized infant observed without antibacterial treatment is well-appearing at 24 hours.
6. Family:
   - has participated in the discharge planning and decision processes
   - understands and agrees to any prescribed therapies or follow-up needs
   - confident in ability to care for infant at home.
7. Home environment considered appropriate for continuing care prescriptions.
8. Follow-up physician:
   - identified
   - has participated in generating the discharge plan
   - agrees with the discharge plan.
Appendix

**Indicators for Possible Neonatal HSV Infection in FUS Infants** *(Kimberlin 2001 [D], Fleming 1997 [O])*

**Highest Risk Factor**
- Primary maternal HSV infection at delivery
  - **Note:** 64% of mothers who acquire HSV during pregnancy are asymptomatic *(Brown 1997 [C])*

**Lower Risk Factors**
The following additional indicators are documented risk factors for neonatal HSV infection in FUS infants. However, there are insufficient data to be able to quantify their individual or collective contribution to risk.
- Known exposure to HSV infected persons
  - e.g. caregiver with oral herpes simplex or maternal history of recurrent genital herpes
- Less than 37 weeks gestation
- Fetal scalp electrodes
- Maternal history of STDs or unexplained fever at delivery
- CSF pleocytosis with a negative gram stain and negative bacterial cultures
- Failure of fever to abate within 24 – 48 hours after starting antibiotics
- Unexplained CNS signs
- Bacterial cultures negative

**Presentation of Infants with Neonatal HSV Infection**
- 7% - 14% present with FUS *(Filippine 2001 [D], Koskiniemi 1989 [D], Sullivan-Bolyai 1986 [D])*
- 61% present with no fever *(Kimberlin 2001 [D])*
- 95% - 98% present prior to 22 days of age *(Koskiniemi 1989 [D], Sullivan-Bolyai 1986 [D])*
- 68% present with a vesicular rash on either the skin or mucous membranes *(Kimberlin 2001 [D])*
- 27% present with seizures *(Kimberlin 2001 [D])*
- Incidence of neonatal HSV infection is about 30/100,000 live births *(Koskiniemi 1989 [D], Sullivan-Bolyai 1986 [D])*

**CCHMC Experience with Infants with Neonatal HSV Infection**
- Nine cases of neonatal HSV infections were admitted to CCHMC over a 2 year period (2001 – 2002).
  - One of these nine infants presented as an FUS.
- Only about 4-5 infants age 30 days or less each year are admitted to CCHMC and documented to have neonatal HSV infections without evidence of underlying immunocompromise (derived from 1983-2003 CCHMC patient database).
  - Over this 20 year period, all of the infants admitted to CCHMC with neonatal HSV infections were 31 days of age or younger.
- This experience in Cincinnati is consistent with the reported experiences in the literature *(Filippine 2001 [D], Kimberlin 2001 [D], Koskiniemi 1989 [D], Sullivan-Bolyai 1986 [D]).*
** Algorithm for managing Fever of Uncertain Source, age 0-60 days **

** Start Clinical Assessment **

- Factitious or not true fever? 
  - YES: No workup required
  - NO: Is there a focal infection?
    - YES: Not eligible for FUS protocol
      - Evaluate and treat as appropriate to site and severity.
    - NO: Toxic** or other high risk clinical factors**?
      - YES: 1. CBC w/ diff, Bld Cx, UA & Cx, LP
        2. IV Antibiotics**
        3. Admit
        4. Consider HSV assessment in infants ≤ 30 days.
      - NO: ≤ 30 days?
        - YES: 1. CBC w/ diff, Bld Cx, UA & Cx, LP
          2. IV Antibiotics**
          3. Admit
        - NO: Available reliable follow-up in 12-24 hrs?
          - YES: Positive labs??
            - YES: 1. Available reliable follow-up in 12-24 hrs?
              2. Adequate parental education?
              3. Outpatient plan OK with PCP and family?
            - NO: Admit
              - May consider observation without antibiotics
              Or
              - LP, if not performed, and give IV antibiotics**
          - NO: LP, if not performed

** Discharge home **
Follow-up 12-24 hr, or sooner if any concerns.
- If meets low risk criteria**, strongly consider discharge without antibiotics unless there are PCP concerns.
- Or
- LP, if not previously performed, and give parenteral antibiotics** prior to discharge.

** See definitions next page **
**SBI Risk Assessment Algorithm and **Definitions** for Algorithm (previous page)**

**Antibiotic Therapy:**

- **0-30 days:** ampicillin 50 mg/kg AND 3rd gen. cephalosporin 50 mg/kg  
  or gentamicin 3 mg/kg

- **31-60 days:** 3rd gen. cephalosporin 50 mg/kg

**See guideline for treatment recommendations for:**

- infants 31-60 days who:
  - are severely ill
  - have findings suggestive of UTI
  - are low-risk

**START**

**Toxic?**
- Lethargy
- Poor perfusion
- Hypo/hyperventilation
- Cyanosis

---

**High Risk Factors?**
**Clinical**
- 1. History of prematurity
- 2. Perinatal antibiotics
- 3. Treated for unexplained jaundice
- 4. History of previous rehospitalization
- 5. Chronic illness
- 6. Not discharged with mother
- 7. Intrapartum history of mother for fever, Group B streptococcus, or antibiotic treatment

**Positive labs**
- 1. WBC < 5,000/µl or > 15,000/µl
- 2. Bands > 1,500/µl
- 3. Urine > 10 WBC/hpf
- 4. CSF abnormal, if obtained

Note: Normal lab values for blood and UA

---

**SBI Risk for a Toxic Infant**
- 17.3% (8-30%)
  
  (Baraff 1993 [E])

---

**SBI Risk for a High Risk Infant**
- 8.6% (3.7-15.6%)
  
  (Baraff 1993 [E])

---

**SBI Risk for a Low Risk Infant**
- 1.4% (0.4-2.7%)
  
  (Baraff 1993 [E])

---

**NO**
Fever 0 to 60 days Team Members 2003

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* Member of 1997-1998 Development Team or Ad Hoc Advisor

Development Process

The process by which this guideline was developed is documented in the Guideline Development Process Manual; a Team Binder maintains minutes and other relevant development materials. The recommendations contained in this guideline were formulated by an interdisciplinary working group which performed systematic and critical literature reviews, using the grading scale that follows, and examined current local clinical practices.

<table>
<thead>
<tr>
<th>CCHMC Evidence Grading Scale</th>
<th>M</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta-analysis or Systematic Review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Randomized controlled trial: large sample</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>B Randomized controlled trial: small sample</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>C Prospective trial or large case series</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td>D Retrospective analysis</td>
<td>Q</td>
<td></td>
</tr>
<tr>
<td>S Review article</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

To select evidence for critical appraisal by the group for the update of this guideline, the Medline, Embase and the Cochrane databases were searched for dates of January, 1998 to December, 2002 to generate an unrefined, “combined evidence” database using a search strategy focused on answering clinical questions relevant to fever of uncertain source in infants age 0 to 60 days and employing a combination of Boolean searching on human-indexed thesaurus terms (MeSH headings using an OVID Medline interface) and “natural language” searching on searching on human-indexed thesaurus terms (MeSH headings using an OVID Medline interface) and “natural language” searching on words in the title, abstract, and indexing terms. The citations were reduced by: eliminating duplicates, review articles, non-English articles, and adult articles. The resulting abstracts were reviewed by a methodologist to eliminate low quality and irrelevant citations. During the course of the guideline development, additional clinical questions were generated and subjected to the search process, and some relevant review articles were identified. December, 1997 was the last date for which literature was reviewed for the previous version of this guideline. The details of that review strategy are not documented. However, all previous citations were reviewed for appropriateness to this revision.

