Antimicrobial resistance of blood culture isolates from patients attending Goroka Provincial Hospital, Papua New Guinea

Watson Toroi[1], Victor Musyoki[2], Becky Max[1], Mona Kheng[2], Temas Ikanofi[3], Chani Kudakwashe[2], May Varasmaite-Keket[3], Amrita Ronnachit[2], Josephine Chanoan[1]

[1]Goroka Provincial Hospital, Papua New Guinea; [2]Burnet Institute, Melbourne, Australia; [3]Central Public Health Laboratory, Papua New Guinea

Introduction

- Bloodstream infection (BSI)
  - Presence of microorganism in blood
  - Threat to every organ especially during sepsis due to systematic inflammatory response syndrome (SIRS)

- Etiological agents
  - Bacteria – *E. coli, S aureus* (causing >80% of the cases)
  - Fungi – *C. albicans*
  - Parasites – *Plasmodium* species
  - Virus – HIV, Hepatitis

Sohana et al., 2023

Types of blood stream infection

- Intravascular
- Extravascular

The BSI is associated with:

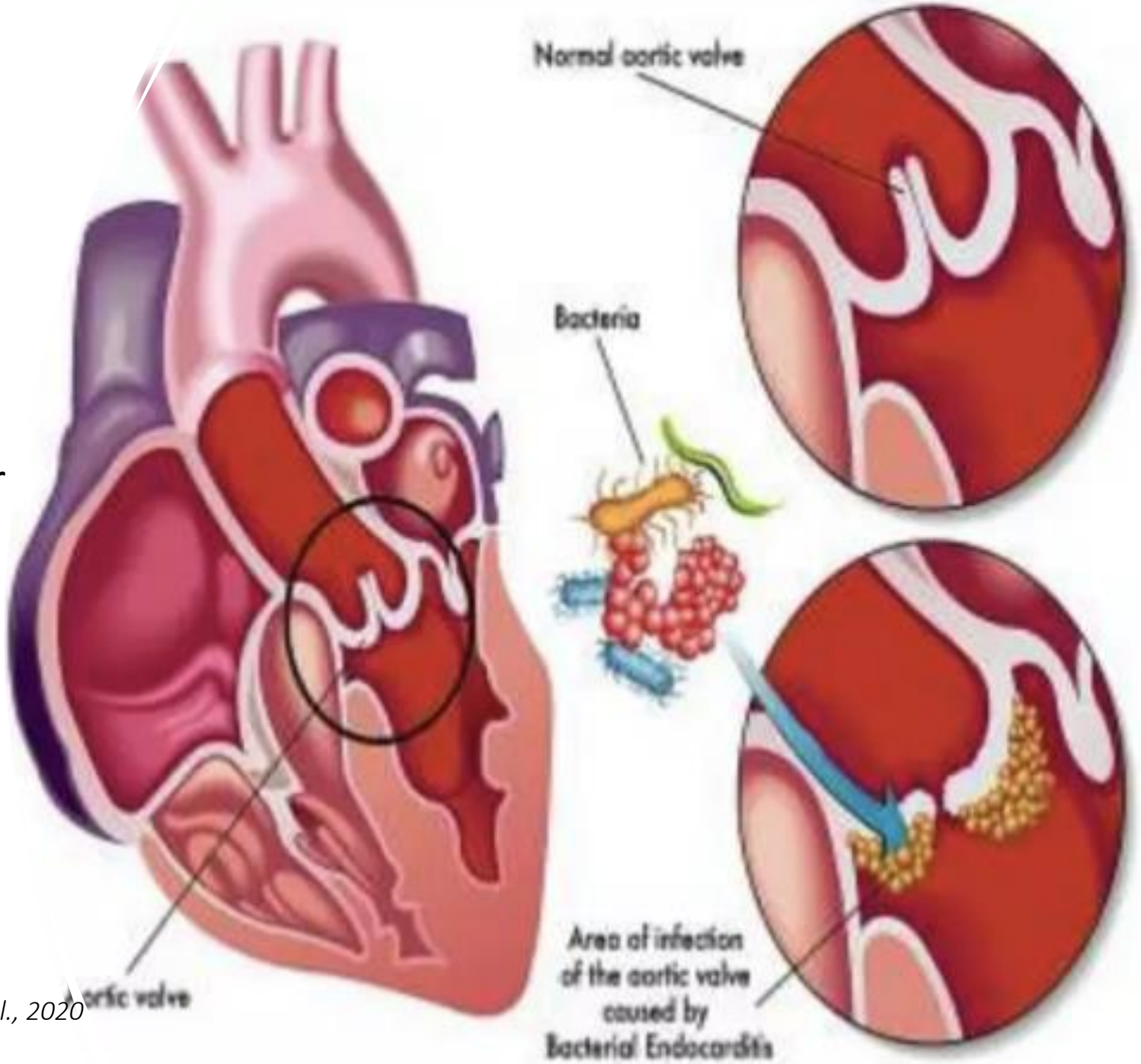
1. Use of immunosuppressive agents
2. Widespread use of broad-spectrum antibiotics
3. Invasive surgical procedures
4. Long hospitalization stay

