Whistlers: The Wheezing Child

June 7, 2013

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Objectives

1. Review the different etiologies of wheezing in the pediatric patient.
2. Describe the appropriate use of diagnostic tests and their limitations in the assessment of the acutely wheezing child.
3. Review newer treatment strategies for bronchiolitis and asthma.
4. Illustrate these principles through a case-based approach

Case 1.1

January

Peds ED, Room 5

Patient

3mosM BIB parents due to 1 day of clear rhinorrhea now with cough and "noisy breathing." Nl full-term infant w/o medical problems. No meds/allergies. Slept poorly overnight.

RR 44   98% RA   HR 156 T 37.2

clear rhinorrhea w/o nasal flaring

transmitted upper airway sounds, lungs o/w clear

your **thorough** exam is o/w unremarkable

What to do?

Young child with URI

Dx

- CXR
- RSV antigen/RVB
- Blood
- Urine

Tx

- Isolation
- Nasal sunction
- Bronchodilator trial
- Steroids
- Antibiotics
- Hypertonic saline
- Counseling

Case 1.2

January	ED, Room 5

Patient

8mosF BIB parents with 3 days of clear rhinorrhea and cough now with "noisy breathing." Slept poorly overnight. Nl full-term kid. Imm UTD. First illness. Felt hot at home today.

RR 52 98% RA HR 156 T 39.2

clear rhinorrhea w/o nasal flaring

diffuse scattered rales and wheezes

mild increased WOB with mild retractions

your **thorough** exam is o/w unremarkable

bornangels.com

What to do?

2mo-2yo with “routine” bronchiolitis

Dx

CXR

CXR: In clinical bronchiolitis

1. Not recommended by AAP for routine use
   - Studies show < 1% rate of unexpected abnormalities
     - Very rarely results in change of clinical mgmt
2. CXR may be helpful:
   - "If the severity of disease requires further evaluation"
   - Another diagnosis suspected
   - Atypical presentation
3. Atelectasis:
   - If present – increased likelihood of severe dz
   - Often correlates w/ clinical picture
   - Increases use of antibiotics

0749-5161/98/1403-0181/$03.00/0
PEDIATRIC EMERGENCY CARE
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Chest radiograph in the evaluation of first time wheezing episodes: Review of current clinical practice and efficacy

MARK G. ROBACK, MD, DAVID A. DREITLEIN

300 Kids

First-time wheezers in PED 1994

60% NOT Xray'd

Fever

Focal Exam

No atopy

Clinical Factors Associated with Focal Infiltrates in Wheezing Infants and Toddlers

E. M. Mahabee-Gittens, MD, MS[1]
M. D. Dowd, MD, MPH[2]
J. A. Beck, RRT[1]
S. Z. Smith, RRT[1]

Clinical Pediatrics; Jul 2000; 39, 7; ProQuest Research Library pg. 387

471 Kids (0-18mos)

Wheezers in PED 1996-7

Total population
10% + CXR

Of those Xray'd
23% + CXR

Grunting
Hypoxia

First-wheezing
Fever
Tachypnea

0749-5161/02/1805-0333
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DOI: 10.1097/01.pec.0000033975.62294.c9

Vol. 18, No. 5
Printed in U.S.A.

First-time wheezing in infants during respiratory syncytial virus season: Chest radiograph findings

MIRNA M. FARAH, MD, LISA B. PADGETT, MD, DAVID J. McLARIO, DO, MS, KEVIN M. SULLIVAN, PhD, MPH, MHA, HAROLD K. SIMON, MD

140 Kids (0-12 mos)

All had CXR

17% abnormal

1 VSD

All else ATX/infiltrate

What to do?