A search using the above criteria was conducted for dates of January, 2002 through September, 2006. Twelve relevant articles were selected as potential future citations for the guideline. However, none of these references were determined to require changes to the 2003 version of the recommendations.

Appropriate companion documents have been developed to assist in the effective dissemination and implementation of the guideline. Experience with the implementation of earlier publications of this guideline has provided learnings which have been incorporated into this revision.

Once the guideline has been in place for three years, the development team reconvenes to explore the continued validity of the guideline. This phase can be initiated at any point that evidence indicates a critical change is needed.
During formulation of these guidelines, the team members have remained cognizant of controversies and disagreements over the management of these patients. They have tried to resolve controversial issues by consensus where possible and, when not possible, to offer optional approaches to care in the form of information that includes best supporting evidence of efficacy for alternative choices.

The guidelines have been reviewed by clinical experts not involved in the development process, senior management, and other individuals as appropriate to their intended purposes.

The guideline was developed without external funding. All Team Members and Clinical Effectiveness support staff listed have declared whether they have any conflict of interest.

Copies of this Evidence-based Care Guideline (EBCG) and its companion documents are available online and may be distributed by any organization for the global purpose of improving child health outcomes. Website address: http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/ev-based/default.htm Examples of approved uses of the EBCG include the following:

- copies may be provided to anyone involved in the organization’s process for developing and implementing evidence based care guidelines;
- hyperlinks to the CCHMC website may be placed on the organization’s website;
- the EBCG may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
- copies may be provided to patients and the clinicians who manage their care.

Notification of CCHMC at HPCEInfo@cchmc.org for any EBCG, or its companion documents, adopted, adapted, implemented or hyperlinked by the organization is appreciated.

NOTE: These recommendations result from review of literature and practices current at the time of their formulations. This guideline does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this guideline is voluntary. The physician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

For more information about these guidelines, their supporting evidences and the guideline development process, contact the Health Policy & Clinical Effectiveness office at: 513-636-2501 or HPCEInfo@cchmc.org.
REFERENCES


35. Local Expert Consensus, [E].


Guideline Highlights

Community Acquired Pneumonia (CAP)

Include:
Children aged 60 days through 17 years with pneumonia acquired in the community.

Exclude:
- Clinically “toxic” or requiring intensive care management
- Persistence of a neonatal cardiac or pulmonary disorder
- Recent hospitalization with exposure to nosocomial flora
- A likely aspiration of a foreign body or stomach contents
- Congenital, acquired, or drug induced immunocompromise
- Chronic conditions such as cystic fibrosis that uniquely alter care options

General

Key issues in the management of CAP include:
- the ability to make a clinical diagnosis, and
- the increased prevalence of strains of S. pneumoniae which are resistant to penicillin.

Guideline Recommendations

ASSSESSMENT
1. Perform clinical assessment of respiratory illness and its severity:
   - historical items may help determine etiology (age, season, community prevalence, vaccination status);
   - especially consider tachypnea, fever, \( \text{O}_2 \) sat, nasal flaring, abnormal breath sounds and increased work of breathing.
2. Be aware that:
   - a small proportion of patients < 5 years of age may present without classical findings, and
   - acutely ill and febrile children may present as pain referred to the abdomen or as fever without a source.
3. Chest X-rays:
   - conduct when clinical findings are ambiguous, complication is suspected, or pneumonia is prolonged and unresponsive to antimicrobial therapy
   - consider in children < 5 years of age with high fever and high WBC of uncertain source
4. Laboratory studies:
   - consider WBC and differential only if the results will help decide whether to use antibiotic therapy
   - conduct:
     - PPD if history of exposure
     - sputum gram stain and culture in more severe disease
     - pleural culture if managing an effusion
   - other routine laboratory studies are not recommended: blood culture, CRP, ESR, other measures of acute phase reactants, cultures or serologic testing for specific pathogens, rapid viral studies
5. When the historical, physical, radiological or laboratory findings are inconsistent, consider additional studies or re-evaluation for alternative or coincidental conditions (e.g. foreign body aspiration or immunodeficiency).

MANAGEMENT
6. 1st line therapy:
   - age < 5 years: high dose amoxicillin to cover for S. pneumoniae
   - age \( \geq 5 \) years: macrolide to cover for C. pneumoniae and M. pneumoniae, as well as S. pneumoniae.
7. In more severe disease, use a combination of a macrolide and a \( \beta \)-lactam agent to cover for resistant organisms and mixed infections.
8. Avoid therapies directed toward airway clearance (e.g. CPT, postural drainage).
9. Follow up within 24 to 48 hours.
10. Consult with a specialist in:
    - pediatric infectious diseases when considering the need for alternative antibiotics due to allergies, comorbid conditions or antibiotic failure;
    - pediatric pulmonary disease if uncertain about the management of an effusion.
11. Prevention and Education:
    - Assure immunizations are up-to-date, including: Prevnar®, and annual flu (as appropriate).
    - Educate family to preventive behaviors and to risk factors, including handwashing, breastfeeding, and exposure to other children.

See complete Evidence-Based Care Guideline for details and supporting evidence. Adherence to recommendations is voluntary. Ultimate judgment regarding priority of any specific procedure must be made by the physician in light of the individual circumstances presented by the patient.

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Guideline Highlights

Urinary Tract Infection (UTI)

Include: Twelve years of age or less with a first time presumed or definite episode of UTI

Exclude: Known immunodeficiencies, major genitourinary anomalies, sepsis with shock or meningitis, ICU need, ventilator care, and severe comorbid conditions

Goal: To help practitioners promptly diagnose UTI and to initiate appropriate treatment and follow-up evaluation to decrease risk of short and long-term outcomes

Recommendations

1. A dipstick/urinalysis and urine culture on a specimen collected by age appropriate method (SPA, catheterization, midstream clean catch) is recommended for all children presenting with clinical findings consistent with UTI.

2. If dipstick/urinalysis results are abnormal, empirical antibiotic therapy for presumed UTI is recommended.

3. Admit if: under 30 days of age, IV fluids or IV antibiotic therapy are required, high risk clinically or by laboratory data, or clinician or family is uncomfortable managing in an outpatient setting.

4. Reliable urine cultures results are the following:
   - SPA > 1,000 cfu/mL
   - Catheterized specimen > 10,000 cfu/mL
   - High quality midstream clean catch specimen > 100,000 cfu/mL.

5. If urine culture is positive, antibiotic therapy for 7-14 days is recommended, followed by prophylactic antibiotics until results of imaging studies are available.

6. Assess clinical response and C&S results within 48-72 hours and adjust antibiotic or other care, if appropriate.

7. Imaging recommendation for all boys, girls < 36 mo, and febrile girls < 7yrs: US and cystogram (VCUG for boys and either RNC or VCUG for girls).

8. Imaging recommendation for afebrile girls > 3 yrs and all girls > 7 yrs: consider observation without imaging for first time UTI. If UTI recurs, US and cystogram recommended.

9. Renal cortical scan recommended only if identification of acute pyelonephritis or renal scarring will change management.

10. After first UTI, recommend families and clinicians maintain a high index of suspicion for recurrent UTI, and to obtain a dipstick/urinalysis and/or culture for age-appropriate symptoms of UTI, including unexplained fever.
What is asthma?

Asthma is a lung disease that lasts a long time (chronic illness). It cannot be cured, but it can be controlled.

- Airways (breathing tubes) are inflamed, and airway linings are irritated.
- Airways are sensitive. They may react to many things, such as; infections, cigarette smoke, pollen, weather change, chemicals, or cold air. When airways react, this causes cough, wheeze, chest tightness, and difficult breathing. We call this an asthma episode.
- During asthma episodes, airways can get smaller, making breathing difficult.

