The Context and Key Problems of Pneumonia Diagnosis in Low Resource Settings

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Outline

- Burden of childhood pneumonia
- Diagnosis of pneumonia
- Current WHO/UNICEF management algorithm
- Key problems in diagnosis
- Key needs of health care workers for diagnosis
- Programmatic trends and Opportunities
### Burden of childhood pneumonia

- **6.6 million deaths** among children <5y in 2012

  Causing > 75% Deaths

<table>
<thead>
<tr>
<th>Cause</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn problems</td>
<td>3 M</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>1 M</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>0.6 M</td>
</tr>
<tr>
<td>Malaria</td>
<td>0.5 M</td>
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</table>

- **15% (1 million)** were caused by pneumonia

Major causes of mortality in < 5 yrs old children

Sources:
2. *For undernutrition: Black et al. Lancet, 2013*
Burden of Hypoxia

- Every year approximately 11–20M children are admitted with pneumonia.

- At least 13.3-37.5% (1.5–2.7M) have hypoxaemia.

- Hypoxia contributes to the over 1 M deaths due to pneumonia.
Diagnosis of Pneumonia
Diagnosis of Childhood Community-Acquired Pneumonia (1)

- No simple, reliable way to establish aetiology
  - Bacteremia in only 5-20%
  - Virus are more common cause than bacteria
  - 14-35% are virus alone & 8-40% are mixed infection
  - 20-60% unidentified
  - Virus in nasopharyngeal specimen does not mean that it is the cause
  - Often precede with viral and follow with bacterial
Diagnosis of Childhood Community-Acquired Pneumonia (2)

- Chest X-ray is gold standard for diagnosis of pneumonia - Unreliable
- Other tests – Lung punctures, CRP, PCR, Calcitonin
- Sputum is not a good specimen, except when AFB is positive
- No rapid point of care test available
- Clinical signs & symptoms are **MOST** commonly used for diagnosis
  - Cyanosis, nasal flaring, head nodding, stridor
  - Fast breathing
  - Lower chest wall indrawing, intercostal recession, subcostal recession
  - Signs on chest auscultation – crepitations, crackles, wheeze, bronchial breathing
## Guidelines for Management of Pneumonia

<table>
<thead>
<tr>
<th>Industrialized Countries</th>
<th>Developing Countries</th>
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<tbody>
<tr>
<td><strong>US, UK</strong></td>
<td><strong>WHO/UNICEF</strong></td>
</tr>
<tr>
<td>- For hospital based</td>
<td>- Outpatient and community based:</td>
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<tr>
<td>- Qualified staff available to evaluate severity</td>
<td>- Integrated Management of Childhood Illness (IMCI)</td>
</tr>
<tr>
<td>- Chest X-ray available</td>
<td>- Integrated community case management (iCCM)</td>
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<tr>
<td>- Antibiotics, Oxygen &amp; supportive care are available</td>
<td>- Hospital based for seriously sick children</td>
</tr>
<tr>
<td><strong>Challenges:</strong></td>
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</tr>
<tr>
<td></td>
<td>- Inadequate or inappropriately trained staff</td>
</tr>
<tr>
<td></td>
<td>- Chest X-ray may not be available</td>
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<tr>
<td></td>
<td>- Poor and low education in care-givers,</td>
</tr>
<tr>
<td></td>
<td>- No oxygen at 1st level setting (sometimes at 2nd level)</td>
</tr>
<tr>
<td></td>
<td>- Clinical overlap of malaria and pneumonia</td>
</tr>
<tr>
<td></td>
<td>- Dysfunctional Health system</td>
</tr>
</tbody>
</table>
Sensitivity and Specificity of fast breathing

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.

Sensitivity and specificity of fast breathing is 75 to 80%

India, Lesotho, PNG, The Phillipines, The Gambia, Swaziland
Current IMCI Clinical guidelines Pneumonia Standard Case Management (SCM)

0-59 months old child with ARI symptoms presents to a health worker

Assess, classify, identify treatment, counseling and follow-up

General danger signs*

Referral to facility for injectable antibiotic/supportive therapy

Fast breathing‡ & Chest indrawing

Child <2 months

Child 2-59 months

Oral amoxicillin

Cough & Cold

Homecare advice

* Unable to drink, convulsions, abnormally sleepy or difficult to awake, stridor in a clam child, hypoxia $O_2$ sat. < 90% or clinically severe malnutrition

‡ RR $\geq$60 (infants up to 2 months) ; $\geq$50 (infants 2–11 months) & $\geq$40 (children 12–59 months)
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Key Problems in Pneumonia Diagnosis and Management
**ASSESS**

- **DANGER SIGNS**
  - ASK questions from mothers/caretaker
  - LOOK for danger signs

- **MAIN SYMPTOMS** – cough or difficult breathing
  - ASK – duration of symptoms
  - LOOK – count breaths, chest indrawing
  - LOOK & LISTEN - wheeze

**Break points in diagnosis**
Challenges - Pneumonia Diagnosis in IMCI & iCCM (2)

CLASSIFY & IDENTIFY TREATMENT

- Use SIGNS
  - RED – Danger signs, chest indrawing - Refer
  - YELLOW – Fast Breathing – Oral antibiotic at home
  - GREEN – Cough or cold – Home management

Break points in diagnosis
Challenges - Pneumonia Diagnosis in IMCI & iCCM (3)

ADVISE FOR HOME CARE & FOLLOW-UP

- TEACH/ADVISE mothers
- Oral medicines at home
- Follow-up care at home
- Check mother’s understanding
- Follow-up visit – sicker – refer urgently

Break points in management
Key needs for pneumonia diagnosis and management for health workers
Skills & Tools to Diagnosis Pneumonia

- Skills of workers to use correct criteria
  - Recognition of symptoms and signs
  - Classify and treat
  - Counsel care at home and follow-up

- Ability to use appropriate tools
  - Counting breaths to assess fast breathing
    - Timer - counting for one minute
    - Beads or other methods for illiterate HWs
  - Stethoscope
  - Pulse oximeter to assess hypoxemia
Programmatic trends and Opportunities to use tools

- Integrated Management of Childhood Illness (IMCI)
- Integrated CCM for 2-59 months
- Care of young infants in community
  - Home visits – 3 within first week of life
  - Treatment of infections
Summary

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THANK YOU