PNEUMONIA PART II

DR UMMAR KHURSHID

RECURRENT PNEUMONIA

Recurrent Pneumonia

≥2 episodes of pneumonia within 6 months

or

≥3 episodes in a lifetime

Episodes separated by an asymptomatic interval of at least 1 month

or

Radiographic clearing of densities between episodes

Causes of Recurrent Pneumonia

- **Bronchial obstruction (bronchial carcinoma, adenoma, foreign body)**
- **Lung disease (Bronchial asthma, bronchiectasis, lung abscess, cystic fibrosis, sequestrate segment of lung—commonly left lower lobe)**
- **Aspiration (achalasia cardia, scleroderma, pharyngeal pouch)**
- **Immunocompromised patient (HIV, DM, lymphoma, leukemia, multiple myeloma)**

Discharge

Discharge and follow-up

- Depends on their home circumstances and the likelihood of complications.
- A chest x-ray need not be repeated before discharge in those making a satisfactory clinical recovery.
- Clinical review should be arranged around 6 weeks later
- A chest x-ray obtained if there are persistent symptoms, physical signs or reasons to suspect underlying malignancy.

Criteria for discharge

To discharge, the patient should be clinically stable with no more than one of the following clinical signs:

- **Temperature > 37.8 ºC**
- **Heart rate > 100/min**
- **Respiratory rate > 24/min**
- **Systolic BP < 90 mm Hg**
- **SaO_2 < 90%**
- **Inability to maintain oral intake**
- **Abnormal mental status.**

Remember

Before Discharge!!!!

- Influenza Vaccine
- Pneumococcal Vaccine

After Discharge!!!

- Follow up CXR to exclude cancer

Prevention

Preventive measures

- **Current smokers should be advised to stop smoking**
- **Influenza Vaccine & Pneumococcal Vaccine should be considered in selected pts**
- **In developing countries, tackling malnutrition & Indoor air pollution**
- **Immunization against measles, pertussis & Haemophillus influenzae type b in children**
- **Legionella pneumophila has important public health implications and usually requires notification to the appropriate health authority.**

COMPLICATIONS

Complication of pneumonia

- **Para-pneumonic effusion – common**
- **Empyema**
- **Retention of sputum causing lobar collapse**
- **Deep vein thrombosis and pulmonary embolism**
- **Pneumothorax, particularly with** *Staph. aureus*
- **Suppurative pneumonia/lung abscess**
- **ARDS, renal failure, multi-organ failure**
- **Pleurisy**

Complication of pneumonia…

- **Hypoxemia**
- **Atelectasis**
- **Respiratory failure (which requires mechanical ventilator)**
- **Sepsis, which may lead to organ failure**
- **Ectopic abscess formation (*Staph. aureus*)**
- **Hepatitis, pericarditis, myocarditis, meningoencephalitis**
- **Pyrexia due to drug hypersensitivity**

Vaccination

Influenza and pneumococcal vaccines in old age

- **Influenza vaccine reduces the risk of influenza and death in elderly people.**
- **Polysaccharide pneumococcal vaccines do not appear to reduce the incidence of pneumonia or death but may reduce the incidence of invasive pneumococcal disease.**

(Andrew R, et al.(Cochrane Review). Cochrane Library, issue 4, 2003. Oxford: Update software.)

Prognosis

- Most patients respond promptly to antibiotic therapy and wil improve within 2 weeks
- Elderly or very sick patients may need longer treatment.
- However, fever may persist for several days and the chest X-ray often takes several weeks or even months to resolve, especially in old age.
- The mortality rate of adults with non-severe pneumonia is very low (< 1%); hospital death rates are typically between 5 and 10% but may be as high as 50% in severe illness.

HAP (Hospital Acquired Pneumonia)

HAP (Hospital-acquired pneumonia)

- **Hospital-acquired or nosocomial pneumonia is a new episode of pneumonia occurring at least 2 days after admission to hospitaL**
- **New episode of pneumonia occurring at least 48 h post admission to hospital, excludes infection incubating at time of admission (Am J Respir Crit Care Med 153:1711-25, 1995).**

- **Second most common hospital-acquired infection.**
- **leading cause of HAI-associated death.**

HCAP & VAP

- Healthcare-associated pneumonia (HCAP):

  Development of pneumonia in a person who has spent at least 2 days in hospital within the last 90 days,

  - **Has attended a haemodialysis unit**
  - **Received intravenous antibiotics, or home infusion therapy**
  - **Resident in a nursing home or other long-term care facility**
  - **Home wound care**
  - **Family member with multidrug-resistant pathogen**

- Ventilator-associated pneumonia(VAP):

  The elderly are particularly at risk, along with patients in intensive care units, especially when mechanically ventilated; in the latter case, the term 'ventilator-associated pneumonia' (VAP) is used.