Sareen F et al., 2023

Intravascular Infection

- Originates within the cardiovascular system which include:

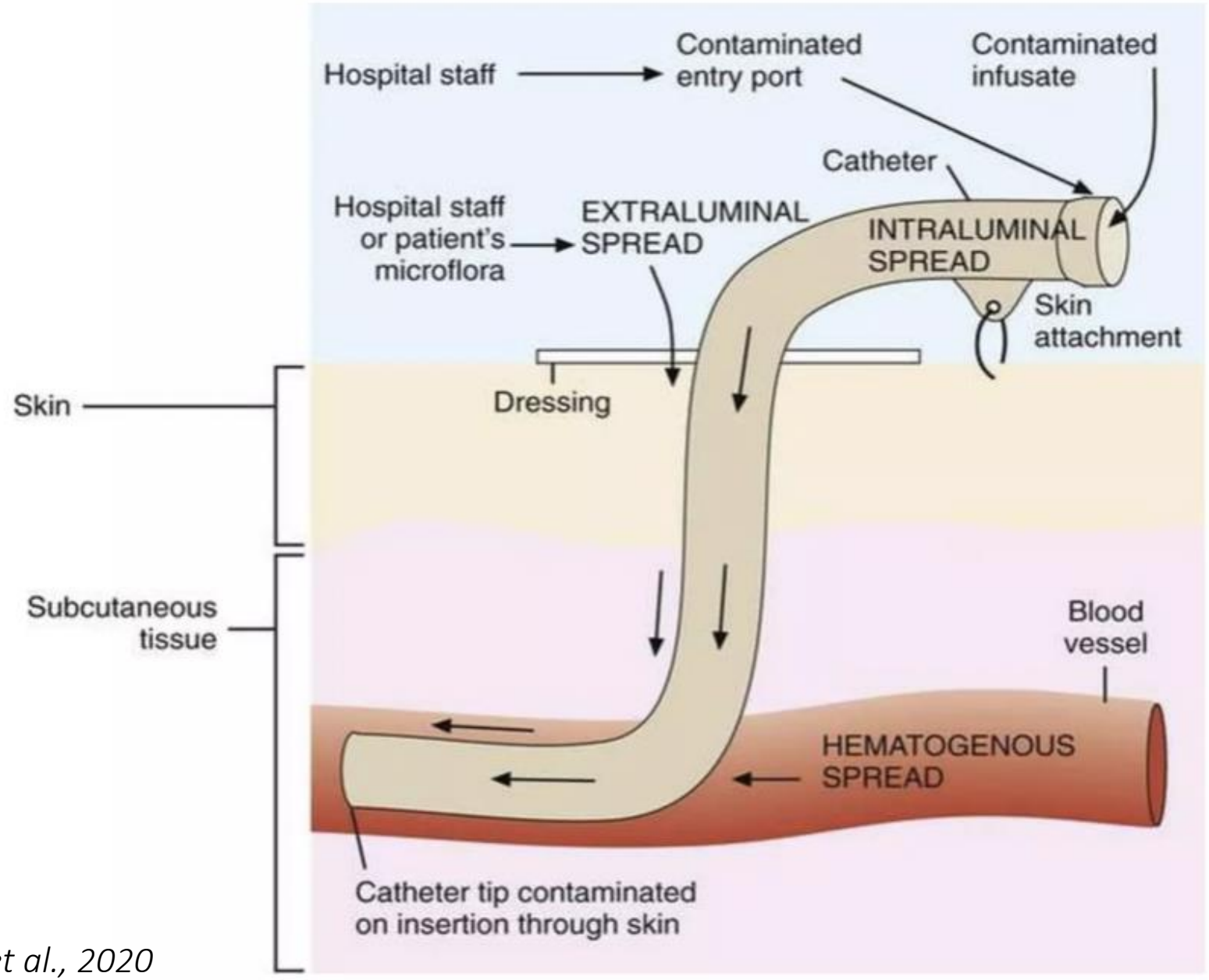
1. Infective endocarditis
    - Infection of the endocardium



