** the doctor start the lecture with revising some information from the last one:

#penicillin G has a good susceptibility against gram(+ve), Neisseria (-ve)

#mostly active against strep. (don't produce B-lactamse), but not staph.(produce B-lactamse) so we use in it streptococcal pharyngitis

#penicillin G , we use it as a definitive therapy in otitis media, meningitis,…, because it doesn't cover all community acquired infection , and it not use empirical. There are some cases that we still use penicillin G with.

N.Gonorrhea have some resistant to penicillin G , so it not always the drug of choice

it always use to treat clostridium tetani, diphtheria, and streptococcal pharyngitis, and sepheles.

We mmostly give it IV

we use another kind of it called "**benzathine penicillin"** for prophylactic action , it give the drug at low dose but prolonged sustain release , but this dose protect the patient from rheumatic fever and also in the treatment of syphilis (2.4 million dose)

#Penicillin V → oral used against any type of strep

→ More active than penicillin G on anaerobic infection

→ Mainly used by the dentist

B-lactamase-resistant penicillin , they don't have any application now because of the production of clavulanic acid ;which inhibit the production of B-lactamase

MRSA is a real nightmare in the hospitals

*** our new lecture :

*Amoxicilin and Azithromycin are the most produced drug in the world

Amoxicillin is active against the microorganism that cause respiratory infection (the most common infection), H-influenzae, strep. Pneumonia , otitis media ,sinusitis…

⇨ Amoxicillin → taken orally, no injectable form

→ Is prodrug toward ampicllin

→ Very well absorbed

→ The antibacterial spectrum is the same as pencillin G plus some gram –ve

⇨ Ampicillin →I.M,I.V

→ In the hospital we use it when we suspect that the patient has H-influenzae, streptococcal pharyngitis

→ We use it in combination therapy with Gentamicin (Gent-Amp), the ampicillin for (+ve strep. We don't really cover staph.) and gentamicin for(-ve), but if we want to use to treat staph. We have to give the injection with "salbactam" (clavulanic acid)

I can use ampicillin in empirical and definitive therapy. We mainly use it to cover streptococcus pneumonia.

H-influenzae and strep pneuomania are the most imp microorganisms in the URT

In the lower respiratory tract we have klebsella pneumonia and strep pneumonia and H-influenza

Injectable → hospital

Oral → community

Amoxicillin is the most used community antibiotic

** types of community acquired pneumonia :

1. atypical : caused by atypical microorganisms mycoplasm ,legunella (children in the day care , army), we treat them with ampicillin ' empirical and definite therapy . found mostly in crowded places like army and schools.

2. typical : strep .pneumonia , H-influenzae , amoxicillin the most use drug

Example : if a child (4 years old) come to the hospital and he has infection , the first question to ask his parent that if he go to day care or not , because if he goes to day care the type of infection will be atypical and we should not treat him amoxicillin. I am not allowed to prescribe amoxicillin for a child who goes to kindergarten and is less than 5 years old because it will not cover the atypical causative agents of pneumonia.

** amoxicillin is a favored drug to treat acute otitis, but if we want to use empirical we have to double the dose (80-90 mg/kg/day) instead of the original recommended 40-45 mg/kg-day,why ??

Because the percentage strep .pneumonia that is resistant to amoxicillin and ampicillin is increase (intermediate resistance) so the response is decrease, but as a treatment we use according to MIC

Strep. Pneumonia still has not developed resistance to consider it resistant to amoxicillin. However, it has become of an intermediate resistance. This is why we increase the dose of amoxicillin given to the patient.

*note:

streptococcal pharyngitis we use the normal dose (40-45 mg/kg/day)

strep .pneumonia we use the double dose (80=90 mg/kg/day) due to increased resistance

amoxicillin has a good profile. It has low side effects and it can be taken orally. Not all antibiotics can be taken orally.

**extensive oral surgery for patient with abnormal heart valves , we use amoxicillin for prophylaxis of infective endocarditis (The most common cause is strep pneumonia, it also might be caused by enterobactar)(2g of amoxicillin ,1 hour before surgery. This is considered to be a high dose of amoxicillin)

** extend spectrum have good activity against (-ve,+ve). ampicillin is effective for salmonella and shigellosis H influenza and E.coli or gastric problem (we use it , but it not the only choice).

Salmonella → shawerma → mayonnaise → eggs → salmonella

Ampicillin and amoxicillin are no longer active on salmonella and e. coli. Shigella is still susceptible towards ampicillin, but not towards amoxicillin.

** we don't treat the patient directly , because almost all of the gastric problem resolve alone so we wait for 5 day and if the sings and diarrhea still present we start the antibiotic.

*and also for otitis media we wait for 2 days until we give antibiotic to the patients especially children. Children get recurrent otitis media, but it usually resolves quickly.

*** it's not recommended from the FDA and Jordanian FDA to give antibiotic directly in these cases.

Children take solutions, they do not take tablets.