How will having asthma change my life?

- Most people with asthma can lead normal lives once they know how to manage their asthma.
- The more you know about asthma, the easier it is to avoid problems (like asthma episodes that need medical care and cause missed school).
- Good asthma management requires close cooperation with your doctors and nurses.

How do I know if I have asthma?

Breathing difficulty or cough with:

- infections, colds
- exercise
- nighttime (12 midnight to 6 AM)
- changes in weather
- exposure to triggers (allergies, smoke, chemicals, etc.)
- may get better quickly after taking quick-relief medicine

Other members of your family may have asthma, allergies (hayfever, etc.) or eczema (dry, itchy skin rash).

How can the Santa Rosa Asthma Program help me?

- We can determine if you really have asthma or some other problem.
- Together, we can design a treatment program that will allow you to control your asthma.
- We can help you learn about asthma and how to take care of it on your own. Knowing when to expect an asthma episode and how to treat it are some of the important skills to learn.
- We can be available to you when you are having trouble with your asthma and are unsure of what to do.
What are warning signs and symptoms? Most people with asthma have different warning signs before serious breathing problems occur. Asthma signs and symptoms are things that you can hear (like cough) or see (trouble breathing) or feel (chest tightness). You may have different signs at different times. Here are some of the common warning signs:

Common warning signs:
- cough
- shortness of breath
- wheezing
- chest tightness
- chest pain
- Other ____________________________

When do you notice these signs and symptoms?:
- After exposures to things in the air (strong chemicals, pollution or smoke)
- With colds or “flu” or allergies
- With weather changes
- With exercise
- At night

Illustrations from the Asthma and Allergy Foundation of America, “You Can Control Asthma” developed at Georgetown University, Washington, D.C., 1994.
**MEDICATIONS: PREVENTION**

**What are asthma medicines?**
There are 2 kinds of asthma medicines— **prevention and quick-relief.**

**Prevention (Everyday) Medicines:**

<table>
<thead>
<tr>
<th><strong>☐ Flovent</strong></th>
<th><strong>☐ Pulmicort</strong></th>
<th><strong>☐ QVAR</strong></th>
<th><strong>☐ Asmanex</strong></th>
<th>**☐ **</th>
<th>**☐ **</th>
</tr>
</thead>
</table>

**Inhaled steroids:** Use this medicine every day to **prevent and control** swelling and mucus in the airways. Most patients increase this medicine during worsening of asthma symptoms (coughing, wheezing, and shortness of breath). You will not feel it working. Inhaled steroids may cause a yeast infection in the mouth called thrush, so rinse your mouth after taking this medicine.

<table>
<thead>
<tr>
<th><strong>☐ Advair</strong></th>
<th><strong>☐ Symbicort</strong></th>
<th>**☐ **</th>
</tr>
</thead>
</table>

**Combination inhaled steroid and long-acting bronchodilator:** Use this medicine daily to **prevent and control** swelling, mucus and tight muscles in the airways. Inhaled steroids may cause a yeast infection in the mouth called thrush, so rinse your mouth after taking this medicine.

<table>
<thead>
<tr>
<th><strong>☐ Singulair</strong></th>
<th><strong>☐ Accolate</strong></th>
<th><strong>☐ Zyflo</strong></th>
</tr>
</thead>
</table>

Other prevention medicines are pills or tablets called “leukotriene modifiers”. Rarely patients may have headaches from taking this medicine. These medicines may also help allergy symptoms.

---

**Normal airway**
- Muscle relaxed
- Lining normal
- Normal mucus

**Airway with asthma**
- Muscle tightened
- Lining inflamed and swollen
- Lots of mucus
**MEDICATIONS: Quick-relief**

### Short acting quick-relief medicines:

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuterol</td>
<td>Quick relief medicines or bronchodilators relieve asthma symptoms quickly by <strong>relaxing the muscles</strong> around the airways. They begin to work fast (within minutes) but only last up to 4-8 hours. They can also be used before vigorous exercise. Side effects of this medicine include fast heart beat, feeling shaky, feeling anxious or nausea.</td>
</tr>
<tr>
<td>Ventolin</td>
<td></td>
</tr>
<tr>
<td>Proventil</td>
<td></td>
</tr>
<tr>
<td>Xopenex</td>
<td></td>
</tr>
<tr>
<td>Proair</td>
<td></td>
</tr>
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<td>__________</td>
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</tr>
</tbody>
</table>

### Oral Steroid medicines:

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prednisone</td>
<td>These medicines can be taken by liquid or tablet to treat severe asthma episodes or to prevent the episode from happening. These medicines may increase your appetite or cause mood changes. If this happens, contact your asthma doctor before stopping them.</td>
</tr>
<tr>
<td>Prelone</td>
<td></td>
</tr>
<tr>
<td>Prednisolone</td>
<td></td>
</tr>
<tr>
<td>Orapred</td>
<td></td>
</tr>
</tbody>
</table>

**Normal Airway**
- Muscle relaxed
- Lining normal
- Normal mucus

**Airway with asthma**
- Muscle tightened
- Lining inflamed and swollen
- Lots of mucus
- Lots of mucus
MEDICATIONS: HOLDING CHAMBERS

☐ **What is a spacer?** A spacer or holding chamber is a device that helps get more of the inhaled medicine to your lungs and helps prevent thrush.

☐ **How do I use my inhaler?** The inhalers work more quickly, have fewer side effects, and are as effective as using a nebulizer. A **spacer should always be used with the inhalers**. All inhalers need to be “primed” (spray a few number of puffs into the air) before using if it has not been used in a while. Shake the inhaler before each puff.

☐ **How long will my inhaler will last?** You will notice when the canister is completely empty, you will no longer see the “puff” come out. An example to figure out how long the inhaler will last is: if there are 120 puffs in your inhaler and you take 2 puffs, 2 times a day your inhaler will last for 30 days. (4 puffs a day x 30 days = 120)

☐ **Your canisters will have _____ puffs**

☐ **How do I clean my inhaler?** Never put the inhaler’s metal canister in water. The tiny hole inside the mouthpiece where the medicine comes out needs to be kept cleaned. This will make sure you are getting the right amount of medicine each time. Read the cleaning instructions; each inhaler is to be cleaned differently.
ACTION PLAN

Asthma Action Plan

- At any time you have a problem, contact your doctor.

- **Early Warning Signs (yellow zone):** Follow your Asthma Action Plan to prevent further worsening of asthma symptoms.
  
  *Asthma episodes usually start with early warning signs like coughing, wheezing or shortness of breath with colds, exercise, weather changes or at night.*

- **Late Warning Signs (red zone):** Follow your Action Plan and contact your doctor right away.
  