2mo-2yo with “routine” bronchiolitis

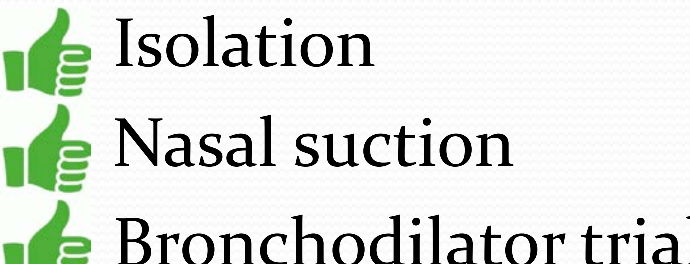
Dx

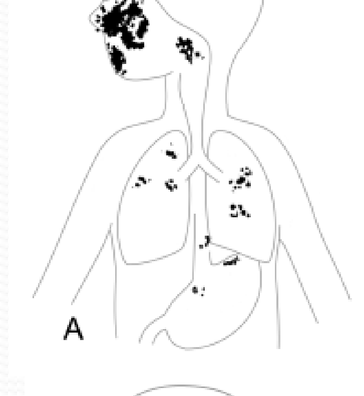
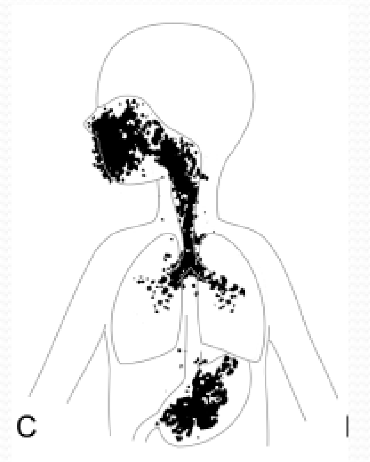
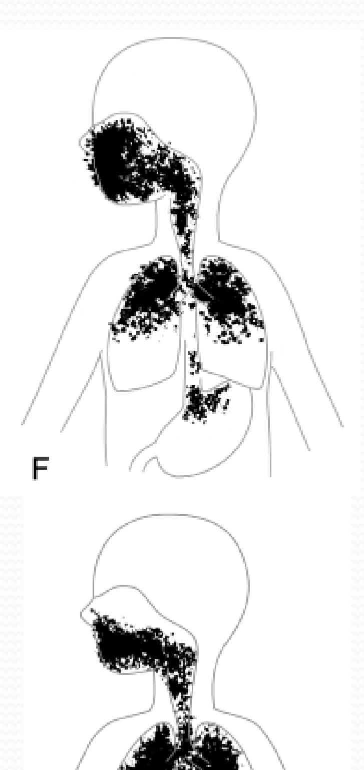
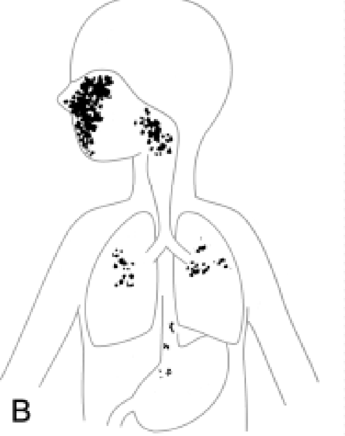
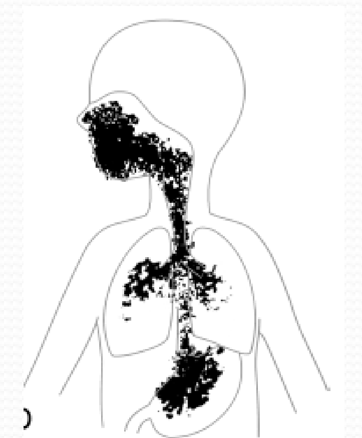
- CXR

- RSV antigen/RVB

- Blood
- Urine

Tx

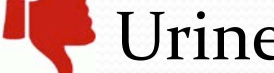

- Isolation
- Nasal suction
- Bronchodilator trial

	Loose fit	Tight fit Screaming	Tight fit Calm
MDI/spacer			
Nebulizer			

Erzinger *et al*. J Aerosol Med. 2007.

What to do?

2mo-2yo with “routine” bronchiolitis

<u>Dx</u>	<u>Tx</u>
CXR	Isolation
RSV antigen/RVB	Nasal suction
Blood	Bronchodilator trial
 Urine	Steroids

Steroids for bronchiolitis

cagle.com

Steroids for bronchiolitis

1. A Multicenter, Randomized, Controlled Trial of Dexamethasone for Bronchiolitis. Corneli *et al*. NEJM 2007. PECARN
   - 600 kids 2-12mos, first-time wheezers
   - 1mg/kg po dex vs placebo
   - No difference : admission rate, resp status after 4hrs, LOS for admitted pt's

2. Cochrane Review 2008: Glucocorticoids for acute viral bronchiolitis in infants and young children. Patel *et al*.
   - 13 RCTs included: 1200 kids w/ viral bronchiolitis
   - No difference: admission rate, readmission rates, hospital revisit, resp status

What to do?