*Extended spectrum: they include pseudomonas, we don't use it in the community because:

1. most of it are injected in the hospital

2. because of high chance of pseudomembrane cloititis

3. disturbance of the normal flora. This gives a chance for colistridium dificile to grow, which causes pseudomembranous colitis.

***chance of pseudomonades membrane cloititis in normal amoxicillin treatment <(0.5-1)%

But in extended spectrum antibiotics (3-5)%

And their also high chance for super infection to happened to the patient

***the dose that we use it , it's (4-6) time over the MIC , so we kill almost all the microorganism in the normal flora

***** broad spectrum :**

-It's include carbenicillin(oldest), ticarcillin, **piperacillin (found in Jordan)**

poorly absorbed from the gut

-susceptible to B-lactamases

- the antibacterial spectrum is as the amoxicillin spectrum+ pseudomonades

Used to treat UTI infections caused by E.coli

1.carbenicillin : it not use any more

2. ticarcillin: most active against pseudomonades but less toward +ve.

3.piperacillin: (real extended spectrum), the most available in Jordan ,it's combined with salbactum or with tazobactum (B-lactamase inhibitor)..the combination is tazosin , it's less active toward pseudomonades than ticarcillin. Pipercillin hasn't still been used in community. Enterobacteria are still susceptible to pipercillin. Especially used against pneumonia and peretonitis

- Not orally
- Strong anaerobic antibacterial spectrum
- Active against pseudomonas (produce life threatening infection in the hospital)

Pipercillin is usually given in ICU… it is called the ICU antibiotic.

** combination therapy with gentamicin for more coverage against +ve , and we may use vancomycin if we suspect the presence of MRSA

Its main uses in intensive care medicine (piperacillin +tazobactum), it cover every infection expect MRSA

*It not use in the community and most of (-ve) are still susceptible

**because of *p.aeruginose* may develop resistance during treatment , so antipseudomonal pencillin is frequently used with aminoglycoside (gentamycin) or fluorouquinolone (cepro, levofloxacin) for infection outside urinary tract . we also use vancomyosin in case we are afraid of MRSA.

** we also use it in the lung >>>>pneumonia

Blood >>>> septicemia

U.T.I>>>>>95% of it because of E-coil

Just to know :

Their are more than (25-30) of pencillin , but we study the most important

** urinary tract penicillin only for (-ve) >>> like temacillin, decacillin

Not use any more

**side effect:

1.Hypersensevity reaction : the degradation product of pencillin combine with host protein and become antigenic (haptens)

the immune system recognize the hapten as a foreign body

#SIGNS: a.dizziness

b.rash and pruritus(حكة)

*common in 10% of the patient , mostly treatable (like antihistamine or adrenaline …)

**if we are not sure that the patient have allergic or not we simply don't give it to him , we have alternatives. Amoxicillin has an alternative called azithromyocin(azithromax). But in some cases in the hospital we have to give it to him , so we should prepare ourselves to deal with it.

2. diarrhea: alteration of bacterial flora in the gut causing diahrrea. This is usually associated with drugs that have a wider spectrum.

Pencillin G >>>>>amoxicillin>>>>> piperacillin (increase the gastric disturbance and also reflect the percentage of pseudomonades membrane cloititis)

3. methicillin : have the potential to cause acute nephritis

4. neurotoxicity : not common (only with high dose of pipercillin or ampicillin)

***notes:

1.carbencillin and ticarcillin and to some extent pencillin G may decrease agglutination

2.all oral pencillin are best given on an empty stomach to avoid the absorption delay except amoxicillin.

*** cephalosporins:

They have four generations, and when we move from the 1st generation toward 3rd one they decrease the activity toward gram(+ve), and increase toward gram(-ve)

The 4th generation actively good on (-ve,+ve), so it should be the last choice to keep its effect for a long time. It covers everything. Nothing else has this amount of coverage.

If you go to Wikipedia and look for cephalosporins you will find about 100 drugs. By the time we graduate half of what we're talking about will be of no use. Even 3rd generation drugs are becoming useless.

Some gram negative bacteria produce ESBL (estended spectrum beta lactamases). Like H-influenza and E.coli.

1. the first generation (1st):

*similar to pencillin G (9mostly active on +ve) but they have a good activity againt staph.aurus

Staph aureus also produces beta lactamases.

Penecinillases are not active against cephalosporins

**cephalexin:

Oral drug, used against cellulitis which is a type of cell infections that caused by staph(but that caused by strep. Its treatment by pencillin G)

**cefazolin: 3rd most prescribed drug.

Injectable, it use as a prophylaxis drug before skin surgery , because the skin strep. And staph. Normal flora may become pathogens , so we give 1g before 2 hour of the surgery.

Cefaloxin is to be used against strep. Pharyngitis because it is like penicillin G. and we are to use it against staph especially the one that causes dermatitis.