Community acquired pneumonia
definition

- Symptoms of an acute LRTI
- New focal signs on chest examination
- At least one systemic feature
- New radiographic shadow
Definition{Crofton}

IT IS A SYNDROME CAUSED BY ACUTE INFECTION CHARACTERIZED BY

1. Symptoms
2. Signs
3. Radiographic picture of consolidation
The annual incidence in the community is 5-11 per 1000 adult pop. The incidence of CAP being admitted is 1-4 per 1000 pop. Between 5% & 10% of adults admitted to the hospital are managed in the ICU.
The mortality of the CAP pts managed at the OPD basis is < 1%

The mortality of the CAP pts admitted in the hospital is 5%-12%

The mortality in the ICU is up to 50%
CLASSIFICATION OF PNEUMONIA

ANATOMICAL

1. Lobar
2. Segmental
3. Subsegmental
4. Bronchopneumonia
Etiology {Microbiologist’s classification}

Gram positive organisms
S. aureus, S. pneumoniae

Gram negative organisms
E. coli, H. influenzae, K. pneumoniae

Anaerobic organisms
Peptococcus, Peptostreptococcus,
Bacteroides, Fusobacterium

Viruses
Influenza, Measles
BEHAVIORIST’S CLASSIFICATION

- Easy pneumonia
- Difficult pneumonia
The Etiology may differ in different population groups

Elderly- *H. influenzae*, atypical
Pts with COPD – *S. pneumoniae*,
    *H. influenzae*
Diabetic pts – Bacteremic pneumococcal pneumonia
Alcoholics – Anaerobes, Gm neg, legionella
Pts on steroids- Legionella
Nursing home residents- Anaerobes ,
    Gm neg,, legionella
Natural history

Routes of infection

1. Aspiration.
2. Inhalation.
3. Colonization
4. Hematogenous seeding.
NATURAL HISTORY CONT..

- Inflammation
- Consolidation
- Resolution or complication
Clinical features

- Symptoms
- Signs
- Vitals
Clinical features particular to an organism

St.pn: ac onset, increasing age, high fever & pleuritic pain

Mycoplasma: younger age, less multisystemic involvement

Legionella: younger pts, diarrhoea, neurological symptoms, evidence of multisystem involvement

Chlamydia: Longer duration of symptoms before admission
Imaging

- Chest x-ray
  - Homogenous shadow with an airbronchonchogram is seen typically in Lobar pneumonia
  - In Bronchopneumonia there are bilateral non homogenous alveolar shadows
  - Syn-pneumonic effusion can be seen

- USG Chest.

- CECT Chest
  - Lymphadenopathy
  - Early abscess formation
  - Syn-pneumonic effusion
Chest radiographs may suggest specific organisms

- S.pnemoniae
- S.aureus
- K.pneumoniae
General investigations at admission

- CXR
- CBC
- KFT, LFT, Sr ELECTROLYTES
- SaO₂, ABG
Investigations for patients admitted as non severe CAP for all patients…

- BLOOD CULTURE
- SPUTUM FOR GM STAINING AND CULTURE/SENSITIVITY.
- CLOTTED SERUM SAMPLE TO BE STORED
- PLEURAL FLUID EXAMINATION
CONT....

For selected patients......

- URINE FOR LEGIONELLA ANTIGEN
- BRONCHOSCOPY FOR CULTURE
  /SENST. OF YIELD
Investigations in patients with severe CAP...

- All the investigations as in cases of non-severe CAP
- Serum for all atypical organisms and pneumococcus
- Investigate for *Pnumocystis carini*
Non-Cultural tests for pneumococcus

- Antigen detection in various body fluids {sputum, serum, urine, pleural fluid}
- Antibodies
- PCR
Legionella

- Antigen in urine
- Antibodies from serum
- PCR from respiratory samples
Non-Culture methods for M.pnumniae and Chamydia

- Both are tested by antibody titer

- Chlamydia antigen testing is available
The idea of severity assessment is to categorize patient with respect to the risk of death.

For this purpose three criteria are taken into consideration:

1. Four “core” adverse prognostic factors [CURB SCORE]

2. Additional adverse prognostic features

3. Pre-existing adverse prognostic factors.
CORE ADVERSE PROGNOSTIC FACTORS (CURB SCORE)

1. confusion – new mental confusion.
2. urea > 7 mmol/l
3. respiratory rate – raised > 30/min
4. blood pressure – low
   [systolic < 90, diastolic < 60 mmHg]
ADDITIONAL PROGNOSTIC FACTORS

- Hypoxemia [ SaO$_2$ <92% ] or PaO$_2$ < 60mmHg.
- Bilateral or multilobe involvement on C-X RAY
PRE-EXISTING ADVERSE PROGNOSTIC FACTORS

1. Age >50 yrs
2. presence of co-existing disease
   [CAD, CHF, COPD, DM, CANCER, STROKE]
AT HOME TREATMENT

IF NONE OF THE CORE/ADDITIONAL/PRE-EXISTING ADVERSE PROGNISTIC FACTORS ARE PRESENT THEN PATIENT CAN BE TREATED ON OPD BASIS
IN HOSPITAL TREATMENT
[severe pneumonia may be in RICU under specialized pulmonology care]

