Antimicrobial Resistance Situation in Uganda

04/03/2019

Background

- Developing countries have been promoting empirical management strategies of infectious diseases- Syndromic Approach to diagnosis and management
- Use of multiple antimicrobial agents with no diagnosis over a long time paved way for development of resistance to the agents used among common bacterial agents
- The urgent steps ideally are immediate investments in laboratory capacity and clinical/healthcare worker training

Blood cultures June 2013 to October 2014

- Patient care and research studies and processed at 2 microbiology laboratories, Makerere University College of Health Sciences (n = 345) and Mulago Hospital (n = 117). ((https://clsi.org/-2011)
- In total, 3,197 blood specimens, 462 (14%) grew an organism. Gram-positive cocci constituted 60% (279/462) of all isolates and (127/279) of these were *Staphylococcus aureus*, of which 32% (41/127) were methicillin resistant
- 14% of the MRSA isolates (n = 41) were fully susceptible to ciprofloxacin, 55% to clindamycin, 25% to gentamicin, and 4% to trimethoprim/sulfamethoxazole

Blood culture 2013 to 2014.....

- Of 184 Gram negative, 122 (67%) were enterobacteriaceae (26% E.coli, 20% Klebsiela and 9% Enterobacter spp
- Sensitivity rates of *E. coli* to antimicrobial drugs were as follows: ceftriaxone 33%, ciprofloxacin 39%, chloramphenicol 56%, piperacillin/tazobactam 80%, and imipenem 81%. Sensitivity rates were similar, but lower overall, for *Klebsiella pneumoniae*: ceftriaxone 15%, ciprofloxacin 23%, chloramphenicol 17%, piperacillin-tazobactam 64%, and imipenem 80%..

Kajumbula et al ; Emerg Infect Dis. 2018 Jan;24(1):174-175. doi: 10.3201/eid2401.171112

Blood cultures June 2015-April 2017

- Gram negative rods are increasingly being isolated
- Bacterial isolates were noted to have zone diameter that qualify for ESBL screen
- E.coli 41/57 were positive by DDST
- Klebsiella spp 38/39
- Salmonella spp 0/17
- Enterobacter spp 7/8
- (acinetobacter 3/18 and 0/6 Pseudomonas species

(*bla*CTX-M, *bla*SXT, *bla*TEM)

Carbapenamse activity among isolates with reduced susceptibility to 3rd generation cephalosporins

Phenotype

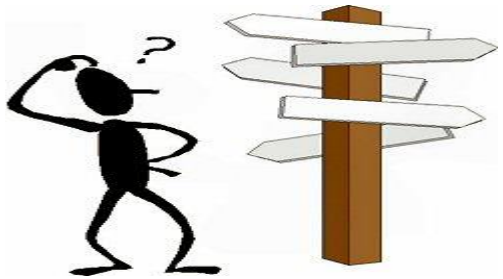
- *E.coli*=21/57
- Klebsiella species=24/39
- Enterobacter species =5/8
- Salmonella=?2/17
- Pseudomonas species =3/6
- Acinetobacter species =12/18

Detectable genotype

- K. pneumoniae carbapenamase (*bla*KPC) =2
- Oxacillinase (*bla*OXA-48) =5
- New Delhi Metallo Betalactamases (*bla*NDM) =5
- Imipenamase (*bla*IPM) =9
- Verona integrin-encoded metallobetalactamase (*bla*VIM) =10

MDR phenotype among blood culture isolates

- Betalactam +sulphonamide=12
- Betalactam +sulphonamide+quinolone=35
- Betalactam +sulphonamide+aminoglycoside=12
- Betalactam +sulphonamide+quinolone+ aminoglycoside=84
- All resistant to septrin
- 8 resistant to both gentamicin and amikacin
- One resistant to colistin
- Which of the antibiotics will work?



Take home

- Enhance diagnostic stewardship to generate data for empiric treatment
- Investigate all cases of sepsis
- Using carbapenems is desirable but resistance to carbapenems is present in what looks seemingly susceptible

    ? Possible treatment failure

    Driving levels of resistance higher

    Supervise prescription of antimicrobial agents

Faecal colonization-severe acute malnutrition

- The bacteria colonizing the gut tend to translocate to the blood
- Empiric therapy regimen for severe malnutrition id Gentamicin+ampicillin
- All isolates collected from 99 children were resistant to ampicillin and basing on isolates with smallest inhibition zone diameter to gentamicin 80.1% (80/99) .
- The resistance to other drugs was: Cotrimoxazole 100%(99/99), Chloramphenicol (79 /99), Ciprofloxacin 67.7%(67/99), Amikacin 48.4 (48/99). Piperacillin 99% (98/99), Augmentin 91.9(91/99) Piperacillin Trazobactum 76.8 (76/99), Cefuroxime 91.9%(91/99), Cefotaxime 90.9% (89/99), Ceftriaxone 90.9%(90/99), Ceftazidime 67.7% (67/99), Cefepime 90.1%(90/99) and Imipenem 30.3% (30/99). 75/99 ESBLs

Take home

- It is increasingly difficult to decide on empiric therapy /surgical prophylaxis in this setting
- Rectal screens could be of use in informing susceptibility (a case by case basis)
- The need to initiate surveillance for CRE carriage in the setting

- The environment and HCWs are colonized with similar organisms

Microbiology MakCHS

Study by enquiry:

- Dissemination of resistance on mobile genetic elements-?co-selection
- Presence of integrons type I and 2 among isolates-?cassete arrays
- Presence of overexpressed pumps among MDR Klebsiella-?tigecycline use
- Extent of OMP loss /alteration-?magnitude of CRE
- Validation of screening tests for enzymes

Applied practice

Identify factors associated with carriage of MDR and enhanced intervention (HCW/Clients)