as we said before: once we need to select an antimicrobial we should:
① make diagnosis to be sure it is an infection ② identify the type of M.O
↳ either by isolation of bacterial infection + sign and symptoms of the patient
③ select the proper treatment based on a group of patient's factors (right dose + frequency)
↳ Lactation مثلاً → mother

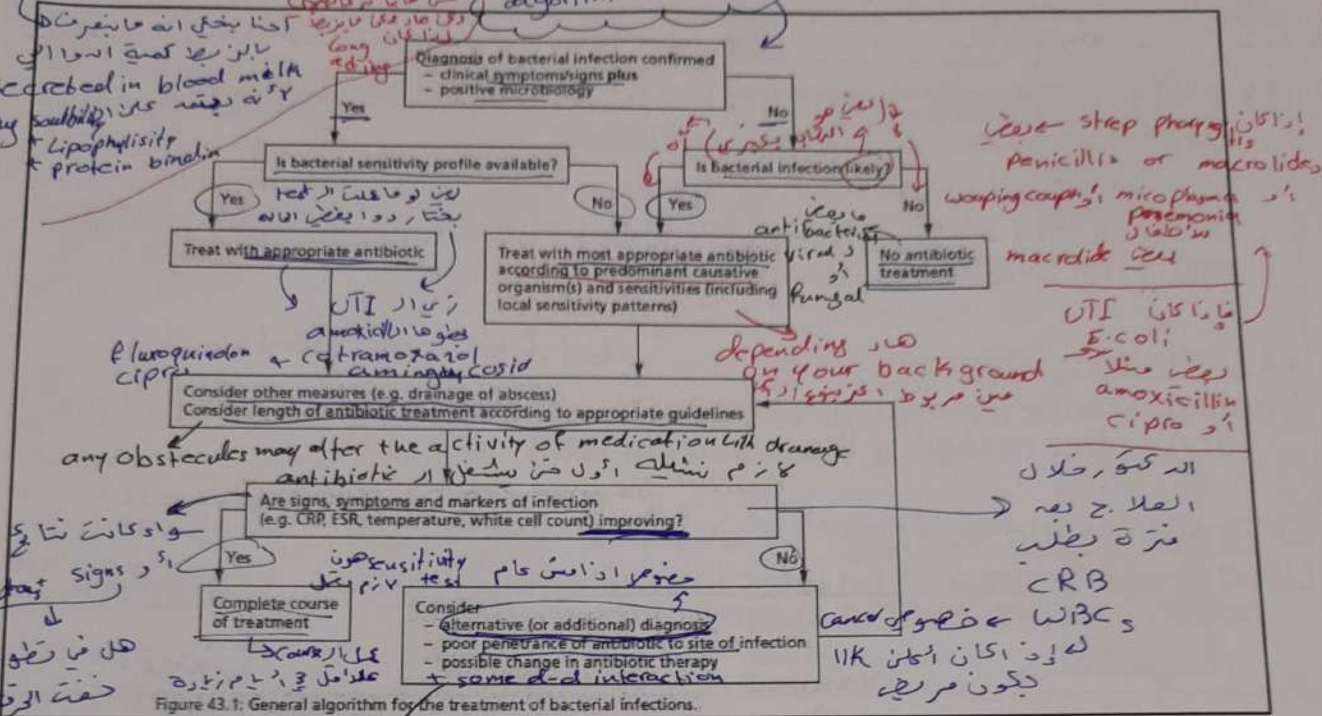


Figure 43.1: General algorithm for the treatment of bacterial infections.

إذا المرض viral لازم ما أعطي antibacterial

tetracycline ... acne vulgaris

- *Ideally*, the antimicrobial agent used to treat an infection is selected *after* the organism has been identified and its drug susceptibility established.

- However, in the critically ill patient, such a delay could prove fatal, and immediate *empiric* therapy is indicated.

