Acute Respiratory Tract Infections
Introduction

- ARI responsible for 20% of childhood (< 5 years) deaths
  - 90% from pneumonia
- ARI mortality highest in children
  - HIV-infected
  - Under 2 year of age
  - Malnourished
  - Weaned early
  - Poorly educated parents
  - Difficult access to healthcare
- Out-patient visits
  - 20-60%
- Admissions
  - 12-45%
Introduction

- **In South Africa**
  - Same picture as elsewhere
    - 20% deaths under 5 years
    - Acute pneumonia 90%

- **Western Cape**
  - Pulmonary TB incidence among highest in world
    - 576/100 000 children per year

- ARI and TB influenced by HIV
Introduction

- Upper and lower respiratory tract separated at base of epiglottis
- Six to eight respiratory tract infections per year (2-3 years)
- Lower respiratory tract involved in 20-30% of these
Factors influencing the incidence of respiratory tract infections

- Poor nutritional status
- Poor socio-economic status
- Parental smoking
- Parasitic infection
- Structural abnormalities
- Breastfeeding and early weaning
- Immunization
- HIV incidence
- Rainy and cold weather
Danger Signs (IMCI)

- High risk of death from respiratory illness
  - Younger than 2 months
  - Decreased level of consciousness
  - Stridor when calm
  - Severe malnutrition
  - Associated symptomatic HIV/AIDS
Pneumonia

- Developed world
  - Viral infections
  - Low morbidity and mortality
- Developing world
  - Common cause of death
  - Bacteria and PCP in 65%
- ARI case management WHO
  - 84% reduction in mortality
  - Respiratory rate, recession, ability to drink
  - Cheap, oral and effective antibiotics
    - Co-trimoxazole, amoxycillin
  - Maternal education
  - Referral
# ARI: Classification and management

<table>
<thead>
<tr>
<th>1. No pneumonia</th>
<th>Cough</th>
<th>Supportive measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not tachypnoea</td>
<td>Antipyretic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No antibiotics</td>
</tr>
<tr>
<td>2. Pneumonia</td>
<td>Cough</td>
<td>Supportive measures</td>
</tr>
<tr>
<td></td>
<td>Tachypnoea</td>
<td>Antipyretic</td>
</tr>
<tr>
<td></td>
<td>No rib or sternal retraction</td>
<td>Antibiotics</td>
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<tr>
<td>3. Severe pneumonia</td>
<td>Cough</td>
<td>Supportive measures</td>
</tr>
<tr>
<td></td>
<td>Tachypnoea</td>
<td>Antibiotics</td>
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<tr>
<td></td>
<td>Rib and sternal retraction</td>
<td>Refer to hospital</td>
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<tr>
<td>4. Very severe pneumonia</td>
<td>Cough</td>
<td>Supportive measures</td>
</tr>
<tr>
<td></td>
<td>Tachypnoea</td>
<td>Oxygen</td>
</tr>
<tr>
<td></td>
<td>Chest wall retraction</td>
<td>Antibiotics</td>
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<tr>
<td></td>
<td>Unable to drink</td>
<td>Immediate referral to level 2 or 3 hospital</td>
</tr>
<tr>
<td></td>
<td>Cyanosis</td>
<td></td>
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</tbody>
</table>
Tachypnoea

- Less than 3 months > 60 breaths per minute
- 3 months - 12 months > 50 breaths per minute
- 1 year – 4 years > 40 breaths per minute
Measures before transferring to hospital

- Antipyretics
- Oxygen
  - 40% by mask or prongs
- Suctioning of secretions
- Stomach tube
  - For decompression,
  - Give fluids
- Severely distressed, IV fluids
- Intravenous penicillin
Etiology

- Vary according to
  - Age, immune status, where contracted
- Community acquired (CAP)
  - Developing countries
    - S. pneumoniae, H. influenzae, S aureus
    - Viruses 40%
    - Other: Mycoplasma, Chlamydia, Moraxella
  - Developed countries
    - Viruses: RSV, Adenovirus, Parainfluenza, Influenza
    - Mycoplasma pneumoniae and Chlamydia pneumoniae
    - Bacteria: 5-10%
# Etiology in special groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Organisms</th>
<th>Antibiotic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immune compromised</td>
<td>Gram negative S. aureus</td>
<td>Ampicillin + Cloxacillin + Aminoglycoside</td>
</tr>
<tr>
<td></td>
<td>Opportunistic</td>
<td></td>
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<tr>
<td></td>
<td>Pneumocystis jiroveci</td>
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</tr>
<tr>
<td></td>
<td>M. tuberculosis</td>
<td></td>
</tr>
<tr>
<td>Less than 3 months</td>
<td>Gram negative Group B streptococcus S. aureus</td>
<td>Ampicillin + Aminoglycoside</td>
</tr>
<tr>
<td>Hospital acquired pneumonia</td>
<td>Gram negative Methicillin resistant S. aureus</td>
<td>Aminoglycoside + Vancomycin + Cephalosporin (3rd generation)</td>
</tr>
</tbody>
</table>
Clinical picture

- Neonates may have non-specific signs
  - Lethargy, failure to feed, temperature instability, apnoea or tachypnoea
- Older children
  - Runny nose, sore throat followed by cough, fever and tachypnoea
- More serious pneumonia
  - Tachypnoea, chest indrawing, feeding difficulty
- Respiratory failure
  - Severe tachypnoea, chest indrawing, restlessness, grunting, tachycardia and central cyanosis
Examination

- Altered breath sounds and crackles
- Signs of lobar pneumonia in minority
  - dullness to percussion, bronchial breathing
- Mild pneumonia only tachypnoea
- Measure severity of hypoxia with transcutaneous saturation monitor
- Sudden deterioration suggestive of complication
  - Pneumothorax, pyopneumothorax
Radiology

- **Bacterial**
  - Poorly demarcated alveolar opacities with air bronchograms
  - Lobar or segmental opacification
Radiology

- Viral
  - Perihilar streaking, interstitial changes, air trapping
Radiology

- Clues to other specific organisms
  - Staphylococcus – areas of break-down
  - Klebsiella, anaerobes, H. influenza or TB – cavitating or expansile pneumonia
  - TB, S. aureus, H. influenza – pleural effusion and empyema
Diagnosis

- White cell count and CRP
- Blood cultures
  - 25% positive
- Sputum specimen
  - Induced sputum
    • PCP
    • TB
- Lung aspirates
- Tuberculin skin test
- Viruses
  - culture
  - antigen
Treatment

- Antibiotics
  - Primary care level
    - Amoxycillin, co-trimoxazole
  - Regional hospital
    - Amoxycillin, cloxacillin, penicillin, erythromycin
  - Special categories – see table

- Oxygen
  - When?
  - Methods of delivery

- Blood transfusion

- Hydration
  - 50 – 80ml/kg/day

- Temperature control

- Airway obstruction

- Other e.g. Vit A
Treatments with NO proven benefit in acute pneumonia in children

- Mucolytics
- Chest physiotherapy
- Postural drainage
- Nebulization
Failure to respond

- Incorrect or inadequate dose of antibiotic
- Resistant or not suspected organism
- Empyema or other complication
- TB
- Suppressed immunity
- Underlying cause
  - e.g. foreign body or bronchiectasis
- Left heart failure and not pneumonia

Refer if no improvement after 3 – 5 days
Prognosis

- Most children recover without residual damage
- Incorrect treatment leads to tissue destruction and bronchiectasis
- Half of children with pneumonia secondary to measles or adenovirus have persistent airway obstruction