HAP (Hospital-acquired pneumonia)..

- **Early-onset HAP (occurring within 4–5 days of** admission) are similar to those involved in CAP.
- **Late onset HAP is associated with a different range of pathogens to CAP**

The organisms

- Gram-negative bacteria **(e.g. Escherichia, Pseudomonas, Klebsiella species and Acinetobacter baumannii),**
- Staph. aureus **(including the meticillin type resistant (MRSA))**
- anaerobes.

Factors predisposing to hospital-acquired pneumonia

Aspiration of nasopharyngeal or gastric secretions

- Immobility or reduced conscious level
- Vomiting, dysphasia (N.B. stroke disease), achalasia or severe reflux
- Nasogastric intubation

Bacteria introduced into lower respiratory tract

- Endotracheal intubation/ tracheostomy
- Infected ventilators/nebulisers/bronchoscopes
- Dental or sinus infection

Factors predisposing to hospital-acquired pneumonia…

Reduced host defenses against bacteria

- Reduced immune defenses (e.g. corticosteroid treatment, diabetes, malignancy)
- Reduced cough reflex (e.g. post-operative)
- Disordered mucociliary clearance (e.g. anaesthetic agents)
- Bulbar or vocal cord palsy

Bacteraemia

- Abdominal Sepsis,
- IV Cannula Infection,
- Infected Emboli

Factors predisposing to hospital-acquired pneumonia…

- **Chronic lung disease (COPD, bronchiectasis)**
- **Frequent suction**
- **Other serious illness such as heart disease, liver cirrhosis, and DM**
- **Recent cold, laryngitis or flu**
- **Immuno-suppressed patients**
- **Difficult swallowing (due to stroke, dementia,parkinsons disease, or other neurological conditions)**
- **Impaired consciousness (loss of brain function due to dementia, stroke, or other neurological conditions)**

Clinical features

The diagnosis should be considered in any hospitalized or ventilated patient who develops

- Purulent sputum (or endotracheal secretions),
- New radiological infiltrates,
- An otherwise unexplained increase in oxygen requirement,
- A core temperature of more than 38.3°C, and
- A leucocytosis or leucopenia.

Management

In early-onset HAP

- **Patients who have received no previous antibiotics can be treated with**
  - Co-amoxiclav or Cefuroxime.
- **If the patient has received a course of recent antibiotics, then**
  - Piperacillin / Tazobactam or
  - a third generation Cephalosporin should be considered

Management..

In late-onset HAP

the choice of antibiotics must cover the

- **Gram-negative bacteria,**
- **Staph. aureus (including MRSA) and**
- **anaerobes.**

Antipseudomonal cover may be provided by a

- **carbapenem (meropenem) or**
- **a third-generation cephalosporin combined with an aminoglycoside.**

Management..

- **MRSA cover may be provided by**
  - **glycopeptides, such as** Vancomycin or Linezolid
- Physiotherapy **is important to aid expectoration in**
  - **the immobile and**
  - **elderly**
- nutritional support **is often required.**

Antimicrobial options for common infecting bacteria

Organism	Antimicrobial options
Staph. aureus	Flucloxacillin, Clindamycin
Pseudomonas aeruginosa	Ciprofloxacin, Piperacillin-tazobactam, Aztreonam, Meropenem, Aminoglycosides, Ceftazidime/Cefepime
Enterobacter spp.	Ciprofloxacin, Meropenem, Aminoglycosides
Anti microbial option for MRSA	Clindamycin, Vancomycin, Rifampicin (Never used as monotherapy), Linezolid, Daptomycin, Tetracyclines, Tigecycline, Co-trimoxazole.

Prevention: HAP

Despite appropriate management, the mortality from HAP is approximately 30%, so prevention is very important.

