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Standard Treatment Workflow (STW) for the Management of SEVERE PNEUMONIA IN CHILDREN

ICD10-J18.9

PRESENTING SYMPTOMS /WHEN TO SUSPECT?

Cough, cold, with or without fever, difficulty in breathing (that includes fast breathing and chest indrawing) of less than 2 weeks duration.

GENERAL DANGER SIGNS
Not able to drink, persistent vomiting, convulsions, lethargic or unconscious, stridor in a calm child or severe malnutrition.

SUSPICION OF FOREIGN BODY ASPIRATION
Sudden onset choking and breathlessness.

ADDITIONAL INFORMATION CHECK FOR HISTORY OF

- Similar illness in past, if yes, history of improvement with nebulized medications to consider asthma.
- Asthma/allergy in family.
- Influenza like illness in family over past 2 weeks: to consider treatment for influenza.
- Immunization (age appropriate specifically vaccination included in national schedule and Pneumococcus, Influenza).

EXAMINATION FOR FOLLOWING SIGNS

Chest indrawing, state of alertness, cyanosis, clubbing, stridor, grunting.

VITAL SIGNS

Respiratory rates, heart rate, temperature, capillary refill time, pulse oximetry.

NUTRITIONAL STATUS

Specifically for defining Severe Acute Malnutrition (SAM).

AUSCULTATION OF CHEST

Breath sounds, crepitation, rhonchi.

DIAGNOSTIC ALGORITHM

Child age 2–59 months with cough and/or difficult breathing.

RED FLAG SIGNS
Irregular or gasping respiration, cold extremities, altered sensorium, cyanosis.

NO PNEUMONIA	PNEUMONIA	SEVERE PNEUMONIA	
Cough and cold, no breathing difficulty.	Fast breathing (2-12 months >50; 1-5 years>40; >5 years >20) and/or chest indrawing oxygen saturation>92%.	Fast breathing (2-12months>50; 1-5 years>40 ;>5 years >20) and/or chest indrawing with any of the general danger signs (not able to drink, persistent vomiting, convulsions, lethargic or unconscious, stridor in a calm child or severe malnutrition).	
Home care advice.	Ambulatory treatment with oral Amoxicillin and follow up.	**No red flag signs** Admit or refer to a facility with following: oxygen by mask or hood, pulse oximeter, IV fluids, oxygen, clinical supervision, X ray film (desirable).	**Red flag signs positive** Admit or refer to facility with following: Appropriate: ventilation facility, ICU, round the clock monitoring **If plan to refer:** Give first dose of antibiotics, arrange transport and inform to the referral centre.

INVESTIGATIONS

ESSENTIAL: Hemogram, random blood sugar, CRP, chest X-ray.
DESIRABLE: Blood culture, pleural tap, serum electrolytes, renal and liver function tests.
OPTIONAL: ABG, lung ultrasound, PCT, tracheal aspirate (gram stain with culture), bronchoscopy/BAL, microbiology culture, investigations for atypical organisms, PCR for viral etiology.

TREATMENT

OXYGEN INHALATION: by mask (1-2 L/min) or hood (4-6 L/Minute) to maintain oxygen saturation> 95%.

IV ANTIBIOTICS:

- **For children 2-59 months:** Ampicillin 100-200mg/kg in four divided doses + Gentamicin 5-7.5 mg/kg as single dose daily.
- **For children >5 years:** Ampicillin/Amoxicillin, add macrolide (Azythromycin/Erythromycin) if atypical pneumonia is suspected.
- If suspected Staphylococcal pneumonia in any age (Pneumatocele on CXR, post measles, infected scabies or pyoderma) add Cloxacillin/ Amoxiclavulanic acid.

SUPPORTIVE CARE: Paracetamol for fever, IV fluid, bronchodilators (inhaled) as needed.

WHEN AND WHAT TO SWITCH TO ORAL AND DURATION:

- **Child is afebrile, RR has returned to below age specific cutoffs, no chest indrawing and accepting orally:** switch to oral Amoxicillin to complete a total of 5-7 days duration (include duration of IV also in it).
- **If getting Doxacillin/Amoxyclav:** continue oral Cloxacillin or Amoxclav for 2 weeks.
- Start feeding as soon as possible when child shows improvement.

IF ASSOCIATED SAM: follow treatment guidelines for SAM.

COMPLICATIONS AND THEIR TREATMENT

NON RESPONDERS: persistence of symptoms and/or signs 48-72 hours after initiation of appropriate treatment-change antimicrobials.
PLEURAL EFFUSION: diagnostic aspiration.
EMPYEMA: drainage with ICD.
LUNG ABSCESS: change antibiotics for longer duration (4-6 weeks).
PNEUMOTHORAX: Intercostal drainage.
RESPIRATORY FAILURE: consider ventilation.
INFECTION IN OTHER SITES: identify and treat appropriately.

ADDITIONAL INFORMATION

First and second line antibiotics for severe pneumonia:

FIRST LINE	ALTERNATE FIRST LINE	SECOND LINE
Ampicillin	First gen Cephalosporins	Amoxiclav Cefuroxime Cefotaxime/Ceftrioxone

WHEN TO REFER TO HIGHER CENTERS?

Facilities (as described above) for treatment or complications (if develops) are not available, suspecting chronic respiratory problems.

WHEN TO SUSPECT INFECTION WITH H1N1 VIRUS?

Child with cold, cough, fever with similar illness in any family members, consider H1N1 infection. Start Oseltamivir (as per national guideline).

WHEN TO SUSPECT ACUTE BRONCHIOLITIS?

A child below 2 years of age fulfilling case definition of first episode of severe pneumonia with predominant finding of wheezing on auscultation.

WHEN TO SUSPECT ASTHMA?

A child of age >3 years with history of recurrent cough, cold, wheezing with or without fever with good response to bronchodilator and personal or family history of asthma.

WHEN TO SUSPECT CHRONIC RESPIRATORY PROBLEM?

Child has any of the following: severe malnutrition, clubbing, feeding difficulty, family history of sibling death due to pneumonia, multi site infections (diarrhea, ear discharge oral thrush).

Discharge when child is switched to oral medications, accepting oral for 24 to 48 hours

KEEP A HIGH THRESHOLD FOR INVASIVE PROCEDURES

REFERENCES

1. *Integrated Management of Childhood Illness (IMCI) (revised). Geneva, World Health Organization/The United Nation Children's Fund (UNICEF), 2014 (http://www.who.int/maternal_child_adolescent/documents/IMCI_chartbooklet/en/).*
2. *Revised WHO classification and treatment of childhood pneumonia at health facilities. http://apps.who.int/iris/bitstream/handle/10665/137319/9789241507813_eng.pdf;jsessionid=8BF6F1C94BD7BA81B8F464D4CBA40249?sequence=1*
3. *Bradley JS, Byington CL, Shah SS, et al. Executive summary: 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. Clin Infect Dis 2011;53:617-30.*
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