Pneumonia is an acute infection of the lung parenchyma distal to the terminal bronchiole, most commonly bacterial in nature, and associated with clinical and/or radiological evidence of consolidation of part or parts of one or both lungs. It remains a cause of considerable morbidity and mortality throughout the world.

CAUSATIVE ORGANISMS IN COMMUNITY-ACQUIRED PNEUMONIA:

The list of organisms commonly associated with pneumonia include:

- Streptococcus pneumoniae
- Atypical pathogens
  - Mycoplasma pneumoniae
  - Chlamydia pneumoniae
  - Legionella species
- Respiratory viruses
- Haemophilus influenzae
- Aerobic Gram-negative bacilli (e.g. Klebsiella pneumoniae)
- Staphylococcus aureus

The possibility of infection with Mycobacterium tuberculosis should always be considered. The infection is especially common in immunocompromised patients, such as those with concomitant HIV infection.
DECISION TO HOSPITALISE PATIENTS:

Not all patients with pneumonia require hospital admission. An important consideration is the patient's socio-economic status and home circumstances. Additional factors are:

- Age >60 years
- Co-morbid illness
  - Chronic cardio respiratory illness
  - Renal disease
  - Diabetes mellitus
- Clinical features indicative of severe pneumonia:
  - Cyanosis
  - Confused or decreased level of consciousness
  - Low blood pressure (<90/60)
  - Tachypnea (> 30/min)
  - High temperature (38.3 Celsius)
  - Multilobar pneumonia
  - Complications of infection
- Laboratory parameters indicating severe pneumonia:
  - Hypoxemia (<60mmHg)
  - White cell count (<4 or >30)
  - Urea >7
  - Abnormal LFT's including albumin <30

SUGGESTED EMPIRIC ANTIBIOTIC THERAPY:

NON-HOSPITALISED PATIENTS:

The treatment here is high-dose oral amoxycillin.

Other alternatives therapies are:

- Newer fluoroquinolones with extended gram positive cover, eg gatifoxacin and moxifloxacin.
- Macrolides resistance in South Africa is significant and so these drugs are no longer recommended as monotherapy for community-acquired pneumonia and the same applies to tetracycline and doxycycline.

**HOSPITALISED PATIENTS:**

The treatment of choice here is augmentin or cefuroxime or a third-generation cephalosporin (ceftiiaxone or cefpodoxime). It is also advised that these agents be given I.V. initially until the temperature settles. An alternative is a fluoroquinolone with enhanced antipneumococcal cover (gatifloxacin or moxifloxacin), particularly in the setting of penicillin allergy.

**HIV SERO-POSTIVE PATIENTS:**

In general the antibiotic treatment recommendations are very similar to those who are immunocompromised. However, in patients presenting with severe infection, in whom the chest X-Ray shows the presence of a diffuse infiltrate and the sputum Gram stain does not show an abundance MN's, or a dominant organism, treatment with high dose bactrim should be used to cover for PCP. This may be combined with augmentin, cefuroxime or a third-generation cephalosporin in order to cover associated pathogens. In the case of PCP infection, a corticosteroid is added to bactrim.

**SEVERELY ILL ADULTS:**

The treatment of choice is a combination of I.V. Augmentin or cefuroxime or a third-generation cephalosporin together with an aminoglycoside (gentamycin or amikacin or tobramycin) and a macrolide (erythromycin or clarithromycin).
DURATION OF ANTIBIOTIC THERAPY:

The optimal duration of I.V. antibiotic treatment and overall duration is uncertain. The usual recommendation is that they be given for 5 - 10 days for 'usual' bacterial infections and for 14 days for infections with atypical organisms. For severely ill patients, they usually require a longer course (Q-3 weeks) including their I.V. regime in hospital. Patients with co-morbid illness, HIV patients and the elderly may require longer duration of therapy.

With appropriate therapy, some improvement in the clinical features should be evident within 24-72 hours. In the elderly or in patients with co-morbidity, resolution of the clinical features and the chest X-ray is considerably slower.

Additional considerations in patients who fail to respond to therapy include:

- Use of inappropriate therapy
- Presence of unusual pathogen
- Associated TB
- Non-infective illness (e.g. pulmonary embolism, sarcoidosis and lung carcinoma)
- Complications of pneumonia (e.g. empyema, sepsis syndrome)

ANTIBIOTIC THERAPY AND DOSAGES:

PENICILLIN and AMINOPENICILLINS-

There is increasing resistance of S.pneumoniae to penicillin in South Africa. Most of the current resistance occurs in the intermediate range. For respiratory tract infections the recommended higher doses of parenteral penicillin and aminopenicillins will still provide more than adequate cover for these resistant pneumococcal infections.

Emerging resistance among H.influenzae isolates has been documented. In situations where there is concern about beta-lactamase production by the infecting organism, e.g. in COPD patients, amoxicillin-cluvalanate (Augmentin) is the preferred antibiotic.

Parenteral-

Penicillin G 2-4 million units 6-hrly

Ampicillin 1-2g 6-hrly

Augmentin 1.2g 6-hrly
Oral
Amoxycillin 500mg 8-hrly or 1 g 12-hrly
Augmentin 625mg 8-hrly

CEPHALOSPORINS:
Parenteral
Cefuroxime 1.5g 8-hrly
Ceftriaxone 1-2g dly
Cefotaxime 3-4g dly in 2-4 administrations

Oral
Cefuroxime 750rng 12-hrly

AMINOGLYCOSIDES:
Parenteral
Amikacin 15mg/kg/day (usually 1 g dly)
Gentamycin 2-4mg/kg/day (usually 240rng dly)
Tobramycin 3-5rng/kg/day (usually 240mg dly)

MACROLIDES:
Parenteral
Erythromycin 4-5mg/kg 6-hrly (usually as I g 6hrly)
Clarithromycin 500mg 12-hrly
Oral-
Erythromycin 500mg 6hrly
Clarithromycin 500mg 12-hrly
Azithromycin 500mg dly
Roxithromycin 150mg 12-hrly

FLOUROQUINOLONES

Parenteral-
Gatifloxacin 400mg dly
Moxifloxacin 400mg dly

Oral-
Gatifloxacin 400mg dly
Moxifloxacin 400mg dly

TETRACYCLINE:

Oral-
Doxycycline 200mg stat followed by 1 00mg bd

In closing, it is essential that as the admitting doctor that you send the patient for a Chest X-ray and that you view the x-ray before the patient is admitted to the ward. This reduces the chance that there will be NO X-ray when the Medical Officer or Consultant does the ward round in he morning.

REFERENCE: South Afrirican Medical Journal supplementary Part 2:August 2002