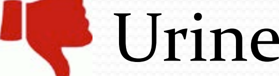
2mo-2yo with "routine" bronchiolitis

Dx

CXR

RSV antigen/RVB

Blood


Urine

Tx

Isolation

Nasal sunction

Bronchodilator trial

Steroids

Antibiotics

? Hypertonic saline

? Heliox

? nCPAP

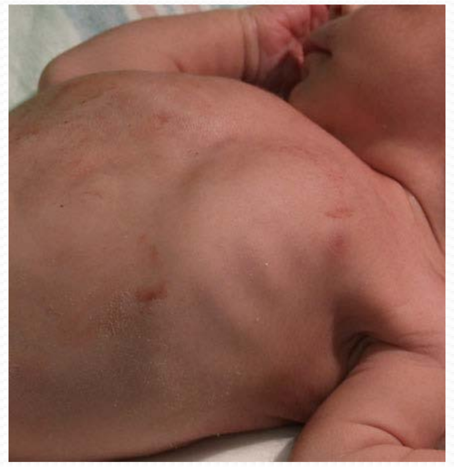
Risk factors for severe disease

History

1. < 12wks of age
2. Prematurity
3. Underlying lung dz (CF, CLD)
4. Significant co-morbidity
   - CHD
   - Immunodefic

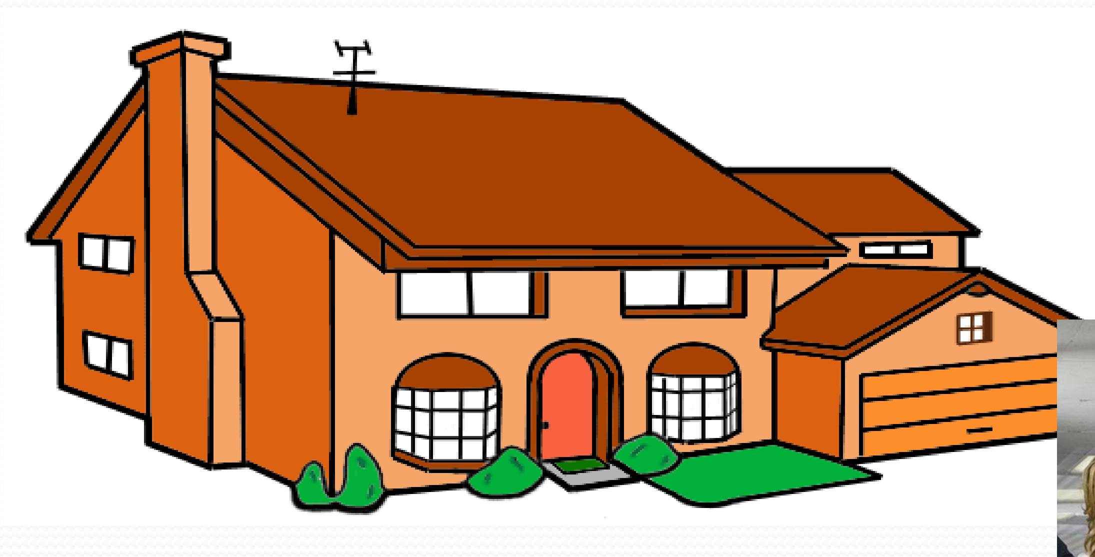
PE

1. Ill-appearing
2. O2 sat < 94% RA
3. RR > 70, or > ULN for age
4. Mod-severe distress



What to do?

2mo-2yo with “routine” bronchiolitis



coolhandcameo.wordpress.com

iamyourtargetdemographic.wordpress.com

SUMMARY

2mo-2yo with "routine" bronchiolitis

Dx

- CXR
- RSV antigen/RVB
- Blood
- Urine

Tx

- Isolation
- Nasal sunction
- Bronchodilator trial
- Steroids
- Antibiotics
- ? Hypertonic saline
- ? Heliox
- ? nCPAP

Case 1.3

January	ED, Room 5

Patient

3wkF BIB parents with 3 days of clear rhinorrhea and cough now with "noisy breathing." Slept poorly overnight. Nl full-term kid. First illness. Felt hot at home today.

RR 52 98% RA HR 156 T 39.2

clear rhinorrhea w/o nasal flaring

diffuse scattered rales and wheezes

mild increased WOB with mild retractions

your **thorough** exam is o/w unremarkable

What to do?