  *Chest and neck are pulled in or sucked in (retractions) with each breath.*
  *Hunching over.*
  *Struggling to breathe.*
  *Breathing is so difficult that it affects walking or talking.*
  *Peak flow number goes down or does not improve after taking quick relief medicines, or drops to 50% or less of your personal best (red zone).*

- **For severe breathing difficulty, GO TO THE EMERGENCY ROOM RIGHT AWAY!**

Illustrations from the Asthma and Allergy Foundation of America, “You Can Control Asthma” developed at Georgetown University, Washington, D.C., 1994.
People with asthma may have worsening with exposure to some things and in response to the following situations:

- **Smoke and fumes** (tobacco, candles, cooking, incense)
  - ![Cigarette](image1.png)
  - ![Incense](image2.png)

- **Chemicals and scented products** (Cleaning products, pesticides, hairspray, cosmetics, paint)
  - ![Cleaning Product](image3.png)
  - ![Pesticide](image4.png)

- **Air pollution and automobile/truck exhaust fumes**
  - ![Truck](image5.png)
  - ![Pollution](image6.png)

- **Infections in the nose or throat** (colds are a common trigger for both children and adults)
  - ![Cough](image7.png)
  - ![Cold](image8.png)

- **Weather change** (cold fronts, rain)
  - ![Storm](image9.png)

- **Cockroaches, dust mites**
  - ![Cockroach](image10.png)

- **Dander (or flakes) from skin, hair or feathers of pets** (cats, dogs, birds, and small rodents)
  - ![Cat](image11.png)
  - ![Dog](image12.png)
  - ![Bird](image13.png)
  - ![Mice](image14.png)

- **Pollens from grasses, weeds, and trees**
  - ![Grass Pollen](image15.png)
  - ![Tree Pollen](image16.png)

- **Molds** (indoor and outdoor)
  - ![Mold](image17.png)

- **Strong emotions** (laughing or crying) and exercise
  - ![Crying](image18.png)
  - ![Exercise](image19.png)
Colds and Infections
- Wash hands often and before meals.
- Eat healthy foods and get plenty of rest.
- Stay away from people who are sick
- If you get a cold or flu: stay in bed, drink plenty of fluids

Weather
- Watch the news for weather and pollution warnings that trigger your asthma.
- Dress warmly in the winter.
- Cover your nose and mouth with a scarf when outside in cold weather

Exercise
- Warm up before doing exercises and cool down afterwards.
- If you have an asthma episode with exercise, try to relax, do controlled breathing and use your rescue inhaler if needed.
- If you still wheeze, chest gets tight, or cough, tell your coach, parent, or asthma doctor.
- Avoid outdoor exercise on air quality alert days
- Stay in shape: exercise daily
**Smoke**
- Do not smoke.
- Do not allow smoking in the house or in the car.
- Stay away from restaurants with smoking allowed

**Chemicals**
- Do not burn scented candles or incense in the house.
- Avoid strong perfumes and hair spray.
- Do not use room deodorizers, “plug-ins”, disinfectant sprays carpet powders.
- Use mild house cleaning products, if possible.

**Indoor Pollution**
- Do not use unvented gas space heaters
- Do not use your gas stove to heat your home
- Avoid smoke from fireplaces and wood burning stoves
- Reduce strong cooking odors (especially frying) by using a fan and opening windows or use a stove vent when cooking
- Avoid use of strong cleaning products. After cleaning increase ventilation in the home: open windows, turn on exhaust vents
- Avoid using spray pesticides
- Allow new furniture to air out
- Keep home well ventilated with fresh air if you have new carpet, new furniture, fresh painting or new construction

**Outdoor Air Pollution and Automobile**
- If pollution is high, stay inside
- Avoid smoke from barbecue
- Avoid high pollution and traffic areas
- Keep your car tuned up
- Avoid vehicles with diesel exhaust
- Keep garage well ventilated
- Store gasoline and other chemicals outside the house in a well ventilated area
- Ozone alert: http://www.tceq.state.tx.us/cgi-bin/
ASTHMA CONTROL: ALLERGENS

☐ Cockroaches
☐ Avoid using pesticides. If you have cockroaches, let someone else spray when you are away and air out your home for a few hours after spraying.
☐ Use roach traps and change traps every 3 months
☐ Eat only in designated areas. Clean up after eating
☐ Store food in sealed plastic containers.
☐ Put trash outside of the house.
☐ Clean stove top (especially grease).
☐ Wash dishes daily, do not leave them in the sink.

☐ Triggers due to animals are from the dander, saliva, and urine. The length of a pet’s hair does not matter.
☐ Remove the pet from the bedroom.
☐ Pets should live outside.
☐ Wash your hands and change clothes after handling your pet
☐ Wash the pet weekly
☐ Keep your pet’s cage clean
☐ Take asthma medicine (quick relief) or allergy (anti-histamine) medicine before visiting places where animals are present

☐ Pollens and Molds (Outdoor)
☐ Stay indoors when the pollen count is high. Tree pollens can be highest in the morning.
☐ Use A/C and change filters weekly.
☐ Keep windows closed during seasons when pollen and mold counts are highest.
☐ Do not dry clothes on a clothesline during pollen season or when mold counts are high
☐ Change clothes after being outside.
☐ Shower and wash hair after being outside.
☐ Daily pollen report: www.pollen.com
Dust Mites
- Cover your mattress and all pillows with a dust mite-proof cover. Wash cover in hot water every 3 months
- Wash your bed covers, clothes, pillows and washable stuffed toys once a week in hot (130°F) water, and dry in a hot dryer
- Keep stuffed toys out of your bed
- Place stuffed toys in the freezer for at least 1 hour once a week
- Avoid sleeping or lying on upholstered furniture
- Leave the room when it is being vacuumed.
- Use a high efficiency (HEPA) filter in your vacuum cleaner
- Dust with a damp cloth
- Avoid carpets: hard floors (wood, tile) are preferred

Molds (Indoor)
- Reduce moisture in the home (repair leaks, remove water sources, use a bathroom kitchen/stove vents, use a dehumidifier, do not use humidifiers/vaporizers)
- If possible, use A/C and change filters often (monthly).
- Keep bathrooms, kitchens, and basements well aired and clean
- Wash shower curtains.
- Use dehumidifiers for damp areas, with level set for less than 50%. Empty and clean regularly
- Remove visible mold with 10% bleach solution, increase ventilation (open windows, turn on vents after cleaning to remove chemical fumes)
What is a peak flow meter? A peak flow meter shows you how well air moves out of your lungs. During an asthma episode, the airways of the lungs begin to narrow slowly. The peak flow meter can help you find out if there is a narrowing in the airways hours—even days—before you have any symptoms of asthma. By taking your medicine before symptoms you may be able to stop or avoid a serious episode of asthma.

The peak flow meter can also be used to help you:
- Decide if your Self Management Plan is working.
- Decide when to step-up or stop medicine.
- Decide when to seek emergency care.
- Find triggers or what causes your asthma symptoms to get worse.

How do I use a peak flow meter?
1. Place the indicator at the base of the numbered scale.
2. Stand up.
3. Take a deep breath.
4. Place the meter in your mouth and close your lips around the mouthpiece. (Do not put your tongue inside the hole.)
5. Blow out as hard and as fast as you can.
6. Write down the number you get.
7. Repeat Steps 1 through 6 two more times.
8. Write down the highest of the three numbers.

What do the numbers mean? Your personal best peak flow number is the highest number you get over a 2-week period when you feel good and do not have any asthma symptoms. Each person’s asthma is different, so it is important for you to find your own personal best peak flow number.

To find your personal best peak flow number, take peak flow readings and keep track of the numbers:
- Every day for 2 weeks.
- Mornings and evenings (when you wake up and before you go to bed).
- Before and 15 minutes after taking inhaled bronchodilators (if you take this medicine).
How do I use the peak flow number?

The peak flow numbers are put into zones based on your best number and are set up like a traffic light. This will help you know what to do when your peak flow number changes. For example:

**Green Zone**-(80-100% of your personal best number) means *Go*. No asthma symptoms are present (no cough, wheeze or shortness of breath). Continue to follow your Asthma Plan by taking your prevention or everyday medicines.

**Yellow Zone**-(50-80% of your personal best number) means *Caution*. You may be having an episode of asthma or your overall asthma may not be under control. You may notice your early warning signs such as coughing, shortness of breath or wheezing. Follow your Asthma Plan. Start taking your quick-relief medicine and continue or increase your prevention medicine.

**Red Zone**-(below 50% of your personal best number) means *Danger*. Your asthma is not under control. You may notice your late warning signs such as difficulty breathing, struggling to breathe, or chest retractions. Take quick relief medicine right away. Call your doctor right away if your peak flow number does not return to and stay in your Yellow or Green Zone.