Timsit JF et al., 2020

Intravascular Infection……

2. Intravenous catheter-associated bacteraemia



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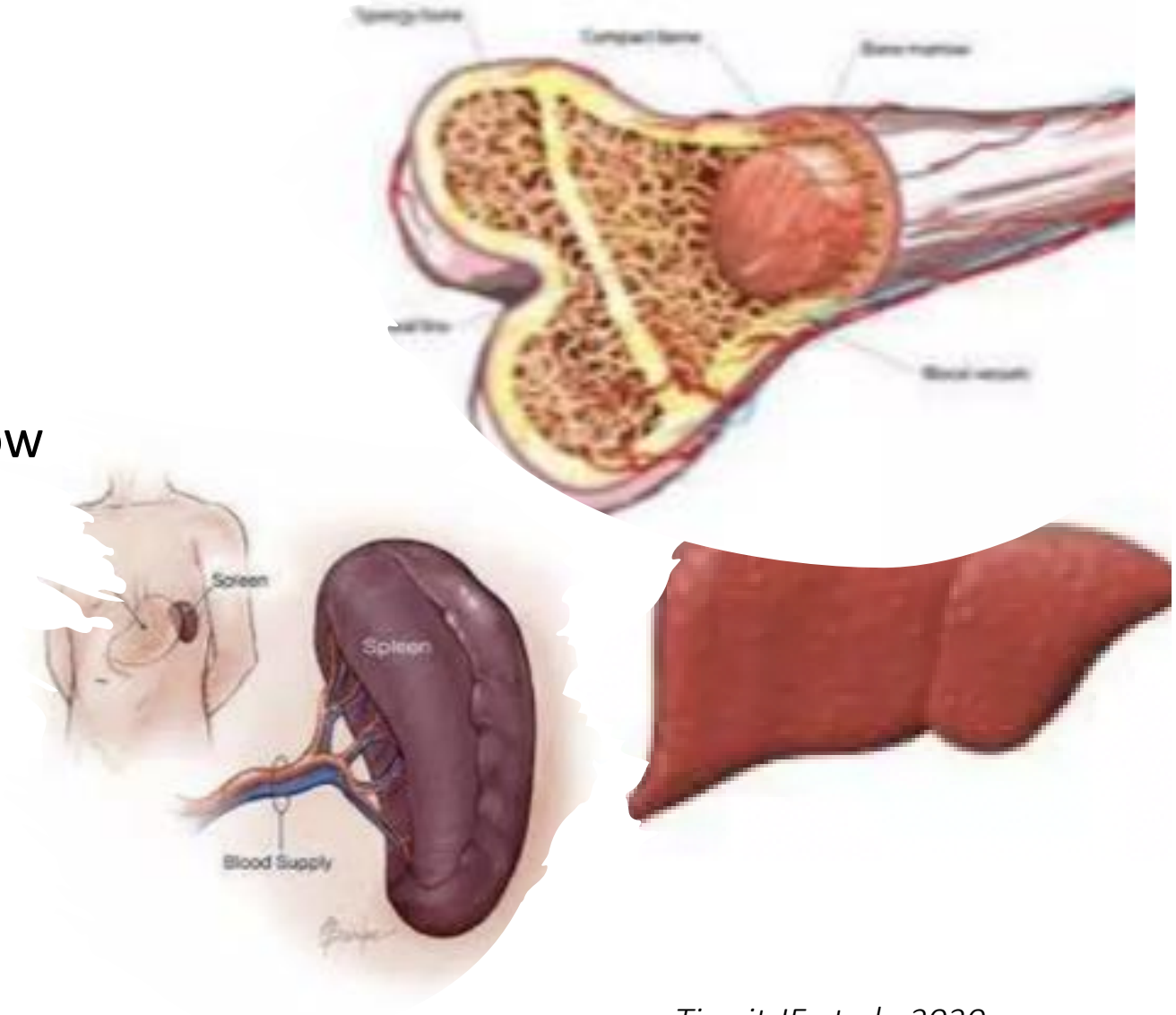
Extravascular infection

- Infection of the lymphatic system
  - Includes liver, spleen and bone marrow



Timsit JF et al., 2020

Management of BSI

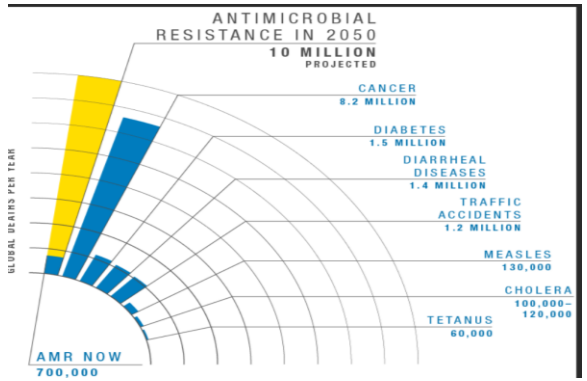
- Includes the use of antimicrobial agents

However;

- Antimicrobial resistance is a global public health concern

Global AMR burden

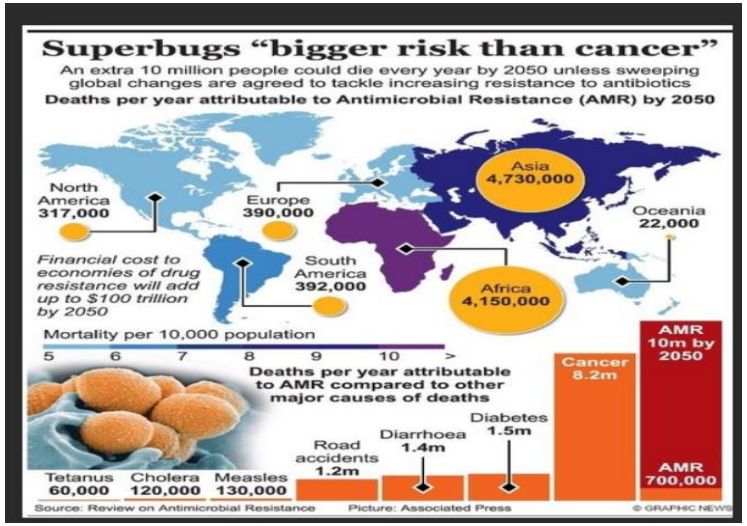
- Globally
  - **5 million deaths associated with AMR**
  - **Approximately 1.5 million deaths attributed to AMR**
  - **2050 projection: 10 million**