Neonate with fever and bronchiolitis

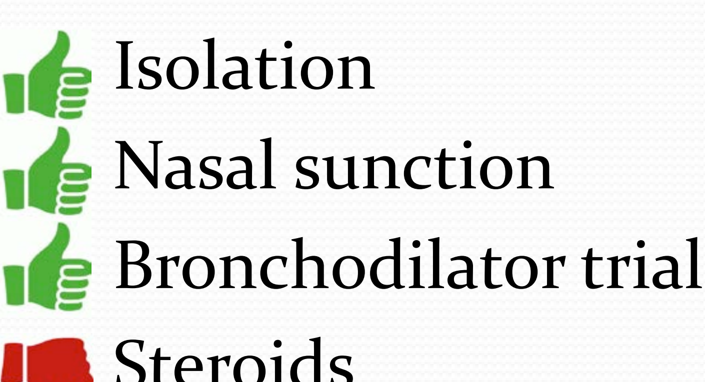
What to do?

Neonate with fever and bronchiolitis

Dx

- CXR
- RSV antigen/RVB
- Blood
- Urine
- CSF

Tx



- Isolation
- Nasal sunction
- Bronchodilator trial
- Steroids
- Antibiotics

What to do?

Neonate with fever and bronchiolitis

legallysociable.com

epguides.com

A word on APNEA

www.polyvore.com/blue_spongebob/thing?id=10542824

www.polyvore.com/cgi/imgthing?.out=jpg&size=l&tid=9084514

A word on APNEA

- Limited data, none from ED setting
- Retrospective data dominates

- Willwerth *et al* 2006:
  - 700 hospitalized patient < 6mos of age
  1. Full-term < 1mos
  2. Premie < 48wks post-conception
  3. h/o apnea of prematurity
  4. Witnessed apnea

toonpool.com/user/589/files/trouble_breathing_886875.jpg

Case 2.1

Next week

ED, Room 3

Patient

6yoF w/ known asthma BIB parents d/t cough and "wheezing" for the past 2 days. Has been using albuterol MDI every 4-6hrs for last 36hrs No other meds. Hosp x 1 9mos ago w/o PICU or intubation. 2 ED visits in last 6 mos and needed po steroids both times (last was 4wks ago). No fever.

RR 32   96% RA   HR 118 T 37.4

clear rhinorrhea

Diffuse insp-exp wheeze w/ prolonged exp phase. No focal findings. + retractions. Speaking in short sentences.

your **thorough** exam is o/w unremarkable

What to do?

Moderate asthma exacerbation

Tx

Abluterol: neb vs. MDI

Atrovent

Systemic sterc

Inhaled steroi

Antibiotics

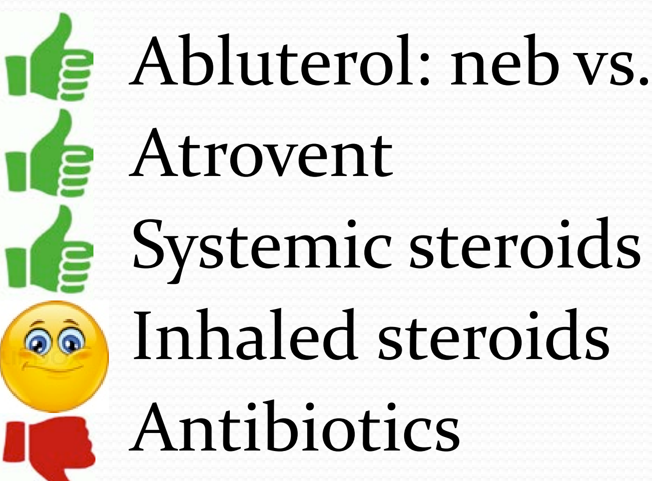
Dx

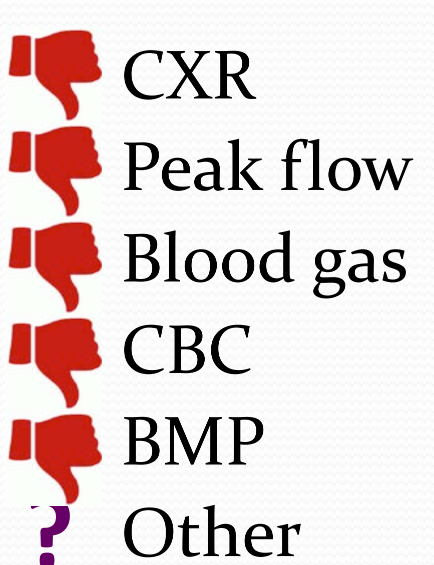
CXR

What to do?

