Parnami, 3 year old female

- Presents with an acute history of fever, cough for 3 days
- She is irritable and has significant cough
- The parents are worried because the local practitioner has told them that Parnami has pneumonia and should be admitted. They seek your opinion.

What will you look, hear or investigate to confirm the diagnosis?

TACHYPNEA –
Most consistent clinical sign of pneumonia

Age	Respiratory rate (breaths/min)
< 2 months	60 or more
2 months upto 12 mo	50 or more
12 months upto 5 years	40 or more

WHO recommends using these Respiratory rate cutoffs to diagnose pneumonia at the community level

RR should be counted for full 60 secs.

Parnami has a respiratory rate of 48/min

- She has tachypnoea and a RR higher than the age specific cutoffs endorsed by WHO,
- Dr Padma, your resident says “Does this mean she has pneumonia? This is simple and I can use this in my OPD screening too”.

Is she right?

Age	Respiratory rate (breaths/min)
< 2 months	**60 or more**
2 months upto 12 months	**50 or more**
12 months upto 5 years	**40 or more**

Tachypnoea

- A sensitive and specific tool – 66% approx,
  - as good or better than auscultation for pneumonia
- But, several clinical situations can cause rapid breathing e.g. Asthma / Bronchiolitis/ WALRI
- Non pulm causes like metabolic acidosis, CHF, raised ICT can also cause tachypnoea

A clinician must use this merely as a beginning step.

Use all clinical skills for making a final conclusion.

Child with Cough, Rapid, Difficult breathing

- **Consider Bronchiolitis-walri** if:
  - Age 1mo -1yr
  - Presence of Upper respiratory catarrh
  - Progressive increase in resp distress (tachypnoea, retractions)
  - Wheeze ± crackles
  - Clinical and radiological evidence of hyperinflation

Child with Cough, Rapid, Difficult breathing

- **Consider LTB-Croup** if:
  - Hoarseness of voice and barking/brassy cough
  - Stridor
  - Mild to marked respiratory distress
  - Sonorous rhonchi
  - Fever usually mild or spiking (tracheitis, rare)

Child with Cough, Rapid, Difficult breathing

- **Consider Asthma if:**
  - Recurrent episode, 3 or more
  - Wheeze
  - Good response to bronchodilator
  - Hyperinflation
  - Family/personal history of atopy

Can viral LRTI or bacterial pneumonia be clinically distinguished

- May be difficult as the investigations do not confirm etiology
- Advantage of using the suggested methodology- decreases the confounders to viral pneumonia alone rather than broad ARI

Let us discuss CAP

Dr Padma is now convinced. She says, “Now I know that simple clinical tools used judiciously can differentiate between different causes for cough and rapid breathing. And therefore help us be rational in management.”

But Sir,

A. **How do I confirm the diagnosis?**

and if I have to use the correct antibiotics,

B. **How can I suspect or confirm the probable organisms?**”

Investigations and their relevance

DIAGNOSIS RADIOLOGICAL

- Do all patients require a chest radiograph?
  - NO,
    - Not all CAP, **particularly if on domiciliary treatment**
- Few -Yes,
  - If severely ill
  - If complication suspected (for example, pleural effusion)
  - Ambiguous Clinical features

MICROBIOLOGICAL

- Not recommended routinely
- Takes a long time and hence has limited utility
- Sputum cultures / cough swabs have relatively poor reliability
- Invasive methods can not be justified for routine pneumonias.

Role of acute phase reactants, etc. in pneumonia

- TLC, DLC, CRP are not diagnostic but may be useful to monitor the response to treatment.

- .

QUESTIONS?????

- In the absence of a microbiological diagnosis in most cases, How does one know which bacteria is the offending organism?
- Are there any other supportive evidences for the probable etiology?

Age related Pathogens involved in Community Aq Pneumonia

0-3 months	Gram Negative *St pyogenes* *Chlamydia* Viruses
3mo-5yrs	***Str pneumoniae*** ***H Influenzae*** *Staph aureus* Viruses *Mycoplasma pneum*
>5 yrs	***Str pneumoniae*** *Staph aureus* Viruses ***Mycoplasma pneum*** *St pyogenes*

Defining Community Acquired Pneumonia

- It is an acute infection of the pulmonary parenchyma in a **previously healthy child,**
- acquired <u>outside of a hospital setting.</u>
  - patient should not have been hospitalized within 14 days prior to the onset of symptoms

    or
  - has been hospitalized less than 4 days prior to onset of symptoms.