ARC, 2022

[Emerging and Ebbing Threats | UCSF Magazine]

- Little information on BSI due to antibiotic resistant bacteria is available in Pacific nations, including Papua New Guinea

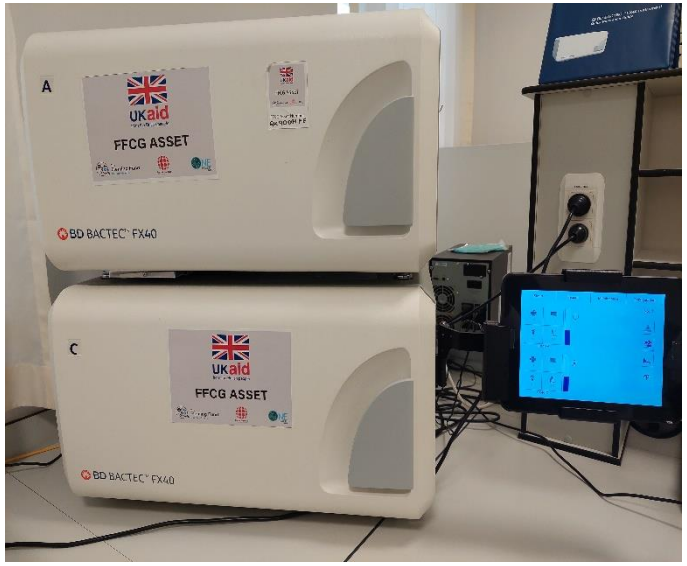


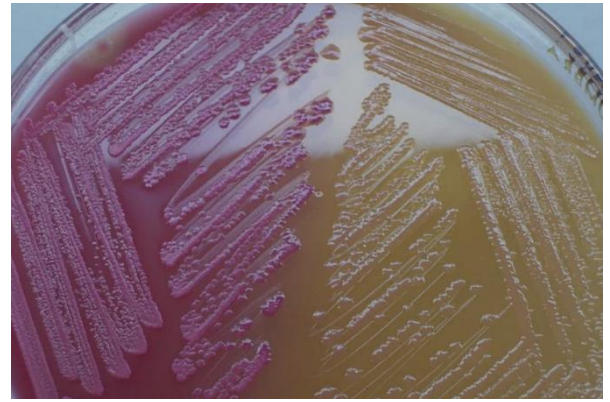
Introduction……

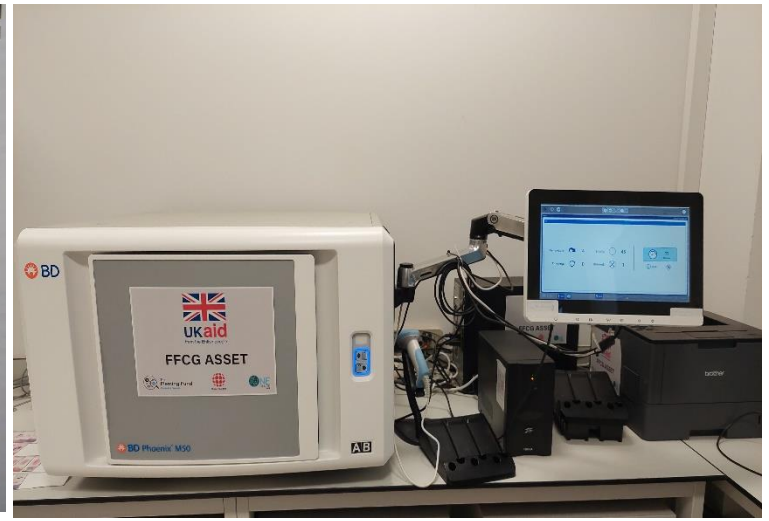
- Fleming Fund – UK funded project to address AMR in developing countries
  - PNG is a recipient of grant
    - Goroka Provincial Hospital in EHP is among the FFCG AMR surveillance sites

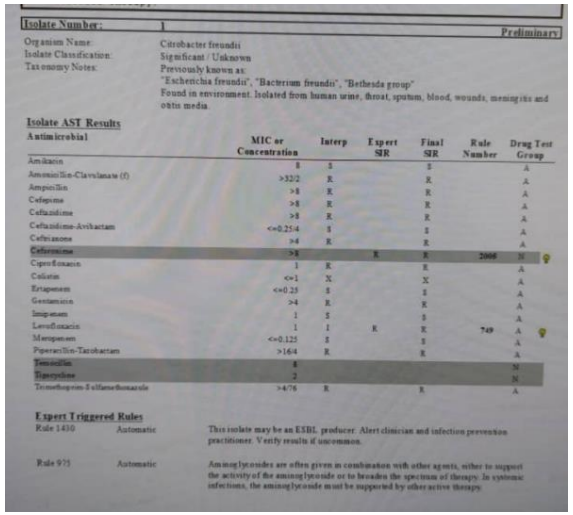
- To monitor AMR;
  - Blood culture-based antimicrobial resistance surveillance of BSI in patients receiving clinical care at Goroka Provincial Hospital, Papua New Guinea