- Keep track of your peak flow numbers and symptoms and bring this to all asthma appointments.
- Write down your peak flow numbers in your diary every day.
- Monitor how your peak flow number changes from your personal best from one reading to another.
Working with your child’s doctor when your child has asthma.

Asthma is a chronic lung disease that affects millions of children in the United States. It can be managed and controlled. However, controlling asthma requires medication, education and good communication with your child’s doctor. Follow these steps to help manage your child’s asthma.

Schedule regular “asthma check-ups” for your child. When starting a new medicine schedule an appointment within 4-6 weeks with the same doctor. This is a great time to see if the medicine is working as expected. Once asthma control is achieved, schedule an appointment every 3-6 months or sooner if needed. Children who schedule and keep their asthma appointments with the same doctor have better asthma control.

After a trip to the emergency room. Often doctors in emergency rooms do not know your child’s history and can only provide emergency care. Make an appointment to see your child’s regular doctor within one week after a trip to the ER. At this appointment, you can discuss your child’s asthma management plan with the doctor and make changes, if needed. It is also another opportunity to ask questions and to voice your concerns.

Follow your asthma action plan. Keep this plan close and where you can see it at home, daycare and school.

Learn all you can about asthma. Attend an asthma class or enroll your child in an asthma education program. A Certified Asthma Educator can help you develop ideas and plans to keep your child’s asthma under control.

Track your child’s asthma symptoms. Get a calendar and write down which days your child has symptoms. Divide it into daytime and nighttime. Make a special note if the symptoms occur with exercise such as when running and playing sports. Talk with your child’s doctor or show him your calendar.

Avoid triggers. Learn about your child’s asthma triggers. These include smoke, furry/feathered animals, dust mites, strong odors, roaches, pollens and mold.

Keep an eye out. Watch your child when he takes his asthma medicine. You want to be sure that your child is using the medicines properly and is taking the correct amount. Make sure your child uses a spacer with his inhalers. Kids love to test boundaries i.e. “how much or how little can I get away with”.

Get refills. Make sure you know when you need a refill. All inhalers have a “set” amount of medicine. The inhaler may continue to spray, but that is not medicine! Your child could be using an empty inhaler and not even know it.

Lastly, ask, ask, ask and ask. Don’t be shy. If you have a question, ask it! If you don’t understand the answer, ask again. When you think of a question, write it down.
Complete this form and take to your next doctor’s appointment. If our child has frequent asthma symptoms, this information should help the doctor control and prevent the symptoms.

**KNOW YOUR CHILD’S HISTORY:**
My child has had Asthma since he/she was _______ years/ months old.  
The last time he/she was in the hospital was ________________, for _________ days.

**MEDICATIONS:**

<table>
<thead>
<tr>
<th>Medicine</th>
<th>what medicine is for</th>
<th>how much to take</th>
<th>how often is medicine given</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
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<tr>
<td>3.</td>
<td></td>
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<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ASTHMA SYMPTOMS:**

How often does your child have coughing, wheezing, or shortness of breath during the day per WEEK?

- [ ] 1-2 times a week  
- [ ] 3-6 times per week  
- [ ] Daily  
- [ ] Continual

How often does your child have coughing, wheezing or shortness of breath at night per MONTH?

- [ ] Two nights per month  
- [ ] 3-4 times a month  
- [ ] more than 5 times a month

Does your child cough or get tired quickly when playing, running, or riding the bike?

- [ ] Yes  
- [ ] No

If so, what does he/she do when this happens? _________________________________

Does your child get a runny nose or congestion with any of the following:

- [ ] Weather change  
- [ ] Seasonal (only every winter, spring, or fall)

- [ ] Every morning  
- [ ] _________________________________

If so, how long does the runny nose or congestion last?

_____ hours  _____ days  _____ weeks  other _________________________________

**QUESTIONS FOR MY CHILD’S DOCTOR:**

1. ______________________________________________________

2. ______________________________________________________

3. ______________________________________________________

4. ______________________________________________________
Your Child’s Asthma & School

Knowing that your child’s asthma can be controlled is a relief. Well-controlled asthma means less nights without sleep, emergency room visits, missed workdays and missed school days. Take these important steps at the start of every school year.

Don’t wait until the last minute, plan ahead. Schedule an appointment for your child to see his doctor. Have the doctor complete and sign an Asthma Action Plan. Get all the medicines your child takes refilled. You will need two quick-relief inhalers (one for home and another for school). You will also need two spacers or holding chambers (one for home and another for school). Do this at least 2-4 weeks before the first day of school.

Talk to your child’s school. This means you will meet with your child’s teacher, P.E. teacher and school nurse at the start of each school year. Give the school nurse, classroom teacher and P.E. teacher a copy of your child’s Asthma Action Plan (completed & signed by the doctor).

Teach them (teacher/nurse/coach) what they need to know. Show them how to use the quick-relief medication correctly and what to do during a flare-up. Tell them about your child’s triggers. Make sure the medicine is labeled. Some children also take their quick-relief medicine 15-20 minutes before exercise (before P.E. or recess).

Offer education. Recommend that the school contact a local hospital or organization for asthma education from a Certified Asthma Educator (AE-C). This is often a free service.

Continue to talk with your child’s school. Meet with your child’s teacher and school nurse on a regular basis. If you have a busy schedule, this can be done by telephone or e-mail. They can tell you about your child’s asthma symptoms while at school. Then, you can share this information with your child’s doctor.

Ask for help. Remember that many different adults supervise your child. You may need to meet with more than one teacher. You can talk to the principal, office staff, school counselor and bus driver, too. The more people at the school who know your child has asthma- the better!

Get informed. Ask about school policies on Air Quality Alert Days and field trips. A little planning can go a long way.

Don’t give up. Sometimes you will need to advocate for your child. Stop, take a break and think. Then call or ask to meet with the school administrator to talk about your concerns.
ASTHMA RESOURCES

American Lung Association (ALA)
1-800-LUNG-USA  1-800-586-4872
www.lungusa.org

Asthma and Allergy Foundation of America (AAFA)
1-800-7-ASTHMA
www.aafa.org

American College of Chest Physicians (ACCP)
1-847-498-1400
www.chestnet.org

American Academy of Allergy Asthma & Immunology (AAAAI)
800-822-2762
www.aaaai.org

American Academy of Pediatrics (AAP)
1-847-434-4000
www.aap.org

American Association for Respiratory Care (AARC)
1-972-243-2272
www.aarc.org

American Academy of Family Physicians (AAFP)
1-800-274-2237
www.aafp.org

Asthma Coalition of Texas (ACT)
830-709-2497
www.texasasthma.org

National Heart, Lung and Blood Institute (NHLBI)
1-888-346-3656
www.nhlbi.nih.gov

Global Initiative for Asthma (GINA)
www.ginasthma.com

Allergy & Asthma Network/ Mothers of Asthmatics
1-800-878-4403
www.aanma.org
RESOURCE TELEPHONE NUMBERS

MEDICAID:
For Santa Rosa Patients call Cymetrix (Located in the hospital across from the cafeteria)
404 Brady 212-6986
2534 Castroville 436-4392
3300 Nacogdoches 599-3217
321 N. Center St. 229-9200
1067 Bandera Rd. 337-3550
933 Pleasanton Rd. 977-9720
19575 K St., P.O. Box 10 (Somerset) 830-701-3800

PROBLEMS WITH MEDICAID? Call the Ombudsman 1-877-787-8999 (fax)
1-512-491-1970 (phone)
Regional Headquarters 1-877-322-3233

MEDICAL TRANSPORTATION PROGRAM (MTP):
For patients with an up-to-date Medicaid card 1-877-633-8747