* لازم نعرف نوع الـ infection , الـ identification للـ M.O بعطيه الـ antimicrobial

* لكن في بعض الحالات ... الوضع خطير

Empiric treatment ← هو antimicrobial بعطيه قبل الـ identification للنوع الـ M.O لكن بعد اخذ عينات من المريض specimens ... muscle stiffness ... infection ممكن يكون bacterial أو viral بالتالي حسب الـ background ... meningitis ... strep ... CSF ... antibacterial ...

- **Empiric therapy:** is treating the patient without knowing the causative organisms & their sensitivity test.
  - Immediate administration of the drug prior to identification of bacteria and sensitivity test.(or the specimens is obtained but lab result not available)

- **Definitive therapy :** once we identified the treatment
treating exactly the causative agent depending on its sensitivity test (done after receiving the results of test)

- **Prophylactic therapy:**
Used drugs to prevent an infection rather than to treat , to maintain health and prevent the spread of disease.

Prophylactic antibiotics

1. To prevention of opportunistic infection
   - ❖ In bowel surgery to prevent peritonitis
   - ❖ In dental manipulation to prevent bacterial endocarditis in patients with abnormal heart valves.
2. Prevention of spread among contacts. (vaccines, Tb, malaria)

- ❖ Rifampicin to prevent Meningitis.
- ❖ Chloroquine to prevent Malaria.

ex. د20

Rhumatic heart diseas → infection by group A sterptococcus بكتيريا وهاد ال infect بيصير ال heart ال joint وفي ال skin وهاد البكتيريا بتعمل invade → groupA strep الي بيصير انه إذا المريض مصاب ب tonsilitis أو smpile fever بنعطيه وما تعالج صح بعد أسابيع ممكن يصير عنده مشاكل بالقلب بال CNS أو ال join

1

Pretreatment may prevent streptococcal infections in patients with a history of rheumatic heart disease. Patients may require years of treatment.

وارد احصل reinfection بعد ال infect الأول بيصير antibodies بال 2 inf التاني

خلع اسنان

هاد ال antibodies بتصير تهاجم ال tissue لل tissue + reinf →

خاصة بالأطفال 5-15 سنة مشاكل قلب ومفاصل

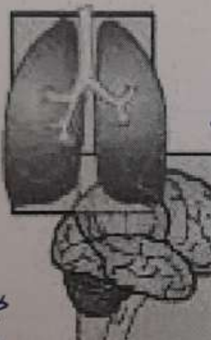
2

Pretreating of patients undergoing dental extractions who have implanted prosthetic devices, such as artificial heart valves, prevents seeding of the prosthesis.

بيعطيه بنسلين اللوز بخاف من ال recurrence → penicillin G ← long acting أو بياخذه كل شهر prophylactic

3

Pretreatment may prevent tuberculosis or meningitis among individuals who are in close contact with infected patients.



بحالة ال Tb أو meningitis بالأشخاص القرايبين من ill patient

abdominal + joint replacement

4

Treatment prior to most surgical procedures can decrease the incidence of infection afterwards. Effective prophylaxis is directed against the most likely organism, not eradication of every

3- To prevent infection or disease : as prophylactic

- To prevent recurrent **UTI: Co-Trimoxazole** twice per week
  خاصة بالكبار بالسن والـ femal
- to prevent **Rheumatic fever :** young man who is having recurrent **tonsillitis**, we start giving him a monthly interval long acting **Benzathine penicillin** to prevent the acute streptococcal infection from coming back.

Advantages of drugs combination

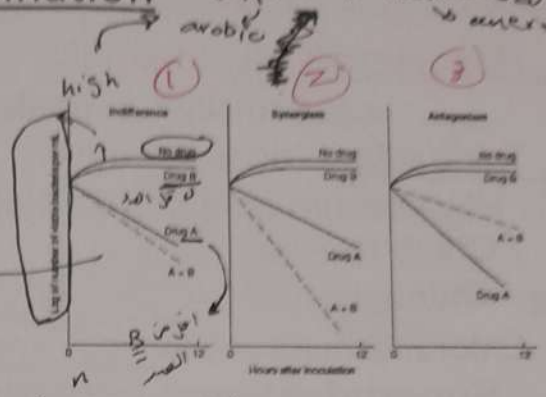
1. To delay or avoid the development of resistance.
   (Ex. Tuberculosis)
2. To broaden the spectrum of activity. (Mixed infection , severe unknown infection,).
3. To obtain potentiation (synergistic effect).
   Ex: -B-lactams and aminoglycosides in endocarditis. Penicillin + Aminoglycosides
   2 separate IV bolus injection ,with time interval to avoid interaction.
   - Co-trimoxazole.