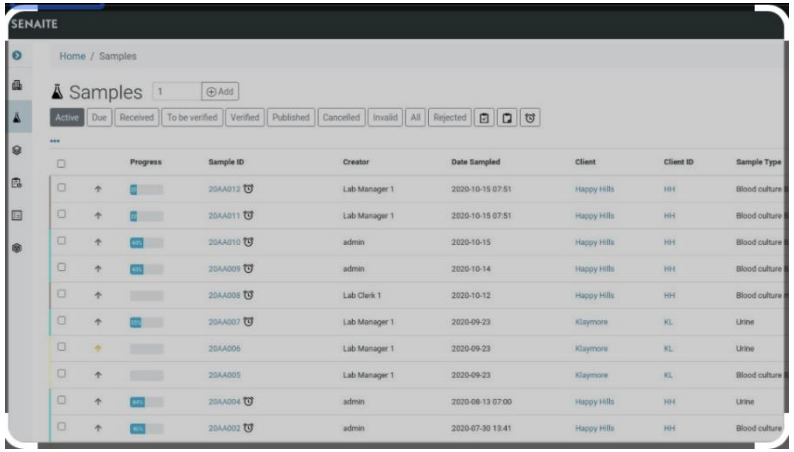
Methods: Goroka microbiology Lab











Methods……

Panel	Antibiotics contained and disc abbreviation
STAPH	Penicillin PEN1) Cefoxitin (FOX30) Chloramphenicol (C30) Erythromycin (E15) Sulfa/trimethoprim (SXT25) Tetracycline (TE30)
ENC	Penicillin (PEN1) Ampicillin (AMP2) Nitrofurantoin (100) Vancomycin (VA5)
GNR	Amoxy+clavulanate (AMC30) Ceftriaxone (CRO30) Gentamicin (CN10) Ciprofloxacin (CIP5) Nitrofurantoin (F100) Sulfa/trimethoprim(SXT25)
MRGN	Tobramycin (TOB10) Meropenem (MEM10) Ceftazidime (CAZ10) Piperacillin/tazo (30/6) Amikacin (AK30) Chloramphenicol (C30)
SSV	Ampicillin (AMP10) Ceftriaxone (CRO30) Sulfa/trimethoprim (SXT25) Chloramphenicol (C30) Pefloxacin (PEF5) Azithromycin (15ug)
HAEM	Penicillin (PEN1) Tetracycline (TE30) Sulfa/trimethoprim (SXT25) Chloramphenicol (C30) Ceftriaxone (CRO30)
STREP	Penicillin (PEN1) Oxacillin (OX1) Erythromycin (E15) Tetracycline (TE30) Sulfa/trimeth(SXT25) Chloramphenicol (C30)