What it excludes

- Child with any immune-deficiency
  - Severe Malnutrition
  - Post measles state
- Ventilator assoc Pneum
- Nosocomial spread

Reliability of predicting a special etiological agent based on clinical features and/or radiography

- Generally POOR
- ONE EXCEPTION - STAPH
  - More likely if
    - Very rapid progression
    - Skin Lesions, infected scabies
    - PE/ Pneumothorax/ empyema
    - ?post measles

Parnami

- On detailed examination, she has tachypnoea, no cyanosis or diaphoresis. She is conscious but irritable.
- She has significant lower chest retractions and flaring of the alae nasi.
- How bad is she? How should she be treated?

The ball is in your court!

Indications for admission to hospital

- SaO_2 < 92%,
- Marked tachypnea, say 20+breaths/min above the cut off for the age
- difficulty in breathing
- intermittent apnea, grunting
- not feeding/ dehydrated
- family not able to provide appropriate observation or supervision.
- Failure of OPD treatment

Disease	**Pneumonia**		
Setting	Domicilliary		
AGE	First Line	Second Line#	Suspected Staphylococcal ds
Upto	Usually Severe, treated as inpatients		
	Clavulanic acid	OR	Amoxycillin* + Cloxacillin*

Second line domiciliary therapy is for patients who show inadequate or no response to first line treatment after 48hrs, though have no deterioration or increase in severity.

*Use Separately in 1:2 ratio as combinations available are not scientifically correct

Severe – Very Severe Pneumonia		
Treat as In-patient		
Age	First Line	Second Line
0-3 mo	Inj 3rd Gen Cephalosporins: Cefotaxime/Ceftriaxone ± Aminoglycoside (Gent/Amika)	Inj Co-amoxy clavulinic acid + Aminoglycoside (Gent/Amika)

Severe- Very Severe Disease

SUSPECTED STAPHYLOCOCCAL DS

Inj 3rd Gen Cephalosporins: Cefotaxime/Ceftriaxone
+ Cloxacillin
OR
Inj Cefuroxime ± Aminoglycoside
OR
Inj Co-amoxyclavulinic acid + Aminoglycoside

Second line: Vancomycin/ Teicoplanin/ Linezolid
+
Inj 3rd Gen Cephalosporins

Supportive therapy for CAP

- **Oxygen :**
  - as indicated by pulse oxymetry and/ or ,
  - clinical signs of hypoxia like rapid breathing as well as retractions
- **IV Fluids:**
  - If dehydrated,
  - Tachypnoea severe enough to make the child unable to drink, or
  - impending respiratory failure.
- **Fever management**
  - Important as fever increase oxygen requirement
  - Paracetamol and sponging are useful in most situations.
- **Bronchodilators**, where indicated
  - should be used to decrease the work of breathing.

Duration and mode of therapy

- Domiciliary 5-7 days, Oral
- If admitted:
  - All antibiotics by parenteral route (i.v.) to begin with
  - Switch to oral after 48-72 hrs or earlier if can accept orally.
  - Step-down/ switch therapy for Inj 3rd generation Cephalosporins
    - 3rd generation oral like Cefpodoxime
    - NOT Cefixime because it lacks action against *Strep. Pneumoniae*
    - Fluoroquinolones are not recommended
  - Total 5-7 days more

- If on second line, then treat for 7-10days
- If *Staphylococcal* disease.:
  - 2 weeks if no complication;
  - Else 4-6 weeks

Parnami

- While on treatment with Inj co-amoxyclav, Parnami deteriorates on 5th day of treatment
- Her X-ray shows progression of her disease to the other lung as well.
- She is very distressed, has irregular breathing and has cyanosis

Should she be shifted elsewhere?

The ball is in your court!

INDICATIONS FOR TRANSFER TO PICU

- Failure to maintain SaO_2 >92% in FiO_2 >0.6
- Cyanosis
- Shock
- Rising respiratory and pulse rates with clinical evidence of severe respiratory distress and exhaustion with or without raised $PaCO_2$
- recurrent apnea or slow irregular breathing.
- Excessive diaphoresis