CHIP (Children’s Health Insurance Program)
Member hotline 1-800-647-6558
Tex Care Partnership 1-877-543-7669
PROBLEMS WITH CHIP? Call the Ombudsman 1-800-252-9330

Children with Special Health Care Needs
Local 949-2155
1-800-252-8023

CARELINK Program:
Call to make an appointment for services 358-3350
1-800-844-6202

Medical Legal Assistance for Families (MLAF)
Goldsbury Center for Children and Families 704-8730
For families with problems with housing, education and/or public benefits or in need of utilities assistance.
Ask your physician to refer you.
CLINICS: (FEE BASED ON INCOME AND FAMILY SIZE)
Barrio Comprehensive  1102 Barclay  434-2368
Bishop Ernest Dixon Jr  1954 Houston  472-1835
Centro Med (Main Office)  924-9254
Community Clinic  210 W. Olmos  821-5522
Dr Frank Bryant Health Center  3066 E. Commerce  233-7000
La Mission Family Health  19780 Hwy 281 S.  626-0705
Wesley Primary Clinic  1406 Fitch  922-6922

PRESCRIPTION AND MEDICAL EXPENSE ASSISTANCE
Any Baby Can  227-0170
(The office here @ Santa Rosa is in St. Johns Hall)  ext 42222
Community Action Program  227-0335
Catholic Charities  433-3256
Ministry Emergency Assistance Program  590-6655
SA Food Bank (can help fill out Medicaid App.)  337-3663
Helpingpatients.org
Partnership for Patient Assistance:  www.PPARx.org  1-888-4PPA-NOW  or
Needy Meds:  www.needymeds.com  1-888-477-2669
RxAssist:  1-800-729-3284
RxOutreach:  1-800-769-3880
Access to Benefits Coalition:  1-202-479-6670

Pharmaceutical Companies with PRESCRIPTION ASSISTANCE PROGRAMS*
*You will need an “ADVOCATE” to help you with most of these programs listed below
GLAXOSMITHKLINE:  1-866-728-4368
Advair Diskus
Serevent Diskus
Flovent
Flonase
Ventolin (Albuterol sulfate)

Merck:  1-800-727-5400
Singulair
AstraZeneca: 1-800-424-3727
Pulmicort (Flexhaler or Respules)
Rhinocort Aqua nasal spray
Symbicort

Forest: 1-800-851-0758
Aerobid

Pfizer: 1-800-707-8990
Zyrtec

3M Pharmaceuticals: 1-800-328-0255
MaxAir Autohaler

Aventis: 1-800-221-4025
Allegra
Nasocort Nasal Spray

Schering-Plough 1-800-656-9485
Asmanex
Nasonex Nasal Spray

TEVA – 1-866-296-1401, ProAir HFA (Discount card only)
PEDIATRIC ASTHMA EDUCATION CLASSES

- **LOCATION:** Child Life Activity Center - 5th floor CHILDREN'S HOSPITAL

- **DATE AND TIME:** MONDAY through FRIDAY @ 10:00 a.m.*

- **TOPICS:**
  1. How the lungs work
  2. What happens during an asthma attack
  3. Recognizing the early signs and symptoms
  4. Medications used to treat and control asthma
  5. Asthma triggers

- Call for more information or to schedule a class:
  Debra Long, CRT AE-C 704-2465

* Class schedule subject to change
List all known Allergies or NKA:

0049 HT: WT (Kgs):

For the safety of your patient, Write Legibly!
Print your name and a contact phone number to allow for call back.

Check those boxes and/or fill in the blanks (as appropriate) of those orders you wish to use. If you do not want to use a particular order, draw a line through the entire order.

Date: __/__/____  Time: __________

MM DD YY

Physician Signature_____________________________________MM/DD/YY___________

Nurse Signature _______________________________________MM/DD/YY____________

1. Admission:  □ Admit to ______ (nursing unit); Team: _______; Attending M.D. ________
   □ Full admission  □ 23 hour Observation (patient expected to stay 23 hrs or less)
   □ Transfer to ______ (nursing unit); Team: _______; Attending M.D. ________

2. Diagnosis: Status Asthmaticus

3. Vital signs: Every 4 hours and prn with pulse oximetry spot checks.

4. Oxygen therapy: O₂ to keep saturation >90% per RT evaluation

5. Activity: □ As tolerated  □ Other (specify): ___________________________________________

6. Diet: □ Regular  □ Other (specify): ___________________________________________

7. IV: □ None
   □ D5 / ½ NS with 20 mEq KCl per liter at ____________ ml/hr
   □ Saline lock
   □ Other (specify): __________________________________ at ___________ ml/hr

8. Nursing: Please have family call for follow-up appointment with PCP and document appointment on Asthma Action Plan.

9. Medications (consider continuing home medications):
   A. Systemic Steroid Therapy (select one):
      
      Dosing recommendations: Usual dose: 1-2 mg/kg/DAY divided every 12 hours
      Usual Maximum dose = 60 mg/day (<12 yrs) or 80 mg/day (≥ 12 years)

      □ Prednisolone (e.g. Orapred® 15mg/5ml) ______ mg po every 12 hrs ( ____mg/kg/day)
      □ Prednisone ______ mg po every 12 hrs ( ____mg/kg/day)
      □ Methylprednisolone (e.g. Solu Medrol®) _____ mg IV every 12 hrs ( ____mg/kg/day)

   B. Split virus influenza vaccine before discharge between October-February & patient > 6 months of age)-
      □ N/A  □ Age 6-35 months: 0.25 ml IM  □ Age 3 years and above: 0.5 ml IM

   C. Other medications: _______________________________________

      Physician Signature_____________________________________MM/DD/YY___________

      Nurse Signature _______________________________________MM/DD/YY____________

Page 1 of 3
List all known Allergies or NKA:

For the safety of your patient, Write Legibly!
Print your name and a contact phone number to allow for call back.

Check those boxes and/or fill in the blanks (as appropriate) of those orders you wish to use.
If you do not want to use a particular order, draw a line through the entire order.

Date: ______/______/_____ Time: __________

Physician Signature_____________________________________MM/DD/YY___________
Nurse Signature _______________________________________MM/DD/YY____________

10. Medications administered by Respiratory Therapy:

A. Albuterol
   - Adjust albuterol treatments according to weaning protocol.
     (Pediatric Asthma Score before each treatment.)
   - Albuterol via MDI with spacer ______ puffs every ______ hours
     [Metered Dose Inhaler (MDI) dosing guidelines: 2.5 mg nebulized Albuterol = 4-5 puffs by MDI]
     If initial albuterol dose is greater than 4 puffs, decrease dose to 4 puffs prior to
     weaning to every 4 hrs (per protocol)
   - Albuterol nebulization ______ mg/dose every ______ hours.
     If initial albuterol dose is greater than 2.5 mg neb, decrease dose to 2.5 mg prior to
     weaning to every 4 hrs (per protocol)
     For patients 5 years and older: change to Albuterol MDI 4 puffs with spacer when reach Q4 hr
     interval (per protocol)

B. Anti-Inflammatory Inhalation:
   - Budesonide (Pulmicort Respules®)  0.25 mg  0.5 mg  Daily  bid via nebulizer
   - Fluticasone (Flovent®)  44 mcg  110 mcg MDI ______ puffs bid with spacer
   - Other (please specify): _______________________________________________________________

* Note: There is no evidence that continuation of combination long-term-control medications
  during acute exacerbations improves outcomes (e.g. Advair®; Symbicort®)