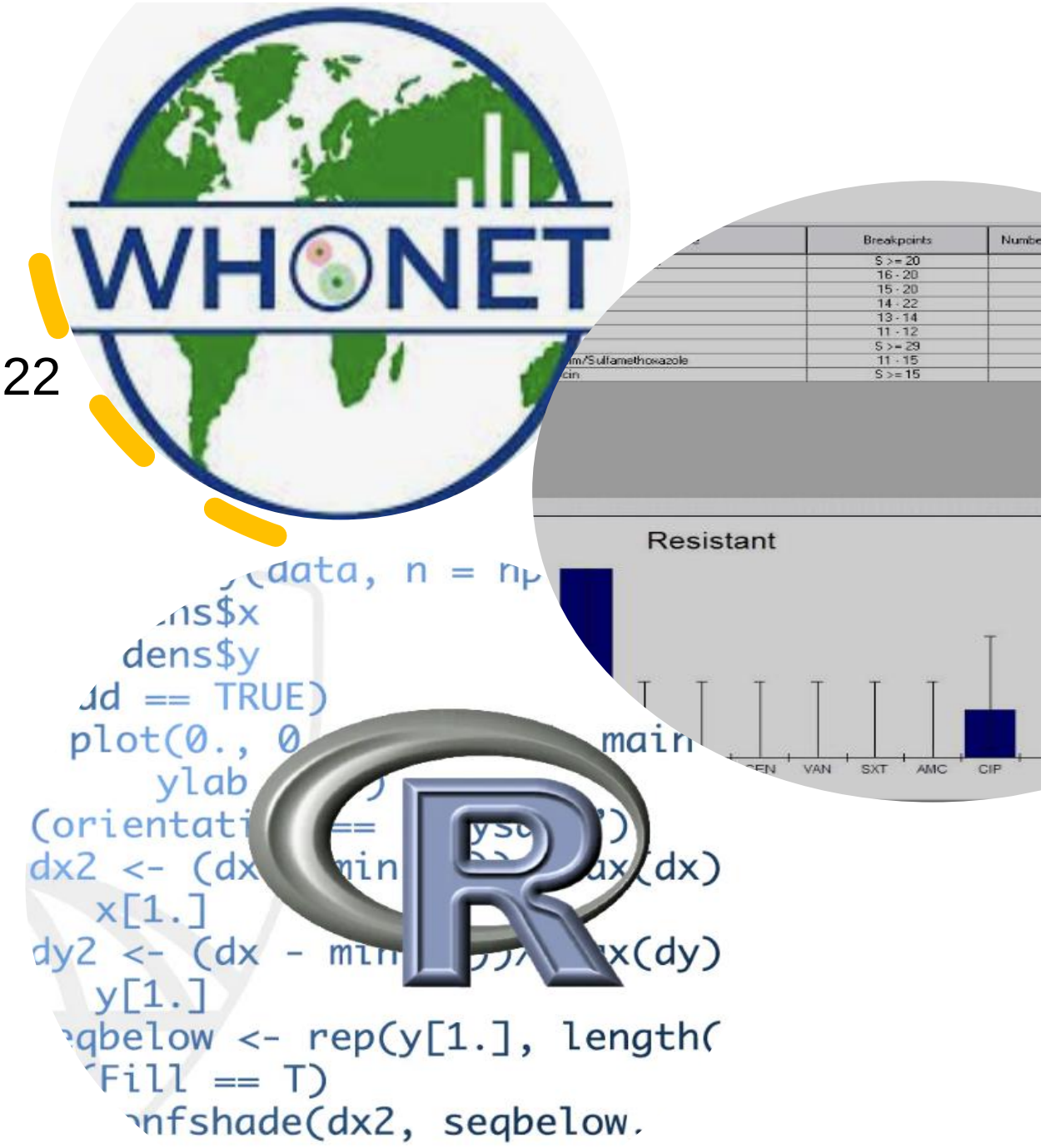
Eucast Version12

https://www.eucast.org/clinical_breakpoints

Methods…..

- Demographic, clinical, bacterial identification and antimicrobial susceptibility testing data from blood specimens collected between April 2022 and July 2023 was retrieved from Senaite Laboratory Information Management System (LIMS)

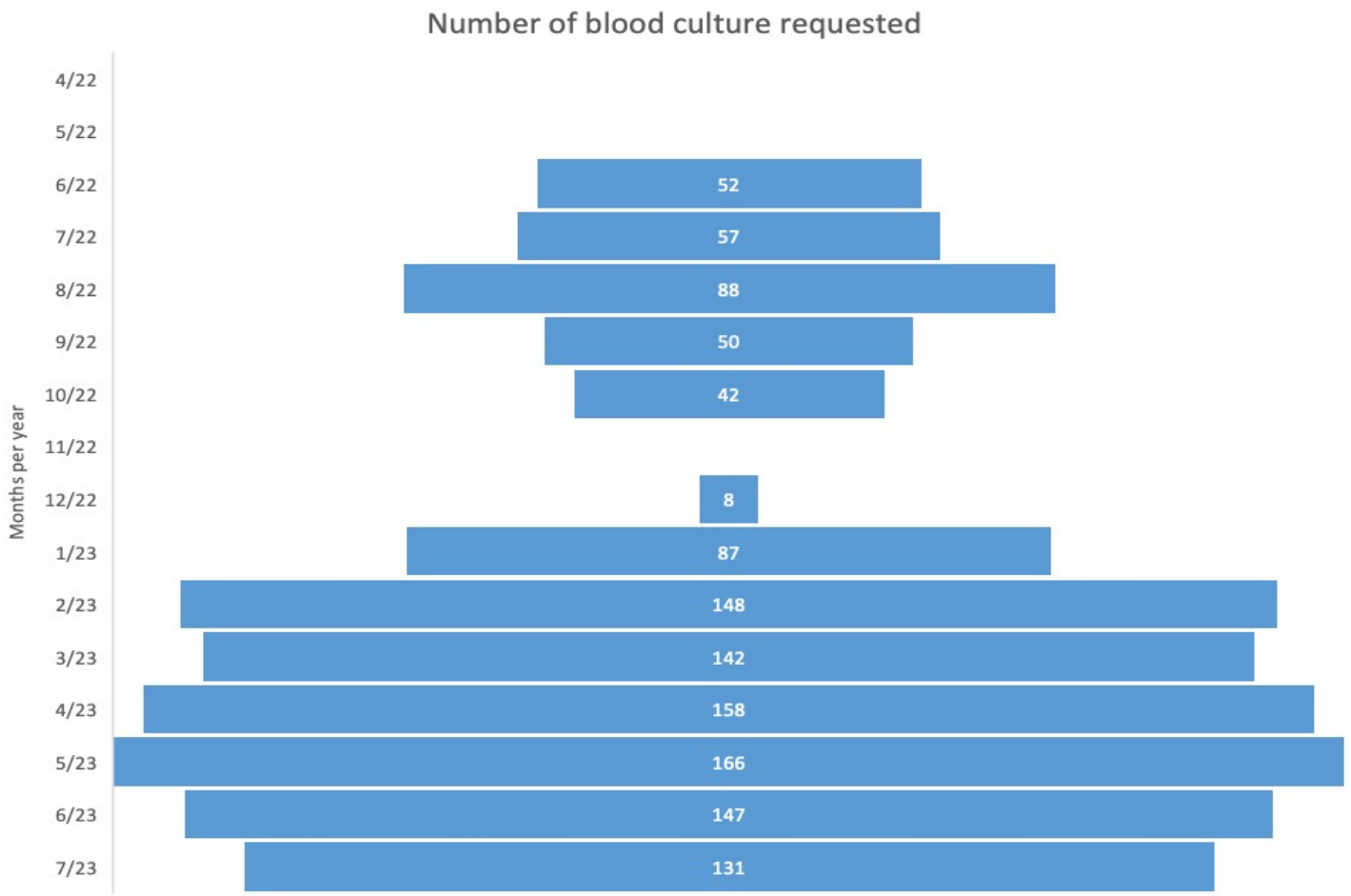
- Data analysis was done using WHONET and R statistical software version 4.3.1



