Sensitivity & specificity

Definition

Pneumonia

Recognition • Fast breathing • Antibiotics

Severe Pneumonia or Very Severe Disease

Lower chest wall indrawing
Recognition • Clinical signs • Antibiotics

Wheezing

Causes • Drug management
Disadvantages of Addition
Consider Addition
Recognition

• Based on fast breathing, and lower chest wall indrawing

• “Cough OR difficult breathing,” not “cough AND difficult breathing”
  - Fewer than 25 percent of children with cough also have difficult breathing
  - Many causes of difficult breathing not related to cough
  - Using both can cause false positives
Sensitivity and Specificity

Definitions

- **Sensitivity** - the proportion of those with the disease who are correctly identified by sign. It measures how sensitive the sign is in detecting the disease.

- **Specificity** - the proportion of those without the disease who are correctly called free of the disease by using the sign.

- Low sensitivity of diagnosis is a more serious problem than low specificity.

- Respiratory cut-off rates determined by ROC curve.
Fast breathing

- Fast breathing based on age-specific thresholds
  - 2 to 12 months ≥ 50
  - 12 months up to 5 years ≥ 40
  - If rate is below cut-offs (plus no danger signs and no chest wall indrawing) the classification is no pneumonia, cough and cold.
- Use timing device to count rate for one full minute (preferably)
- Best to count rate in a quiet and alert child
- Fever can affect respiratory rates, but do not wait for fever to subside
**Acute Respiratory Infections**

**Pneumonia**

**Fast breathing**

- Initial WHO respiratory rate cut-off of 50/minute based on Goroka, Papua New Guinea studies

- Studies in Gambia and Philippines showed this cut-off rate was not specific enough for children 1 to 4 years

- Threshold for older children was lowered to 40/minute and confirmed with studies

- Two rates may cause confusion but advantage is increased sensitivity
Severe Pneumonia

Lower chest wall indrawing

- Problems in recognizing children who should be urgently referred

- “Retractions” suggested as indication of severe disease but multiple definitions existed

- Studies found lower chest wall indrawing best identified children who required assessment or admission
  - must be definite, present all the time
Severe Pneumonia or Very Severe Disease

Recognition

- Urgently refer children with Cough or difficult breathing **AND**
  - Lower chest wall indrawing **OR**
  - Stridor when calm **OR**
  - Any general danger sign
### Severe pneumonia or Very Severe Disease

#### Clinical signs

<table>
<thead>
<tr>
<th></th>
<th>Chest indrawing</th>
<th>Stridor when calm</th>
<th>Danger signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe pneumonia</td>
<td>+</td>
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<td>±</td>
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<tr>
<td>Bronchiolitis</td>
<td>±</td>
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<td>Asthma</td>
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<td>Epiglottitis</td>
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<td>Laryngo-tracheitis</td>
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<tr>
<td>Severe anaemia</td>
<td>±</td>
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<td>Meningitis</td>
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<td></td>
<td>+</td>
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<tr>
<td>Septicaemia</td>
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</tbody>
</table>

+ = always present  ± = Present sometimes

A combination of clinical signs indicates need for referral and further assessment.

Identification of potentially life threatening diseases must be made by a proper physical examination at a higher level facility.
Antibiotics

• **Cotrimoxazole**
  - Inexpensive, twice a day dosage
  - Few adverse effects
  - Resistance to S. pneumoniae and H. influenzae

• **Amoxicillin**
  - More expensive, 3 times daily
  - Drug reactions are less common, but include diarrhoea
  - Clinically effective against penicillin-resistant pneumococci
Severe pneumonia or Very Severe Disease

Antibiotics

- Invasive bacterial organisms warrant injectable antibiotics
  - Delivered to the blood and/or meninges
  - Incessant vomiting or shock prohibit oral antibiotics

- Penicillin – IM
  - Inexpensive
  - Widely available
  - Limited organisms treated
  - Poor CSF penetration
**Severe pneumonia or Very Severe Disease**

**Antibiotics**

- Chloramphenicol intramuscularly
  - Broader range of organisms treated
  - Good CSF penetration
  - Bioequivalent to IV administration
  - Some reluctance because diosyncratic aplastic anaemia occurs in 1 in 80,000 to 100,000
  - Still best choice as a single dose pre-referral antibiotic
Wheezeing

Causes

- Under age 2 - Bronchiolitis
- Older children plus those with recurrent attacks of wheeze - bronchial asthma or reactive airways disease
  - transient wheezers
  - persistent wheezers
- Other respiratory infections
- Inhaled foreign body
- Tuberculous node compressing bronchus
A c u t e   R e s p i r a t o r y   I n f e c t i o n s

W h e e z i n g

D r u g   m a n a g e m e n t

• Bronchodilators for asthma or recurrent airways disease but **not** for bronchiolitis

• Use of metered-dose inhalers with spacer device

• Relatively inexpensive - Salbutamol inhaler $ 1.50 for 200 doses

• Can be used in outpatient setting and at home

• Combined inhaler and inhaled steroids (expensive) reserved for cases of recurrent asthma
Disadvantages of Addition

- Not a major cause of mortality
- Recognition of audible wheeze is poor with low specificity
- Incorrect diagnoses increase clinic visits and drug use
- Drugs and supplies expensive to buy and maintain at first-level facilities
- Drugs often diverted to adults
Wheezeing

Consider Addition

- In countries that can afford bronchodilators and where morbidity from asthma is a problem
- In areas where rapid-acting bronchodilators are available at first-level facilities
- When health workers are trained to recognize audible wheeze and use bronchodilators
Wheezeing

Consider Addition

- If it will reduce unnecessary referral to the hospital
- If caretakers can be trained in home use/compliance
- If the health worker can recognize when a child with recurrent wheeze is not responsive in the first-level health facility
- If health workers can recognize underlying bacterial pneumonia