- **Good hygiene is paramount, particularly with**
  - **handwashing**
  - **equipment used.**
- **To minimise the chances of aspiration**
- **To limit use of stress ulcer prophylaxis with PPI**
- **Oral antiseptic/mouth wash**

Prevention: HAP…

- The risk of aspiration should be minimized
- Oral antiseptic (chlorhexidine 2%) be used to may decontaminate the upper airway,
- Some intensive care units employ selective decontamination of the digestive tract when the anticipated requirement for ventilation will exceed 48 hours.

Prevention: HAP…

- Frequent turning of bed ridden patients and early ambulation as much as possible
- Coughing and breathing techniques
- Sterilization of respiratory therapy equipment
- Suctioning of secretion in the unconscious who have poor cough and swallowing reflexes, to prevent aspiration of secretions and its accumulation

Prevention: HAP…

- To prevent aspiration during nasogastric tube feedings
- check the position of tube and administer feedings slowly
- To control the spread of infection, dispose secretions properly.

Prevention: HAP…

- **Vaccination**

  Influenza & Pneumococcus

- **Isolation of patients with resistant respiratory tract infections**
- **Enteral nutrition**
- **Choice of GI prophylaxis**
- **Subglotic secretion removal**

HAP – Failure of Therapy

- Incorrect diagnosis (it is not pneumonia): Atelectasis, CHF, PE with infarction, lung contusion, chemical pneumonitis, ARDS, pulmonary hemorrhage
- Pathogen resistance
- Host factors that increase mortality
  - Age > 60, prior pneumonia, chronic lung disease
  - immunosuppression
- Antibiotic resistance

Am J Respir Crit Care Med 153:1711-25, 1995

Respiratory Infection In Old Age

Respiratory infection in old age

- **Increased risk of and from respiratory infection:** because of reduced immune responses, increased closing volumes, reduced respiratory muscle strength and endurance, altered mucus layer, poor nutritional status and the increased prevalence of chronic lung disease.

- **Predisposing factors:** other medical conditions may predispose to infection. e.g. swallowing difficulties due to stroke increase the risk of aspiration pneumonia.

Respiratory infection in old age…

- **Atypical presentation:** Older patients often present with confusion, rather than breathlessness or cough.

- **Mortality:** The vast majority of deaths from pneumonia in developed countries occur in older people.

- **Influenza:**
  - Higher complication rate, morbidity and mortality.
  - Vaccination significantly reduces morbidity and mortality in old age but uptake is poor.

Respiratory infection in old age…

❑ Tuberculosis:

- ➢ Most TB cases in old age represent reactivation of previous, often unrecognized disease
- ➢ Precipitated by steroid therapy, diabetes mellitus and the factors above.
- ➢ Cryptic miliary TB is an occasional alternative presentation.
- ➢ Older people more commonly suffer adverse effects from antituberculous chemotherapy and require close monitoring.

HAP – Risk Factors

Risk Factors For Multidrug-resistant Pathogens Causing HAP.HCAP.VAP

- **Antimicrobial therapy in preceding 90 days**
- **Current hospitalization of 5 days or more**
- **High frequency of antibiotic resistance in the community or in the specific hospital unit**
- **Immunosuppressive disease and/or therapy**

HAP – Modifying Factors

Penicillin-resistant and drug-resistant pneumococci

- **Age > 65 yr**
- **B-Lactam therapy within the past 3 months**
- **Alcoholism**
- **Immune-suppressive illness (including therapy w/ corticosteroids)**
- **Multiple medical comorbidities**
- **Exposure to a child in a day care center**

Am J Respir Crit Care Med 163:1730-54, 2001

HAP – Modifying Factors

Enteric gram-negatives

- Residence in a nursing home
- Underlying cardiopulmonary disease
- Multiple medical comorbidities
- Recent antibiotic therapy

HAP – Modifying Factors

Pseudomonas aeruginosa

- **Structural lung disease (bronchiectasis)**
- **Corticosteroid therapy (10 mg of prednisone per day)**
- **Broad-spectrum antibiotic therapy for > 7 d in the past month**
- **Malnutrition**

Pneumonia: Risk Factors

CAP

- Older adult
- Chronic/coexisting condition
- Recent history or exposure to viral or influenza infections
- History of tobacco or alcohol use