Moderate asthma exacerbation

Tx	Dx
Abluterol: neb vs. MDI	CXR
Atrovent	Peak flow
Systemic steroids	Blood gas
Inhaled steroids	CBC
Antibiotics	BMP
	? Other





EDUCATE!!

EMERGENCY DEPARTMENT—ASTHMA DISCHARGE PLAN

Name: ____________________ was seen by **Dr.**______________ on ___/___/___

- Take your prescribed medications as directed—do not delay!
- Asthma attacks like this one can be prevented with a long-term treatment plan.
- Even when you feel well, you may need daily medicine to keep your asthma in good control and prevent attacks.
- Visit your doctor or other health care provider as soon as you can to discuss how to control your asthma and to develop *your own* action plan.

Your followup appointment with ______________ is on: ___/___/___. **Tel:** ___________

YOUR MEDICINE FOR THIS ASTHMA ATTACK IS:

Medication	Amount	Doses per day, for # days
Prednisone/prednisolone (oral corticosteroid)		_____ a day for _____ days Take the entire prescription, even when you start to feel better.
Inhaled albuterol		_____ puffs every 4 to 6 hours if you have symptoms, for _____days

YOUR DAILY MEDICINE FOR LONG-TERM CONTROL AND PREVENTING ATTACKS IS:

Medication	Amount	Doses per day
Inhaled corticosteroids		

YOUR QUICK-RELIEF MEDICINE WHEN YOU HAVE SYMPTOMS IS:

Medication	Amount	Number of doses/day
Inhaled albuterol		

ASK YOURSELF 2 TO 3 TIMES PER DAY, EVERY DAY, FOR AT LEAST 1 WEEK:

"How good is my asthma compared to when I left the hospital?"

If you feel much better:	**If you feel better, but still need your quick-relief inhaler often:**	**If you feel about the same:**	**If you feel worse:**
• Take your daily long-term control medicine.	• Take your daily long-term-control medicine. • See your doctor as soon as possible.	• Use your quick-relief inhaler. • Take your daily long-term control medicine. • See your doctor as soon as possible—don't delay.	• Use your quick-relief inhaler. • Take your daily long-term control medicine. • Immediately go to the emergency department or call 9–1–1.

YOUR ASTHMA IS UNDER CONTROL WHEN YOU:

① Can be active daily and sleep through the night.	② Need fewer than 4 doses of quick-relief medicine in a week.	③ Are free of shortness of breath, wheeze, and cough.	④ Achieve an acceptable "peak flow" (discuss with your health care provider).

University of Michigan Health System
Emergency Department
Asthma Discharge Instructions

Name:	
Reg No:	Date:
DOB:	Age:

MOST PEOPLE WITH ASTHMA DO NOT GET SO SICK THAT THEY NEED EMERGENCY CARE.

The fact that you had to get emergency care may mean:

- you are not taking your long term control medicine the right way
- you have not been prescribed any/enough long term control medicine
- you are still exposed to triggers that start your asthma symptoms

You can avoid asthma flare-ups by using this F.L.A.R.E. plan until you see your primary doctor.

FOLLOW UP WITH YOUR PRIMARY DOCTOR- CALL TO MAKE AN APPOINTMENT TO BE SEEN WITHIN ___ DAYS.

- If you have trouble making an appointment, ask to speak to the office nurse.
- If you do not have a primary care doctor call (866) 688-9050 or call the number on the back of your insurance card to get one.

This will make your emergency visits rare.

- At the follow up appointment:
  - ✓ Bring all of your medications and this plan with you.
  - ✓ Make an asthma action plan with your doctor that you can follow every day to keep your asthma under control.
  - ✓ Write down your questions and your doctor's answers.

LEARN ABOUT YOUR ASTHMA MEDICINES. TAKE ALL OF THESE MEDICINES JUST AS THE DOCTOR TELLS YOU, EVEN IF YOU ARE FEELING MUCH BETTER.

Kind of medicine	Name of medicine	How much	How often and how long you need to take it
Quick-relief/Rescue			
Long term control			
Steroid pills or syrup			

ASTHMA IS A LIFE-LONG (CHRONIC) DISEASE.