Results

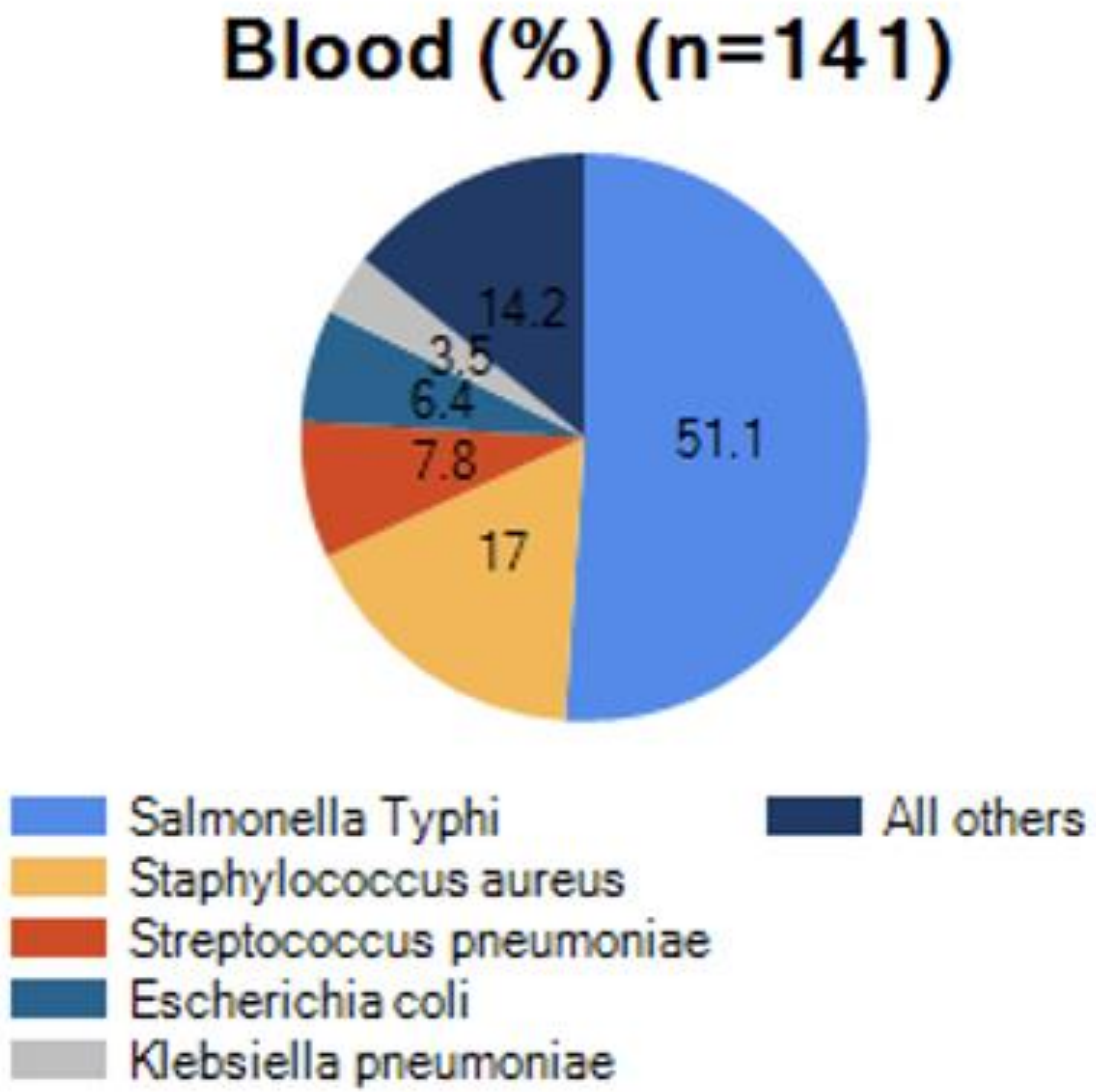
- Among the 1,276 patients screened for BSI
  - 51% (646) were male
  - Median age was 19 years (IQR 6-33)

- Increased utilization of blood culture system
  - 2023



Results….

