Microbiological profile of organisms causing bloodstream infections between 2004 and 2016 in a tertiary hospital, Limpopo Province, South Africa

Sizeka Maweya
BDT (Medunsa), MBChB(Pret), MMed(Fam.Med)(UL), MSc.Clin.Epi(Pret), AHMP(FPD,Yale)
Family Physician, Clinical Epidemiologist and Senior Lecture University of Limpopo
OUTLINE OF PRESENTATION

• Introduction
• Research Question
• Methodology
• Data Analysis
• Literature search
• Results
• Conclusions
• Acknowledgements
Introduction

• The aetiology and antimicrobial profile of bloodstream infections (BSIs) continue to change with the evolution of medical care, particularly among the hospitalized patients who require intensive care support and antimicrobial treatment.

• The AIM of the study: To determine the aetiology and susceptibility profile of BSIs at Pietersburg hospital.

• Describe the prevalent bacterial pathogens isolated from the blood culture specimen received from Pietersburg Hospital and to review the antimicrobial profile.
Research Question

• Are BSIs common in Pietersburg Hospital?
• Hypothesis:
  $H_1$ - There was a change in the patterns of infectious agents isolated at Intensive Care Unit of the Pietersburg Provincial Hospital between 2004-2006 and 2014-2016.
  $H_0$ - No change
Methodology

• A cross-sectional, laboratory-based study comparing two study periods (2004-2006 and 2014-2016)
• The local data used was drawn from the NHLS
• **2004-2006:** The BD BACTEC™ Blood Culture Media – BD was used for incubation of the bottles; however, the identification was done with Analytical Profile Index (API) which is a manual identification of organisms with a limited spectrum.
• **2014-2016:** The same BD BACTEC™ Blood Culture Media – BD was used for incubation of the culture bottles. However, identification and susceptibility testing were done using Microscan® which is a semi-automated instrument
Data Analysis

• Data were entered into Epidata and saved as a Stata file for analysis in Stata version 13 from StataCorp LP

• Summary measures included proportions for binary variables and ratios for categorical variables with more than 2 outcome states

• Chi square tests or Fisher’s exact tests, was used to determine whether any changes in antibiotic resistance were statistically significant (alpha = 0.05).
## Results

<table>
<thead>
<tr>
<th>Organism</th>
<th>2004-2006 (n=73)</th>
<th>2014-2016 (n=298)</th>
<th>p-values*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td><strong>Acinetobacter spp</strong></td>
<td>8</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td><strong>Coagulase negative staph</strong></td>
<td>23</td>
<td>32</td>
<td>167</td>
</tr>
<tr>
<td><strong>E coli</strong></td>
<td>4</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td><strong>Enterobacter spp</strong></td>
<td>4</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td><strong>Enterococcus spp</strong></td>
<td>4</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td><strong>K.pneumoniae</strong></td>
<td>8</td>
<td>11</td>
<td>36</td>
</tr>
<tr>
<td><strong>Proteus spp</strong></td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td><strong>Pseudomonas spp</strong></td>
<td>2</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td><strong>Staphylococcus aureus</strong></td>
<td>6</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td><strong>Streptococcus pneumonia</strong></td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Streptococcus group (A-F)</strong></td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td><strong>Viridans streptococci</strong></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>MRSA</strong></td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>MRSE</strong></td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td><strong>Other Klebsiella</strong></td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>
Conclusions

• There was an increase in the number of tests and isolates

• Drug resistance level 3%, against antibiotics tested for (colistin, imipenem, linezolid, meropenem and vancomycin)

• No clinically significant change in the resistance levels between the first and second study periods.
Limitations

• Data for 2004-2006 was very scant, possibly due to the change in the laboratory information system and the lack of input from the microbiologist at that time.

• Capturing of data was predominantly manual and could not be retrieved with the current system.

• The microbiology testing was not centralized in the first-time period; – inconsistent reporting standards and testing protocols may have been an issue during this time.

• No input from on-site pathologist, especially with the drug to organism matches, when reporting.

• Lack of specialist or senior doctors in the ICU – the hospital was primarily a regional hospital.

• Testing was done manually using the disc diffusion method.

• The reports were manually entered.

• No electronic capturing and storage for the reports.
Acknowledgements

Dr Elize Webb
My supervisor Prof Brendan Girdler-Brown UP SHSPH
My co-supervisor Prof Lekalakala NHLS UL
My PA Ms P. Khoza
Dr Sam Ntuli UL Biostatistician