Even though your breathing is better after getting emergency care, you still need to get long term control of your asthma. If you do not, you are at risk for more severe flare-ups and even death.

- If you use quick-relief medicine more than 2 times per week then your asthma is not under control. You need to see your doctor or an asthma specialist to make a plan to get control of your asthma.
- Take long term control medicine every day as ordered by your doctor.
- Figure out what things make your asthma flare up and try to stay away from these "triggers".

RESPOND TO THESE WARNING SIGNS THAT YOUR ASTHMA IS GETTING WORSE:

- Your chest feels tight
- You are short of breath
- You are wheezing
- You are coughing
- Your peak flow is getting low

KEEP TAKING YOUR MEDICINES AS PRESCRIBED AND CALL YOUR DOCTOR.

EMERGENCY CARE MAY BE NEEDED IF YOU:

- Have trouble talking

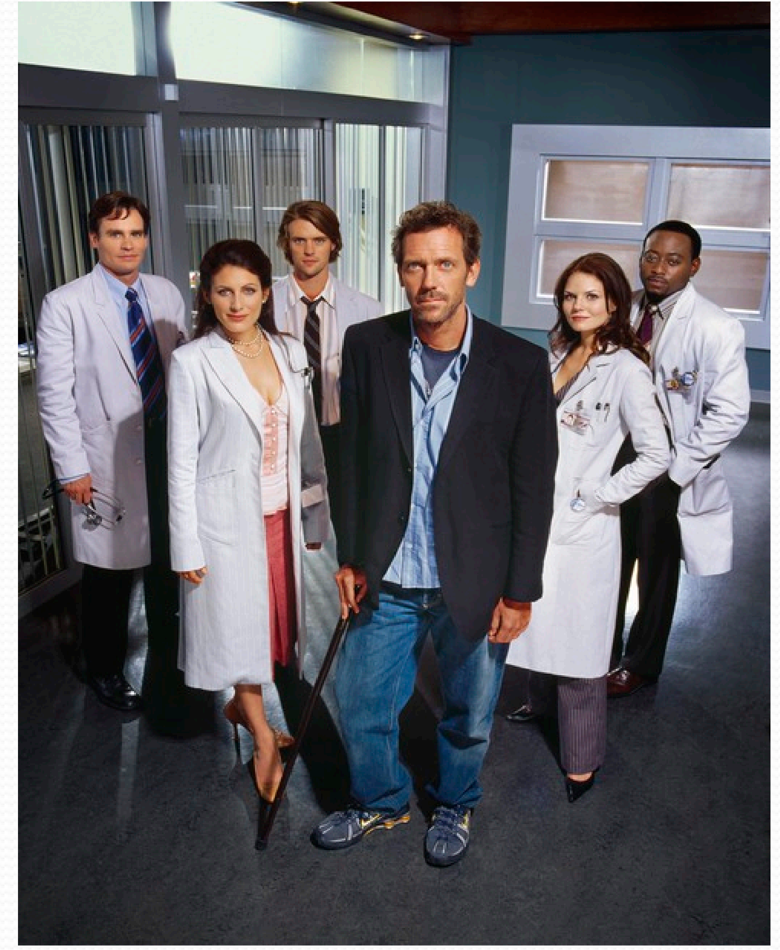
TAKE YOUR QUICK-RELIEF MEDICINE AND WAIT 20

What to do?