HAP

- Older adult
- Chronic lung disease
- Aspiration
- ET, Trach, NG / GT
- Immunocompromised
- Mechanical ventilation

Pneumonia In The Immunocompromised Patient

Pneumonia in the immunocompromised patient…

- **Patients immunocompromised by drugs or disease (particularly HIV) are at high risk of pulmonary infection.**
- **The majority of cases are caused by the same pathogens that cause pneumonia in non-immunocompromised individuals.**
- **Patients with more profound immunosuppressant, unusual organisms or those normally considered to be of low virulence or non-pathogenic may become 'opportunistic' pathogens.**

Pneumonia in the immunocompromised patient…

Patients with more profound immunosuppression, unusual organisms or those normally considered to be of low virulence or non-pathogenic may become 'opportunistic' pathogens. Infection is often due to more than one organism.

- **Gram-negative bacteria, especially** *Pseudomonas aeruginosa,*
- **viral agents,**
- **fungi,**
- **mycobacteria, and**
- **less common organisms such as** *Nocardia asteroides* **has to be considered.**

Causes of immune suppression-associated lung infection

Defective Phagocytic function	
Causes	Infecting organisms
Acute leukaemia **Cytotoxic drugs** **Agranulocytosis**	**Gram-positive bacteria including Staph. aureus** **Gram-negative bacteria** **Fungi, e.g. Candida albicans, Aspergillus fumigatus**

Causes of immune suppression-associated lung infection…

Defects in cell-mediated immunity	
Causes	Infecting organisms
Immunosuppressive drugs **Cytotoxic chemotherapy** **Lymphoma** **Thymic aplasia**	**Viruses** **Cytomegalovirus ,Herpesvirus,** **Adenovirus ,Influenza** **Fungi** **Pneumocystis jirovecii (formerly carinii)** **Candida albicans** **Aspergillus fumigatus**

Causes of immune suppression-associated lung infection…

Defects in antibody production	
Causes	Infecting organisms
Multiple myeloma **Chronic lymphocytic leukaemia**	**Haemophilus influenzae** **Mycoplasma pneumoniae**

Clinical features
of Pneumonia in the immunocompromised patient…

- Influenced by the degree of immunosuppression.
- Symptoms are less specific in the profoundly more immunosuppressed.
- The speed of onset tends to be less rapid in patients with opportunistic organisms such as Pneumocystis jirovecii and mycobacterial infections than with bacterial infections
- Typically include fever, cough and breathlessness.
- In P. jirovecii pneumonia, symptoms of cough and breathlessness can be present for several days or weeks before the onset of systemic symptoms or the appearance of X-ray abnormalities.

Diagnosis

of Pneumonia in the immunocompromised patient…

- The approach is informed by the clinical context and severity of the illness.
- **Invasive investigations**, such as bronchoscopy, BAL, transbronchial biopsy or surgical lung biopsy, are often **impractical**, as many patients are too ill to undergo these safely.
- **'Induced sputum'** offers a relatively safe method of obtaining microbiological samples

Diagnosis
of Pneumonia in the immunocompromised patient…

HRCT is useful in differentiating the likely cause:

- **Focal unilateral airspace opacification favours bacterial infection, mycobacteria or** *Nocardia.*
- **Bilateral opacification favours.** *P. jirovecii* **pneumonia, fungi, viruses and unusual bacteria, e.g.** *Nocardia.*
- **Cavitation may be seen with N. asteroides, mycobacteria and fungi.**
- **The presence of a 'halo sign' may suggest Aspergillus.**
- **Pleural effusions suggest a pyogenic bacterial infection and are uncommon in P. jirovecii pneumonia.**

Diagnosis
of Pneumonia in the immunocompromised patient…

- In theory, treatment should be based on the identified causative organism but in practice, this is frequently unknown and broad-spectrum antibiotic therapy is required, such as
- a third-generation cephalosporin or
- A quinolone, plus an antistaphylococcal antibiotic, or
- an antipseudomonal penicillin plus an aminoglycoside.

Management
of Pneumonia in the immunocompromised patient…

- Thereafter, treatment may be tailored according to the results of investigations and the clinical response.
- These may dictate the addition of antifungal or antiviral therapies.


Thank you