- Out of the total (n = 1276) blood specimens processed
  - 141 (11%) were positive for bacterial pathogens

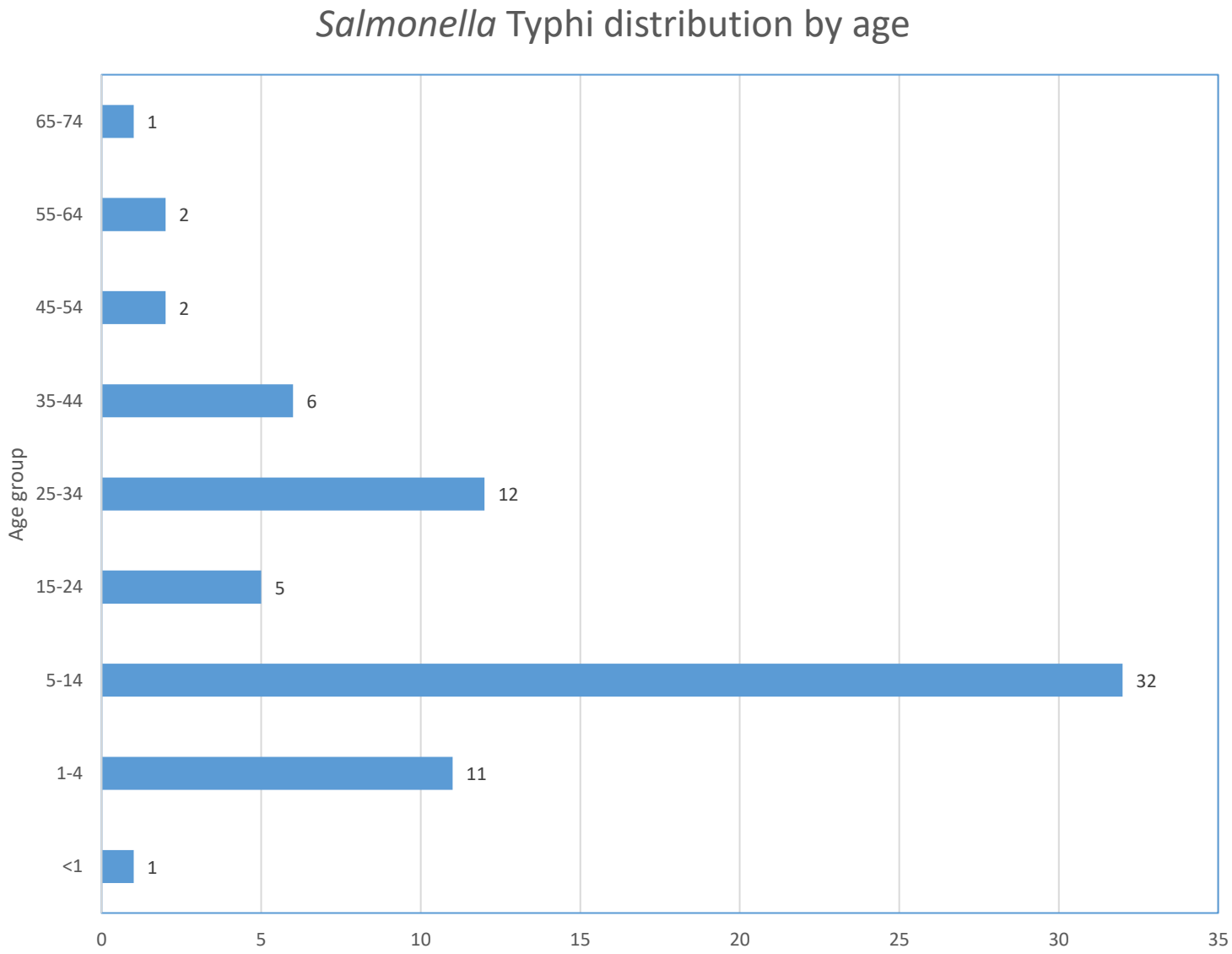


Results.....

- *Salmonella enterica* serovar Typhi (72, 51%) and Methicillin-resistant *Staphylococcus aureus* (14, 10%) were the most frequently isolated bacteria and showed high susceptibility to conventional first-line antibiotics (93–100%)
    - Nearly half of the isolates (43%) of *Salmonella* Typhi were resistant to chloramphenicol
- 6 isolates (n=12) (*E. coli*, 2 and K. *pneumoniae,* 4) were ceftriaxone-resistant-ESBL

Results…..

- Patients with *S.* Typhi did not differ significantly in age compared to patients presenting with BSI as a result of other bacteria, including MRSA (P>0.05)
    - Increase in Isolation of S. Typhi <10 years
- Isolation rate of *S.*Typhi and MRSA was significantly high in the paediatric ward (93%) and the emergency ward (15%), respectively (P<0.05)



Conclusion and recommendation

- *Salmonella enterica* serovar Typhi, resistant to chloramphenicol, was the predominant cause of bloodstream infection, especially among infants and children <10 years of age, posing a threat to patient management.

- There is a need for routine surveillance to monitor the spread of resistant strains and strengthen Infection prevention and control

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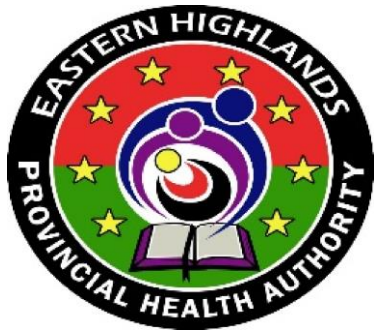
Acknowledgements



THANK YOU