Principles of Antibiotic Therapy

Important questions to routinely answer before selecting an antibiotic

1.

♦ Is an antibiotic indicated on the bases of clinical findings?

2.

♦ Have appropriate clinical specimen been obtained, examined and cultured?

3.

♦ What pathogens are most likely to be causing the infection?

4.

♦ If multiple antibiotics are available to treat this likely or known organism, which agent is best for a given patient? (This question involves such factors as drug of choice, pharmacokinetics of agents, toxicology, cost and bactericidal compared with bacteriostatic agents.)

5.

♦ Is an antibiotic combination appropriate?

6.

♦ Are there special considerations related specifically to given patient?
– Renal function?
– Liver function?
– Allergies?
– Pregnancy?
– ……?

7.

♦ What is the best route of administration?

8.

♦ What is the appropriate dose?

9.

♦ Will initial therapy require modification after culture data are returned?

10.

♦ What is the optimal duration of treatment?

Empiric antibiotic therapy

♦ Empiric antibiotic therapy is antibiotic therapy commenced before the identification of the causative micro-organism is available. Typically, full identification and susceptibility testing of bacteria from clinical specimens is not available for 48-72 hours after collection of the specimen from the patient

Empiric antibiotic therapy

♦ Empiric antibiotic therapy should be initiated only if there is clear clinical reason, otherwise therapy should be postponed until susceptibility testing of bacteria from clinical specimens is available

♦ Next slides are especially about choice possibilities for empiric therapy according to the site and the character of infection

Bacterial (tonsilo)pharingitis

♦ Group A beta-hemolytic streptococcus
♦ a throat culture or a rapid antigen detection test (RADT) if clinical signs are not sufficient to exclude other conditions
♦ Drug of choice **penicillin** (V p.o., G i.v.)
♦ Macrolides are alternative drugs for patients who are allergic to penicillin
♦ 10-day course

Acute sinusitis, Otitis media

♦ Steptococcus pneumoniae, Hemophilus influnsae, Moraxella catarrhalis

♦ Drug of choice - **Amoxicillin/clavulanic acid, ampicillin/ sulbactam**

♦ Alternative agents – macrolides, clindamycin

Community acquired pneumonia

♦ *Streptococcus pneumoniae, Mycoplasma pneumoniae, Haemophilus influenzae, Chlamydia pneumoniae, viruses, Legionella*

♦ blood and sputum cultures, serology to Mycoplasma and Chlamydia

♦ Previously healthy and no risk factors for drug-resistant

– **Macrolide**

– **Beta-lactam or Doxycycline** in regions with a high rate (more 25%) of infection with macrolide-resistant *S. pneumoniae*

Community acquired pneumonia

♦ <u>Presence of comorbidities</u>, such as chronic heart, lung, liver, or renal disease; diabetes mellitus; alcoholism; malignancies; immunosuppressing conditions

– **Macrolide plus beta-lactam**

– **A respiratory fluoroquinolone (moxifloxacin)**

Hospital-acquired pneumonia

♦ *P. aeruginosa*, *Escherichia coli*, *Klebsiella pneumoniae*, *Acinetobacter, Citrobacter and Enterobacter* species, *Staphylococcus aureus, Streptococcus pneumoniae, Haemophilus influenzae and others*

♦ blood and sputum cultures, endotracheal aspirates, BAL

♦ Combination therapy

♦ III.**gen. cephalosporin or amoxicillin/clavulanat** plus **fluoroquinolone or aminoglycoside**

Urinary tract infection

- *Escherichia coli* is the predominant cause of UTI in all age groups (for uncomplicated UTI more than 90%)

- Other G- bacteria are isolated less frequently including *Proteus spp., Klebsiela spp.,* less *Pseudomonas spp., Enterobacter spp., Serratia spp,* occasionaly others.

- G+ organisms, *coagulase-negative staphylococci* and *Enterococcus spp.* occur quite frequently.

- Contribution of *E. coli* on UTI`s etiology decreases in patients with complicated UTI

- urine culture, blood culture in case of febrile infection

Classification of symptomatic urinary tract infections

- uncomplicated urinary tract infections

  – lower UTI (cystitis)

  – uncomplicated pyelonephritis

- complicated UTI with or without pyelonephritis

- urosepsis

- urethritis

- special forms: prostatitis, epididymitis and orchitis

Factors that suggest a complicated UTI

- The presence of an indwelling catheter, stent (urethral, ureteral, renal) or the use of intermittent bladde catheterization
- A post-void residual urine of > 100 ml
- An obstructive uropathy of any aetiology
- Vesicoureteric reflux or other functional abnormalities
- Renal insufficiency and transplantation, diabetes mellitus and immunodeficiency
- Chemical or radiation injuries of the uroepithelium
- Peri- and post-operative UTI

Empirical treatment of acute uncomplicated cystitis

- First choice agents:
  - **Nitrofurantoin** monohydrate/macrocrystals (100 mg twice daily for 5–7 days)
  - **Trimethoprim-sulfamethoxazole** (160/800 mg twice daily for 3 days)
  - **Fosfomycin trometamol** (3 g single-dose sachet)
  - **Pivmecillinam** (400 mg twice daily for 3–7 days)
- Alternative agents:
  - Fluoroquinolones (dose varies by agent; 3–day regimen)
  - Beta-lactams (dose varies by agent; 3–5 day regimen

Empirical treatment of acute uncomplicated cystitis

♣ The choice between these agents should be individualized and based on:
- ♣ patient allergy
- ♣ compliance history
- ♣ local practice patterns
- ♣ local community resistance prevalence
- ♣ local availability and cost
- ♣ patient and provider threshold for failure

Empirical treatment of acute uncomplicated pyelonephritis

♣ Oral **ciprofloxacin** (500 mg twice daily) for 7 days is an appropriate choice for therapy in patients not requiring hospitalization where the prevalence of resistance of community uropathogens to fluoroquinolones is not known to exceed 10%

Empirical treatment of acute uncomplicated pyelonephritis

♣ Women with pyelonephritis requiring hospitalization should be initially treated with an intravenous antimicrobial regimen such as

  ♣ a **fluoroquinolone**

  ♣ an **aminoglycoside**, with or without ampicillin

  ♣ an **extended-spectrum cephalosporin or extended-spectrum penicillin**, with or without an aminoglycoside

  ♣ carbapenem (only in case of severe sepsis)

♣ The choice between these agents should be based on local resistance data, and the regimen should be tailored on the basis of susceptibility results

Complicated UTI

♦ Treatment strategy depends on the severity of the illness; hospitalization is often required

♦ Treatment encompasses three goals:
  – management of the urological abnormality
  – antimicrobial therapy
  – supportive care when needed.

♦ To avoid the emergence of resistant strains, therapy should be guided by urine culture whenever possible.

♦ Empirical treatment involves the same agents as for uncomplicated pyelonephritis