Moderate asthma exacerbation

www.seat42f.com

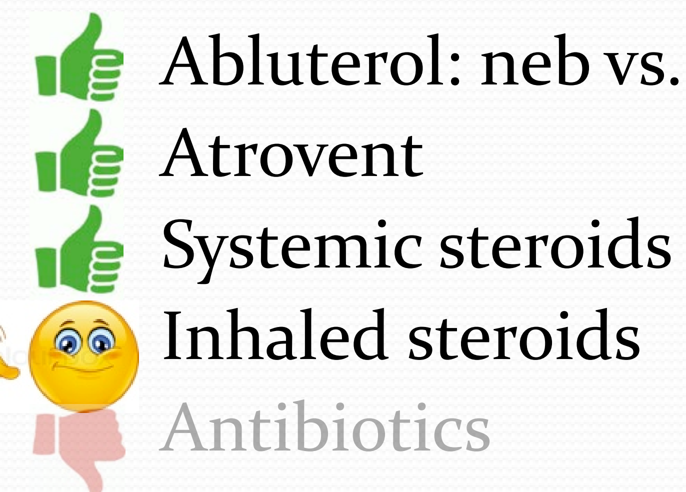
Hotelclub.com



SUMMARY

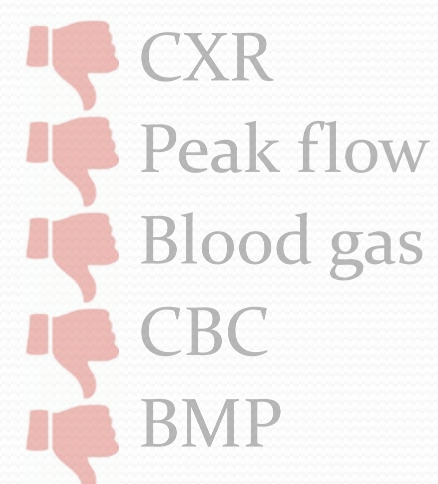
Moderate asthma exacerbation

Tx



- Ablutero l: neb vs. MDI
- Atrovent
- Systemic steroids
- Inhaled steroids
- Antibiotics

Dx



- CXR
- Peak flow
- Blood gas
- CBC
- BMP

EDUCATE!!

Case 2.2

Next week

ED, Room 3

Patient

6yoF w/ known asthma BIB parents d/t cough and “wheezing” for the past 2 days. Has been using albuterol MDI every 4-6hrs for last 36hrs No other meds. Hosp x 1 9mos ago w/o PICU or intubation. 2 ED visits in last 6 mos and needed po steroids both times (last was 4wks ago). No fever.

RR 52 86% RA HR 170 T 37.4

1-2 word phrases w/ obvious resp distress

poor air mvmt w/ nearly inaudible insp/ex ty.
+ suprasternal retractions

tachy, reg rhythm. Nl perfusion

your **thorough** exam is o/w unremarkable

LITTLE CHANGE AFTER 3 DUONEBS

What to do?

SEVERE asthma exacerbation

Tx

O_2

Abluterol

Atrovent

Steroids

Epi/terbutaline

Magnesium

Heliox

Leukotriene inhibitors

Methylxanthines (theophyline)

? Intubate

Dx

CXR

Blood gas

CBC

BMP

Risk factors for DEATH

Any:
- ICU, Intubation

Prior yr:
- 2+ hosp
- 3+ ED visits

Prior month:
- Asthma hosp
- >2 SABA canisters

Social
- Low SES
- Drug use
- Psychosocial problems

Co-morbidities
- CV dz
- Other lung dz
- Psych dz

What to do?

SEVERE asthma exacerbation

Style-by-design.blogstop.com

Een.wikipedia.org

SUMMARY

SEVERE asthma exacerbation

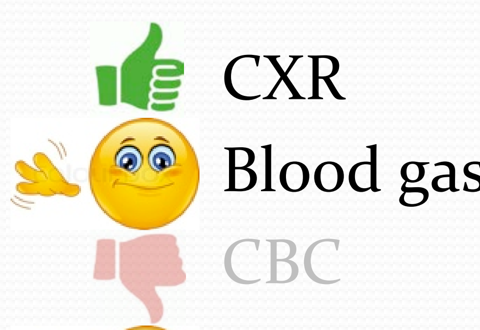
Tx

O2

Abluterol

Atrovent

Steroids



Epi/terbutaline

Magnesium

Heliox

Leukotriene inhibitors

Methylxanthines (theophyline)

? Intubate

Dx

CXR

Blood gas

CBC

BMP

"That's a puffer. If you want to blow a house down, you'll also need a huffer."

http://www.cartoonstock.com/newscartoons/cartoonists/mba/lowres/mban2616l.jpg

Case 3

2 wks from now

ED, Room 6

Patient

5yoF w/ cough, congestion, fever for 3 days. Healthy, fully immunized girl. Kid seemed to have more difficulty breathing over last 24 hrs. Decr po and UOP. Reports some abd pain and had 3 episodes of NBNB emesis in last 12 hours.