11. Peak Expiratory Flow Monitoring: Before and after each treatment (for patients > 5 years of age)

12. Call to schedule for Asthma Education 4-2465 and pager# 220-7813:
   - in English
   - in Spanish

13. Consult: Social work consult for financial concerns for patient care needs
   - Yes
   - No

Physician Signature_____________________________________MM/DD/YY___________
Nurse Signature _______________________________________MM/DD/YY____________
Dosing Recommendations for Inhaled Corticosteroids

<table>
<thead>
<tr>
<th>Age</th>
<th>Steroid Dose</th>
<th>Fluticasone Flovent HFA 44® MDI</th>
<th>Fluticasone Flovent HFA 110® MDI</th>
<th>Budesonide Pulmicort® nebulization</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 years</td>
<td>Low</td>
<td>4 puffs/day</td>
<td></td>
<td>0.25-0.5mg per day</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td></td>
<td>2-3 puffs/day</td>
<td>&gt;0.5-1mg per day</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td></td>
<td>&gt;3 puffs/day</td>
<td>&gt;1mg per day</td>
</tr>
<tr>
<td>5-11 years</td>
<td>Low</td>
<td>2-4 puffs/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td></td>
<td>2-3 puffs/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td></td>
<td>&gt; 3 puffs/day</td>
<td></td>
</tr>
<tr>
<td>≥12 years</td>
<td>Low</td>
<td>2-6 puffs/day</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Medium</td>
<td></td>
<td>3-4 puffs/day</td>
<td></td>
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<tr>
<td></td>
<td>High</td>
<td></td>
<td>&gt;4 puffs/day</td>
<td></td>
</tr>
</tbody>
</table>
List all known Allergies or NKA: 0050

For the safety of your patient, Write Legibly!
Print your name and a contact phone number to allow for call back.

Check those boxes and/or fill in the blanks (as appropriate) of those orders you wish to use.
If you do not want to use a particular order, draw a line through the entire order.

Date: ______/_____/_____
Time _______

1. Anticipate Discharge on

2. Activity:
   - Unrestricted
   - Other (specify): ____________________________________________

3. Diet:
   - Regular
   - Other (specify): _____________________________________________

4. Discharge Planning:
   a. Arrange for home nebulizer and instruction (complete Title 19 form) Yes No
   b. RT to dispense additional: Spacer Yes No
   c. Arrange for home health visits for asthma education Yes No
   d. Review “Completed” Asthma Action Plan Yes No

5. Medications (prior to discharge):
   - Split virus influenza vaccine (patient must be more than 6 months of age) [Oct-Feb]
   - 0.25 ml IM for patient 6-35 months of age
   - 0.5 ml IM for patient 3 years of age or greater

6. Discharge Medications (Relabel current inpatient inhalers for outpatient use):
   a. Bronchodilator(s):
      - Short Acting:
      - Long Acting (only if already on inhaled steroid): _________________________________
   b. Inhaled Corticosteroids: _______________________________________________________
   c. Oral Corticosteroids: __________________________________________________________
   d. Other (specify): _______________________________________________________________

7. Pulmonary (order through RT department):
   - Peak flow meter- technique review
   - MDI with spacer- technique review
   - Dry powder inhaler- technique review

8. Schedule for asthma class if unable to attend during hospitalization Yes No
   Language preference: English Spanish
   (Leave message at 704-2465 and indicate family’s phone number and date they will attend classes)

9. Follow-up appointment [recommended within 1 week]:
   Physician: __________________________ Telephone: __________________________
   Date/Time: __________________________ Location: __________________________

Physician Signature_________________________ MM/DD/YY_________
Nurse Signature____________________________ MM/DD/YY_________

Page 1 of 1
Patient Label

Pediatric Asthma Discharge Orders

Dr. Wood/Debra Long 0034381 (02/09)
PEDIATRIC ASTHMA WEANING PROTOCOL

THE PROTOCOL IS INITIATED BY A PHYSICIAN ORDER.

THE RESPIRATORY THERAPIST WILL ASSESS THE PATIENT PRIOR TO EACH TREATMENT.

THE PEDIATRIC ASTHMA SCORE AND THE RESPIRATORY CARE RECORD ARE DOCUMENTED UNDER “Care activities” IN MEDITECH.

THE RESPIRATORY THERAPIST WILL NOTIFY YOU:
- IF THE PATIENT EXHIBITS ANY SIGNS OF RESPIRATORY DISTRESS OR REQUIRES INTENSIFIED THERAPY.
- WHEN THE PATIENT HAS BEEN WEANED TO EVERY 6 HRS AND IS READY FOR DISCHARGE.

AT ANYTIME, YOU MAY OVERRIDE THE THERAPIST’S DECISION. (You may write a one-time order and “then wean per protocol” or you may write to “discontinue weaning protocol.”)

- Albuterol q 3 hrs
- O2 to keep sats 91% or above
- Asthma education
- Begin preventive medications
- Social Work consult if indicated for med assistance (Dr. to write prescriptions)
- If patient on high dose albuterol, decrease dose of albuterol to 2.5 mg (4 puffs) before weaning to q 4hr

- Albuterol q 4 hrs
- (Patients 5 yrs and older): change to MDI
- Wean to RA
- Asthma education
- Preventive medications

- Albuterol q 6 hrs
- RA
- Contact MD to change to MDI & give spacer (if not done previously)
- Preventive medications
- Re-label medications
- Flu shot prior to discharge (if applicable)

ADMIT

Every 3 hrs
Does patient meet step-down criteria?
Yes
Every 4 hrs
Does patient meet step-down criteria?
Yes
Every 6 hrs
Does patient meet discharge criteria?
Yes
Discharge

No
No

Rev.11/19/08
PEDIATRIC WEANING PROTOCOL

Criteria for Weaning Protocol:
1. Age 12 months or older (If < 2 yrs age, must have documented response to albuterol).
2. Diagnosis: respiratory distress because of asthma; status asthmaticus; etc.
3. Treatment interval starts at Q3 hours or less frequent. (Exception: physician may write for “albuterol ___mg Q 2hr X 3 and then albuterol ___mg Q 3 hr and wean according to protocol”.)
4. Weaning protocol applies only to those patients on albuterol (i.e. Xopenex™ not part of protocol.)

Note: assessment is done prior to each treatment.

Weaning (Step-down) criteria:
1. Total score=0.
2. Exception to above: When weaning from Every 3 hrs to Every 4 hr: total score may be “1” if due to oxygen therapy.
3. Albuterol dose must be at 2.5 mg nebulized (4 puffs) or lower prior to weaning to every 4 hrs. Patient must receive at least one treatment at this dose prior to further weaning.
4. To wean from Every 4 hr Phase to Every 6 hr Phase: must be on Room Air with O2 saturation ≥91%.
5. RT must notify nurse if patient is weaned.

Continue in current phase:
1. Total score=1.
2. If patient does not meet weaning criteria and also does not meet “intensify” criteria, the patient should remain at same treatment level.

Intensify Therapy criteria:
1. Patient must go back to previous phase if total score = 2 or higher.
2. RT must notify physician.

When should RT consult the physician [notification of physician must be documented]:
1. Patient requires intensified therapy as above.
2. Patient having adverse reaction to beta2-agonist aerosol treatments.