If 2 or more core adverse factors are present then it should be treated as severe pneumonia
Patients having one core adverse feature with no additional/pre-existing feature should be treated as non severe pneumonia but may be treated as severe pneumonia if clinically thought.
One core adverse prognostic factor with additional / pre-existing disease may be treated as severe/non-severe pneumonia as per clinical judgment.
RATIONALE FOR SEVERITY ASSESSMENT

This is based on the risk of death of the patient.
- Low risk of death <0.5%, treated at home
- High risk of death up to 30%, treated as severe pneumonia
- Intermediate risk should be treated in IPD.
Management should broadly be divided into 4 parts:

1. General management
2. Empirical antibiotic therapy
3. Specific antibiotic therapy
4. Identify complications and their management.
GENERAL MANAGEMENT ON OPD BASIS

1. advice – not to smoke, to rest and drink plenty of fluids.
2. manage pleuritic pain with analgesics.
3. Nutritional support.
4. watch for core and additional adverse factors.
GENERAL MANAGEMENT ON IPD / RICU

- Should always be under pulmonologist and nurses trained in RICU.
- Monitor vitals and core adverse factors.
- On need basis do ABG and appropriate non invasive / IMV.
- Look for complications/review diagnosis.
- Obtain bronchoscopic yield samples for culture and sensitivity.
SPECIAL NOTE ON REPEAT CHEST RADIOGRAPHS

As a fact radiographic changes resolve lagging behind the clinical response.

The lag is more in elderly, smoker, multilobe involvement, in patients [complete resolution of CX-ray occurred at 2 weeks in 51%, 4 weeks in 64%, 73% at 6 weeks in one study]

[in another study with more sick patients the resolution took longer time and only 13% cleared at 2 weeks and 41% at 4 weeks]
Conclusion for imaging

The patient who is improving clinically and for whom there is no concerning clinical feature [deteriorating vitals, fresh localizing signs on chest examination, toxic features]

it is not necessary to perform C–x-ray in close succession.

C–x-ray should be performed at appropriate intervals.
Oral amoxicillin is the most preferred drug. Alternatively, macrolide (erythromycin/clarithromycin) can be used.
EMPERICAL ANTIBIOTIC THERAPY IN NON SEVERE PNEUMONIA

- Oral/ injectable amoxicillin and oral macrolides
- Alternatively oral/ injectable newer floroquinolones {levofloxacin / gatifloxacin}
EMPERICAL ANTIBIOTIC THERAPY IN SEVERE PNEUMONIA

Inj B-Lactamase inhibitor [augementin/second /third generation cephalosporin]

AND

Macrolide

alternatively

Inj benzylpenicillin AND Inj newer floroquinilons
CRITERIA OF SWITCHING FROM NTRAVENOUS TO ORAL TREATMENT

- Resolution of fever > 24 hrs
- pr, <100/min
- Resolution of tachypnea
- Clinically hydrated
- Resolution of hypotension
- Absence of hypoxia
- Improving CBC
- No concerns over gut absorption
DURATION OF ANTIBIOTICS

- OPD patients/Non severe pneumonia IPD ONE WEEK
- Severe pneumonia /gram negative/staph/atypical two to three w
DURATION OF ANTIBIOTICS

OPD patients/Non severe pneumonia
IPD

Severe pneumonia
/gram negative/
staph/atypical

ONE WEEK
TWO TO THREE WEEKS
FALIURE OF EMPERICAL ANTIBIOTIC THERAPY

- In OPD treated patients add a macrolide to amoxicillin monotherapy
- In IPD treated non-severe pneumonia patients add a newer fluoroquinolone
- The addition of rifampicin may be considered in a non-responsive patient of severe pneumonia being treated as inpatients
SPECIFIC ANTIBIOTICS FOR SPECIFIC ISOLATED ORGANISMS

- Pseudomonas aeruginosa
  - Ceftazidime 2 g tds iv
  - Plus gentamicin or tobramycin
  - Cipro or pepricillin and gena or tobra
  - Non-MRSA: flucloxacillin rifampicin
  - MRSA: vancomycin
  - Teicoplanin ± rifampicin

- S. aureus
Legionella spp

- Clarithromycin
- ± rifampicin
- Fluoroquinolones

M pneumoniae and C pneumoniae

- Erythromycin or Clarithromycin
- Tetracycline or Fluoroquinolones
- \textit{S. pneumoniae}
- Gram negative enteric bacilli

\begin{itemize}
  \item Amoxicillin \textit{or} benzyl penicillin
  \item Erythromycin \textit{or} clarithromycin
  \item Cefuroxime \textit{or} cefotaxime \textit{or} ceftriaxone
  \item Fluoroquinolone \textit{or} imipenem \textit{or} meropenem
\end{itemize}
FALIURE TO IMPROVE

- INCORRECT DIAGNOSIS
- INAPPROPRIATE TREATMENT
- COMPLICATIONS
INCORRECT DIAGNOSIS

- PULMONARY EDEMA
- PULMONARY EMBOLISM
- BRONCHIAL CARCINOMA
- PULMONARY KOCHS
- EOSINOPHILIC PNEUMONIA
- LOBAR SEQESTERATION
- FOREIGN BODY
COMPLICATIONS

- PARAPNEUMONIC EFFUSION/EMPYEMA
- LUNG ABSCESS
- ADULT RESPIRATORY DISTRESS SYNDROME
- METASTATIC INFECTION
- SEPTECIMIA
- END ORGAN FAILURE
- OVERWHELMING INFECTION
All the best..