RR 30 96% RA HR 128 T 38.6 100/62

mildly ill-appearing, well-hydrated

decr BS with rales RLL. Nl WOB

your **thorough** exam is o/w unremarkable

The Management of Community-Acquired Pneumonia in Infants and Children Older Than 3 Months of Age: Clinical Practice Guidelines by the Pediatric Infectious Diseases Society and the Infectious Diseases Society of America

John S. Bradley,[1,a] Carrie L Byington,[2,a] Samir S. Shah,[3,a] Brian Alverson,[4] Edward R. Carter,[5] Christopher Harrison,[6] Sheldon L. Kaplan,[7] Sharon E. Mace,[8] George H. McCracken Jr,[9] Matthew R. Moore,[10] Shawn D. St Peter,[11] Jana A. Stockwell,[12] and Jack T. Swanson[13]

What to do?

Child with PNA appropriate for OUTPATIENT CARE

Dx

- 👍 Pulse oximetry
- 👎 CXR
- 👎 CBC/Blood Cx
- 👎 Sputum Cx
- 👎 Urine antigen testing
- 👎 Acute phase reactants

Tx

- 👎 Isolation
- 👍 Antibiotics
- 👎 Oxygen
- 👎 IVF
- 👎 Bronchodilator trial
- 👎 Steroids
- 👎 Cough suppressant
- 👍 Counseling

Case 3 (cont)

2 days later | **ED, Room 4**

Patient

5yoF w/ cough, congestion, fever for 5 days. Since being seen 2 days ago, she's taken her amoxicillin without difficulty but she remains febrile and her cough and breathing have worsened. Her po intake and UOP remain low. In general, she seems sicker.

RR 48 88% RA HR 160 T 39.0 100/62

ill-appearing but nontoxic, clearly dyspneic

decr BS with rales RLL, + retractions. No cyanosis.

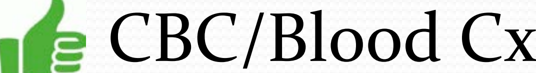
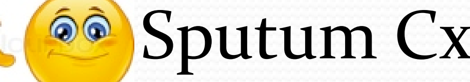
tachycardia, 2+ radial pulses. Brisk CR.

your **thorough** exam is o/w unremarkable

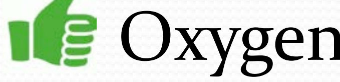
What to do?

Child with PNA requiring HOSPITALIZATION

Dx

- Pulse oximetry
- CXR
-  CBC/Blood Cx
-  Sputum Cx
- Urine antigen testing
- Acute phase reactants

Tx

- Isolation
- Antibiotics
-  Oxygen
- IVF
- Bronchodilator trial
- Steroids
- Cough suppressant
- Counseling

www.offthemark.com/cartoons/1999-10-21.gif

Case 4

3 wks from now | **ED, Room 4**

Patient

12mosM w/ fever and URI sx's for 3 days. Went to PCP for eval of fever. Incidentally reported pt was eating a peanut that morning, immediately began coughing and wheezing. Had intermittent wheezing in office. No tx in office – sent to ED for eval.

RR 30 96% RA HR 154 T 38.2

crying

exp wheezing throughout R>L. Decr BS on right?

your **thorough** exam is o/w unremarkable

What to do?

Soooo….

- We gave him an albuterol neb
  - Wheezing resolved
  - Symmetric BS
  - No distress

WHAT WOULD YOU DO AT THIS POINT?

Summary

Bronchiolitis

Clinical diagnosis

Bronchodilator trial

Consider high risk features

Pneumonia

CXR not required

Amoxil 1st-line

Asthma

Albuterol + Atovent in ED

Systemic steroids

Consider inhaled steroids

Work hard not to intubate

Foreign Body

High-index of suspicion

Selected References

1. American Academy of Pediatrics Subcommittee on the Diagnosis and Management of Bronchiolitis. *Pediatrics*. 2006;118: 1174-93.
2. Zorc JJ and CB Hall. Bronchiolitis: Recent evidence on Diagnosis and Management. *Pediatrics*. 2010;125:342-349.
3. MB, Greenes DS. Identifying hospitalized infants who have bronchiolitis and are at high risk for apnea. *Ann Emerg Med*. 2006;48(4):441-447.
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5. Willwerth BM, Harper Bradley JS *et al*. The Management of Community-Acquired Pneumonia in Infants and Children Older than 3 month of Age: Clinical Practice Guidelines by the Pediatric Infectious Society and the Infectious Diseases Society of America. *Clin Infect Dis*. 2011;53:e25-76.