Antibiotics

- One of the most commonly used group of drugs
- In USA 23 million kg used annually; 50% for medical reasons
- May account for up to 50% of a hospital’s drug expenditure
- Studies worldwide has shown a high incidence of inappropriate use
Reasons for appropriate use

- Avoid adverse effects on the patient
- Avoid emergence of antibiotic resistance - ecological or societal aspect of antibiotics
- Avoid unnecessary increases in the cost of health care
Ecological/Societal Aspect

- Antibiotics differ from other classes of drugs
- The way in which a physician and other professionals use an antibiotic can affect the response of future patients
- Responsibility to society
- Antibiotic resistance can spread from
  - bacteria to bacteria
  - patient to patient
  - animals to patients
Prescribing an antibiotic

- Is an antibiotic necessary?
- What is the most appropriate antibiotic?
- What dose, frequency, route and duration?
- Is the treatment effective?
Is an antibiotic necessary?

- Useful only for the treatment of bacterial infections
- Not all fevers are due to infection
- Not all infections are due to bacteria
  - There is no evidence that antibiotics will prevent secondary bacterial infection in patients with viral infection
Meta-analysis of 9 randomised placebo controlled trials involving 2249 patients

Conclusions: There is not enough evidence of important benefits from the treatment of upper respiratory tract infections with antibiotics and there is a significant increase in adverse effects associated with antibiotic use.
Is an antibiotic necessary?

- Not all bacterial infections require antibiotics
  - Consider other options:
    - antiseptics
    - surgery
Choice of an antibiotic

- Aetiological agent
- Patient factors
- Antibiotic factors
The aetiological agent

- **Clinical diagnosis**
  - **clinical acumen**
    - the most likely site/source of infection
    - the most likely pathogens
  - **empirical therapy**
    - universal data
    - local data
Importance of local antibiotic resistance data

- Resistance patterns vary
  - From country to country
  - From hospital to hospital in the same country
  - From unit to unit in the same hospital
- Regional/Country data useful only for looking at trends **NOT** guide empirical therapy
The aetiological agent

- Laboratory diagnosis
  - interpretation of the report
  - what is isolated is not necessarily the pathogen
  - was the specimen properly collected?
  - is it a contaminant or coloniser?
  - sensitivity reports are at best a guide
Patient factors

- Age
- Physiological functions
- Genetic factors
- Pregnancy
- Site and severity of infection
- Allergy
Antibiotic factors

- Pharmacokinetic/pharmacodynamic (PK/PD) profile
  - absorption
  - excretion
  - tissue levels
  - peak levels, AUC, Time above MIC

- Toxicity and other adverse effects

- Drug-drug interactions

- Cost
Cost of antibiotic

- Not just the unit cost of the antibiotic
- Materials for administration of drug
- Labour costs
- Expected duration of stay in hospital
- Cost of monitoring levels
- Expected compliance
Choice of regimen

- Oral vs parenteral
- Traditional view
  - “serious = parenteral”
  - previous lack of broad spectrum oral antibiotics with reliable bioavailability
- Improved oral agents
  - higher and more persistent serum and tissue levels
  - for certain infections as good as parenteral
Advantages of oral treatment

- Eliminates risks of complications associated with intravascular lines
- Shorter duration of hospital stay
- Savings in nursing time
- Savings in overall costs
Duration of treatment

- In most instances the optimum duration is unknown
- Duration varies from a single dose to many months depending on the infection
- Shorter durations, higher doses
- For certain infections a minimum duration is recommended
**Recommended minimum durations of treatment**

<table>
<thead>
<tr>
<th>Infection</th>
<th>Minimum duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuberculosis</td>
<td>4 - 6 months</td>
</tr>
<tr>
<td>Empyema/lung abscess</td>
<td>4 - 6 weeks</td>
</tr>
<tr>
<td>Endocarditis</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Osteomyelitis</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Atypical pneumonia</td>
<td>2 - 3 weeks</td>
</tr>
<tr>
<td>Pneumococcal meningitis</td>
<td>7 days</td>
</tr>
<tr>
<td>Pneumococcal pneumonia</td>
<td>5 days</td>
</tr>
</tbody>
</table>
Monitoring efficacy

- Early review of response
  - Routine early review
- Increasing or decreasing the level of treatment depending on response
  - change route
  - change dose
  - change spectrum of antibacterial activity
  - stopping antibiotic
Antimicrobial Resistance: Key Prevention Strategies

Susceptible Pathogen

Prevent Transmission

Prevent Infection

Antimicrobial Use

Optimize Use

Effective Diagnosis & Treatment

Infection
12 Steps to Prevent Antimicrobial Resistance

1. Vaccinate
2. Get the catheters out
3. Target the pathogen
4. Access the experts
5. Practice antimicrobial control
6. Use local data
7. Treat infection, not contamination
8. Treat infection, not colonization
9. Know when to say “no” to vanco
10. Stop treatment when cured
11. Isolate the pathogen
12. Break the chain

Prevent Transmission
Use Antimicrobials Wisely
Diagnose & Treat Effectively
Prevent Infections

Campaign to Prevent Antimicrobial Resistance in Healthcare Settings