

Bronchiolitis
Naegleria infection

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PGY 1

CASE 1

- 3 mo male infant presents with 4 days of worsening cough, congestion, difficulty breathing. He has had no fever, but mom reports refusal to feed.
- This is his first respiratory illness. No significant PMH. Birth Hx unremarkable.
- VS: T 37.5 C, HR 150/min, RR 60/min, BP: 85/60 mmHg, SpO2 92% in RA
- He is in moderate respiratory distress with nasal flaring, subcostal retractions. Auscultation reveals bilateral wheezes + crackles. Examination otherwise within normal limits.

CASE 1

- Bronchiolitis is suspected. He is placed on supplemental O₂ via nasal cannula with improvement in SpO₂ to 98%. He is administered nebulized albuterol 2.5 mg x 1 dose with no change in respiratory status.
- What is the next best step in his ER management?

CASE 1

- a) Nebulized Albuterol
- b) Nebulized 3% NaCl (hypertonic saline)
- c) Nebulized epinephrine
- d) Heliox
- e) CXR

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BRONCHIOLITIS

- Inhaled Bronchodilators:
 - Infants and children with bronchiolitis and moderate to severe respiratory distress (eg, NF; retractions; grunting; RR>70 bpm; dyspnea; or cyanosis) should receive a trial of inhaled bronchodilators (albuterol or epinephrine).
 - The effects should be monitored by evaluating the child before and up to one hour after treatment.

BRONCHIOLITIS

- Inhaled Bronchodilators:
 - Initial trial of albuterol (neb or MDI). If clinical response noted, can continue q4-6h as clinically indicated
 - If no benefit after 1 hr, give single dose of nebulized (racemic) epinephrine
 - If no clinical response is seen within one hour of epinephrine treatment, do not continue bronchodilator therapy.
 - If clinical response to epi, may continue q4-6h prn if decision is made to hospitalize patient

BRONCHIOLITIS

- Hypertonic Saline:
 - Theoretical potential to reduce airway edema and mucus plugging, the predominant pathologic features of acute bronchiolitis
 - ED-based trials did not show any significant short-term(30 to 120 minutes) benefit of up to three doses of nebulised 3% saline.
 - Currently, not recommended for use in ED
 - No significant adverse events reported
 - Does shorten length of hospital stay
 - additional studies needed to determine optimal delivery interval, concentration, and delivery device

BRONCHIOLITIS

- CXR:
 - not necessary in the routine evaluation of bronchiolitis
 - unlikely to alter treatment
 - may lead to inappropriate use of antibiotics
 - Chest radiographs should not be routinely obtained in the absence of clinical findings suggestive of other diagnostic suspicions
 - Indicated if mod/severe resp distress AND:
 - Focal findings on examination
 - Cardiac murmur
 - To exclude alternate diagnoses

BRONCHIOLITIS

- Other Therapies not recommended:
 - Systemic glucocorticoids (first bronchiolitis)
 - Inhaled Glucocorticoids
 - Chest PT
 - Antibiotics (almost always viral)
 - Heliox
 - Surfactant
 - Montelukast
 - Ribavirin
 - Anti-RSV IG

BRONCHIOLITIS

DISCHARGE CRITERIA :

- RR <70 breaths/min
- Caretaker can use bulb suctioning
- SpO₂ \geq 95% (RA)
- Adequate po intake
- Available resources at home (neb machine, etc)
- Caretakers confident they can provide care at home
- Anticipatory Guidance provided

Resources

- UpToDate
 - Bronchiolitis in infants and children: Treatment; outcome; and prevention
- PubMed
 - Nebulized Hypertonic Saline solution for acute bronchiolitis in infants (Cochrane Database Syst Rev. 2013 Jul 31;7:CD006458)

CASE 2

- A previously well 10 yo M presents to the ED with 3 days of progressively worsening frontal headache, fever, vomiting and 1 day of increased drowsiness.
- On examination he is found to be febrile, tachycardic, ill-appearing, with neck rigidity. No rashes.
- During initial resuscitation, he develops intractable seizures, such that he has to be intubated and ventilated
- Fulminant bacterial meningitis is suspected and empiric antibiotics are administered.
- However, despite appropriate therapy, he dies within 24 hours of initial presentation

CASE 2

- Post mortem reveals Primary Amoebic Meningoencephalitis (PAM), caused by the “brain-eating amoeba” *Naegleria fowleri*
- It was later discovered that he had gone swimming in a fresh water lake 1 week prior to development of his symptoms
- Which of the following statements about PAM and *Naegleria fowleri* is false?

CASE 2

- a) *Naegleria* is commonly found in warm freshwater (e.g. lakes, rivers, and hot springs) and soil.
- b) *Naegleria* usually infects people when water containing the ameba enters the body through the nose.
- c) *Naegleria* infection may be contracted by drinking contaminated water
- d) *Naegleria* infection/PAM is usually fatal
- e) *Naegleria* infection/PAM has similar presentation and CSF findings compared to bacterial meningitis

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Naegleria fowleri

- *Naegleria fowleri* is an amoeba found around the world
- In the US- warmer southern states
- The amoeba can be found in:
 - Bodies of warm freshwater, such as lakes and rivers
 - Geothermal (naturally hot) water, such as hot springs
 - Warm water discharge from industrial plants
 - Swimming pools that are poorly maintained, minimally-chlorinated, and/or un-chlorinated
 - Water heaters. *Naegleria fowleri* grows best at higher temperatures up to 115°F (46°C) and can survive for short periods at higher temperatures.
 - Soil
- *Naegleria fowleri* is not found in salt water, like the ocean.

PAM/ Naegleria fowleri

- *Naegleria* usually infects people when water containing the amoeba enters the body through the nose.
- *Naegleria* infection CANNOT be contracted by drinking contaminated water
- *Naegleria* infection CANNOT be spread from person to person

PAM/ Naegleria fowleri

- Symptoms start 1-7 days (median 5 days) after nasal exposure
- Death 1-12 days (median 5.3 days) after symptoms begin
- PAM is difficult to detect because the disease progresses rapidly so that diagnosis is usually made after death.

PAM/ Naegleria fowleri

- Symptoms
 - Severe frontal headache
 - Fever
 - Nausea/Vomiting
 - Seizures
 - mental status abnormalities
 - Hallucinations
 - Altered smell/ taste
- Physical exam
 - meningeal signs
 - focal neurologic deficits
- Signs and symptoms mimic those of bacterial meningitis, especially in the early stages.

PAM/ Naegleria fowleri

- Naegleria infection/PAM has similar CSF findings compared to bacterial meningitis
 - elevated opening pressure,
 - polymorphonuclear pleocytosis
 - normal or low glucose
 - elevated protein.
 - blood in the CSF and/or motile ameba are clues to a potential diagnosis of PAM.

PAM/ Naegleria fowleri

- Diagnosed in the laboratory by detecting *Naegleria fowleri* organisms /nucleic acid / antigen in CSF, brain biopsy, or autopsy tissue specimens
 - Direct visualization
 - Immunohistochemical staining
 - DNA PCR
 - Serology
 - Culture

PAM/ Naegleria fowleri

- Treatment:
 - Amphotericin B
 - Azithromycin
 - Fluconazole
 - Rifampin
 - Miltefosine- investigational drug
 - Dexamethasone
 - Therapeutic Hypothermia

PAM/ Naegleria fowleri

- For 24/7 diagnostic assistance, specimen collection guidance, shipping instructions, and treatment recommendations, please contact the CDC Emergency Operations Center at 770-488-7100.

Resources

- CDC:
 - <http://www.cdc.gov/parasites/naegleria/>

THANK YOU