Disadvantages of drugs combination

1. Concomitant administration of a second agent is usually bacteriostatic and may interfere with the action of the first drug that is bactericidal
2. Suppression of normal flora, so give higher chance for opportunistic infection (**superinfection**).
3. Increased incidence of adverse reactions.
4. Highly cost

Antibiotics Combination

Synergistic: Effects of the two agents in combination together multiply their therapeutic effect or one agent enhances the action of another normally inactive against the target organism (for example, aminoglycosides with a penicillins



- **Additive:** Effects of the two agents summate (for example, ciprofloxacin and metronidazole to treat aerobic and anaerobic gut flora).

- **Antagonistic:** Two agents interfere with each other (for example, tetracyclines and penicillin cannot be administered concurrently because of their chelation to one another).

Problems with antimicrobial agents

1. Drug resistance. (the major problem)

(if the maximal level of that antibiotic that can be tolerated by the host does not halt bacterial growth).

- Limitation of drug resistance:
  1. Ensure that the indication, dose, duration are appropriate.
  2. Restrict use of drug combination to appropriate situations(TB).

2. Drug-drug interaction
3. Adverse effects.

3. Adverse effects

a. Hypersensitivity; (not dose related)

e.g. Penicillin, cephalosporin.

b. Toxic effect (dose related)

High serum levels of certain antibiotics may cause Direct toxicity / Organ toxicity

e.g. Aminoglycosides(ototoxicity)

- Chloramphenicol (Aplastic anemia)

c. **Superinfections: (clostridium difficile-colitis)**

alterations of the growth of normal flora of intestine, genitourinary tracts. Respiratory tract

Appearance of **a new infection** while treating an original infection (multiply C.difficile).

How Effective is an Antibiotic

Concentration Dependent Killing

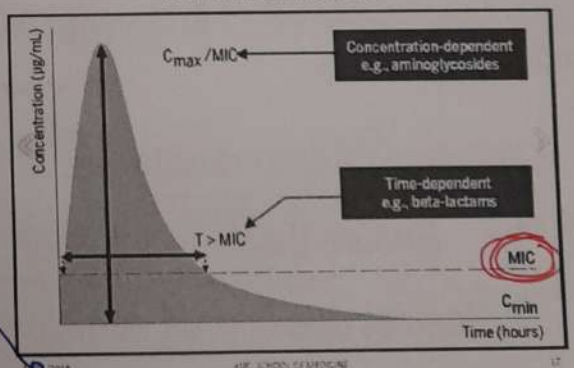
Efficacy determined by magnitude of serum concentration above MIC

e.g. Aminoglycosides, quinolones.

Time Dependent Killing

Efficacy determined by duration of time that serum concentrations exceed MIC

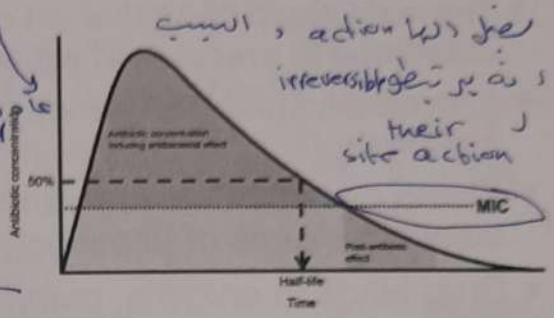
e.g. b-lactams, macrolides, cotrimoxazole



How Effective is an Antibiotic

- **Post-antibiotic effect (PAE):**

phenomenon of continued bacterial killing even though serum concentrations have fallen below the minimum inhibitory concentration (MIC).



•Examples: **Aminoglycosides** and **Fluoroquinolones**.

Inhibitors of Cell Wall Synthesis