Pediatric Asthma Score (PAS)

<table>
<thead>
<tr>
<th>Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
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<tbody>
<tr>
<td><strong>RR</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2 yrs</td>
<td>≤ 39</td>
<td>40-49</td>
<td>≥ 50</td>
</tr>
<tr>
<td>2-3 yrs</td>
<td>≤ 34</td>
<td>35-39</td>
<td>≥ 40</td>
</tr>
<tr>
<td>4-5 yrs</td>
<td>≤ 30</td>
<td>31-35</td>
<td>≥ 36</td>
</tr>
<tr>
<td>6-12 yrs</td>
<td>≤ 26</td>
<td>27-30</td>
<td>≥ 31</td>
</tr>
<tr>
<td>&gt;12 yrs</td>
<td>≤ 23</td>
<td>24-27</td>
<td>≥ 28</td>
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<tr>
<td><strong>O2 requirements</strong></td>
<td>91% or higher on RA</td>
<td>O2 requirement ≤ 2L (≤ 28% FIO2)</td>
<td>O2 requirement &gt;2L (&gt;28%FIO2)</td>
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<tr>
<td><strong>Auscultation</strong></td>
<td>Normal breath sounds to end-exp wheeze</td>
<td>Expiratory wheeze</td>
<td>Inspiratory and Exp wheezing to diminished BS</td>
</tr>
<tr>
<td><strong>Retractions</strong></td>
<td>None</td>
<td>Intercostal &amp; Subcostal</td>
<td>Intercostal, substernal and supraclavicular</td>
</tr>
<tr>
<td><strong>Dyspnea</strong></td>
<td>Child: speak in sentences</td>
<td>Child: partial sentence</td>
<td>Child: single words/phares</td>
</tr>
<tr>
<td>Infant: babbles; no dyspnea</td>
<td>Infant: short cry; dyspnea if eating/drinking</td>
<td>Infant: severe dyspnea; grunting</td>
<td></td>
</tr>
</tbody>
</table>
**GREEN means GO!!!**

- Breathing is good
- No cough or wheeze
- Can work and play

[Table]

<table>
<thead>
<tr>
<th>Medicine</th>
<th>How Much to Take</th>
<th>Times to Take</th>
<th>Take at School?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

20 minutes before exercise use this medicine:

**YELLOW means CAUTION!!!**

- Cough
- Wheeze
- Tight chest
- Wake up at night

**START TAKING QUICK RELIEF MEDICINE**

1. KEEP TAKING GREEN ZONE MEDICATIONS
2. TAKE QUICK-RELIEF MEDICINE TO KEEP AN ASTHMA ATTACK FROM GETTING BAD

<table>
<thead>
<tr>
<th>Medicine</th>
<th>How Much to Take</th>
<th>Times to Take</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Now and every 4-6 hours</td>
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</tbody>
</table>

*If you DO NOT feel better in 20 to 60 minutes FOLLOW THE RED ZONE PLAN
**IF SYMPTOMS CONTINUE FOR 12 TO 24 HOURS, CALL YOUR DOCTOR

**RED means DANGER!!!**

- Medicine is not helping
- Breathing is hard and fast
- Nose opens wide to breathe
- Can't talk well

**GET HELP FROM A DOCTOR NOW !!!**

- Go to doctor's office or emergency room!
- Take these medicines until you see the doctor.

<table>
<thead>
<tr>
<th>Medicine</th>
<th>How Much to Take</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>May repeat times, 20 min. apart</td>
</tr>
</tbody>
</table>

CALL 911 (EMS) IF: Lips or fingernails are blue, or
You are struggling to breathe, or
You do not feel or look better in 20-30 minutes

Make appointment to see Doctor (name/telephone number): ____________________________

Written information on avoidance of asthma “triggers”: __ handout given ______ (initial)

**Physician recommendations for Air Quality Alert Days: (Check one)**

- No outdoor exercise
- Other

**Physician recommendations for medication self-administration: (Check one)**

- The student above has been instructed by me in the proper way to use his/her medications. It is my professional opinion that he/she should be allowed to carry and self-administer the above medications while on school property or at school-related events.

- The student above, in my professional opinion, should NOT be allowed to carry and self-administer any of his/her asthma medication(s) while on school property or at school-related events.

Reviewed by: ____________________________

Signature: ____________________________

Phone/Pager: ____________________________

Date: 06/14/2010

I, ____________________________, agree with the recommendations of my child’s physician as noted above and give permission for my child to receive the above medication(s) as directed. I also give permission for my child’s physician to share written or verbal information with the school nurse for the duration of this school year.

Signature of parent/guardian: ____________________________

Date: ____________________________

Patient Label:

**Christus Santa Rosa Children’s Hospital**

**ASTHMA MEDICINE PLAN**

80272259 (0708)
TIPS FOR COMPLETING AN ASTHMA ACTION PLAN

General recommendations (paper version):
- Write instructions in PLAIN language (e.g. “Four times a day”)
- Please give two copies to family (home and school); keep one copy for medical record.

Specific instructions for electronic template
(found on Sharepoint under “Dept team pages”/ “CSRHC Asthma Education Program”):

The electronic template allows you to complete the asthma action plan, using the pull-down selections and clicking appropriate boxes. You cannot save the completed plan electronically.

- When you first open the pdf file, a pop-up warning will appear: “Cannot save form information.” Close this box.
- If you wish to select a medication/dose/instruction that is not listed on the pull-down menu, type in your selection.
- This format does not allow you to save an electronic copy. You must print copies of the form for the family (home and school) and for your records.

N.B. If physician signs & dates form at bottom, plan can be used as a permission form to administer medication at school.

Green Zone Instructions
- Choose prevention (long-term control) medicine based on severity
  Inhaled corticosteroids are the BEST prevention medicine! Remember to choose a medication that is covered by the patient’s insurance!
- Mark “not applicable” box if patient does not need prevention medicine.
- Consider giving albuterol or Xopenex™ 2 puffs before sports/ P.E.

Yellow Zone Instructions
- Usual pediatric dose: Albuterol or Xopenex™ 2 puffs by M.D.I. with spacer
  (albuterol 1.25 mg nebulized for very young children)
- Continue or increase inhaled corticosteroids

Red Zone Instructions
- Albuterol/ levalbuterol usual pediatric dose: 2-4 puffs by M.D.I. or
  Albuterol 1.25- 2.5 mg nebulized or Levalbuterol (Xopenex™) 0.63- 1.25 mg nebulized
- May repeat dose once or twice at 20 min intervals
- Patient must call doctor or EMS or go to ER

Make appointment to see Doctor: fill in name and telephone number of patient’s PCP or asthma doctor.

Written information on avoidance of asthma “triggers”: check box and initial if you personally give family a handout on asthma triggers.

Physician recommendations for Air Quality Alert Days:
- Recommended choice (National Guidelines): □ No outdoor exercise

Physician recommendations for medication self-administration: choose most appropriate option for your patient. Self-carry and self-administration of quick-relief medication requires a certain level of maturity and responsibility on the part of the child. This option probably is not appropriate for children who are quite young, immature, or who tend to overuse their quick-relief medication. On the other hand, self-administration may be an appropriate option for high school athletes, because the school nurse may not be available during sports practice sessions and games. If you give permission for self-carry/ self-administration, most schools request that families provide an extra inhaler for the school nurse, in case the student misplaces his/her inhaler.

QUESTIONS ABOUT THIS PLAN? Contact:
Debra Long, CRT, AE-C (210)704-2465 debra.long@christushealth.org
Pamela Wood, MD (210) 562-5344 woodp@uthscsa.edu

Rev. 04/27/09
### PEAK EXPIRATORY FLOW RATE [liters/minute]: CHILDREN & ADOLESCENTS, NHANES III*

**AFRICAN-AMERICAN MALES**

<table>
<thead>
<tr>
<th>Age</th>
<th>Height [inches (cm)]</th>
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<td>10</td>
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**AFRICAN-AMERICAN FEMALES**

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**MEXICAN-AMERICAN FEMALES**

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</tbody>
</table>


### PEFR PREDICTED VALUES (L/min):

**GIRLS**

**BOYS**

<table>
<thead>
<tr>
<th>Height (cm)</th>
<th>Hispanic</th>
<th>Black</th>
<th>Anglo</th>
<th>Hispanic</th>
<th>Black</th>
<th>Anglo</th>
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<tbody>
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