INCIDENCE OF BACTERIAL COLONISATION IN HOSPITALISED PATIENTS WITH DRUG-RESISTANT TUBERCULOSIS

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BACKGROUND

- Hospital acquired infections (HAIs) – cornerstone of Infection Control Programmes
- Neglected and under-practiced in South Africa¹
- Tuberculosis (TB) burden in South Africa - ~ 295 000 new notified cases in 2015, 10 000 of these being multidrug resistant and rifampicin-resistant cases²
- Lack of literature concerning nosocomial infections in TB hospital settings

BACKGROUND

Extended spectrum beta-lactamase (ESBL) producing bacteria
Carbapenem resistance on the increase\textsuperscript{1,2,3}
Vancomycin-resistant enterococci (VRE)\textsuperscript{4}


*FEMS Immunology and Medical Microbiology*, 56(3): 191-196.

*Diagnostic Microbiology and Infectious Disease*, 62(1): 86-91.

AIM

To determine the spectrum of bacterial colonisation in drug-resistant TB patients upon admission and during hospitalisation
METHODOLOGY

Demographic information, recent medical care, antibiotic or invasive device exposure over the last month collected at baseline

Nasal, groin and rectal swabs – at admission and every four weeks during hospitalisation

Samples stored at 4°C until transported to the National Health Laboratory Service

Identification and antimicrobial susceptibility testing of isolates using culture and VITEK-MS system (National Health Laboratory Service)

PCR and DNA sequencing for detection carbapenem resistant genes

Microsoft Excel®

Data collection

Matched 1:3—each patient transferred from an acute facility matched with three patients from the community

Specialised drug resistant TB hospital

Prospective, case control study

August to December 2016
Ethics
Nelson Mandela Metropolitan University Research Ethics Committee (Human) – H15-HEA-PHA-017
Eastern Cape Department of Health – EC_2016RP1_50
Declaration of Helsinki¹

37 patients – nine transfers and 28 community admissions
Female patients – 78.37% (n=29)
Average age of population - 35.08±9.62 years

13 patients colonised upon admission

32% - community (9/28)
44% - other institutions (4/9)
N=37

No. of patients

Age Range (years)

HIV Positive

HIV Negative

65%

35%
ANTIBIOTICS PRESCRIBED DURING HOSPITALISATION

Percentage of patients prescribed antimicrobial

- Penicillin: 3%
- Terizidone: 90%
- Pyrazinamide: 93%
- Aminosalicylic acid: 55%
- Moxifloxacin: 45%
- Linezolid: 62%
- Levoflaxacin: 66%
- Isoniazid: 45%
- Ethionamide: 62%
- Ethambutol: 45%
- Clofazimine: 24%
- Bedaquiline: 76%
- Amikacin: 45%
ESBL PRODUCING BACTERIAL ISOLATES

- Staphylococcus aureus
- Escherichia coli
- Klebsiella pneumoniae
- Enterobacter cloacae
- Proteus mirabilis
- Citrobacter freundii
- Klebsiella oxytoca
- Citrobacter braakii

N=64
The high number of *K. pneumoniae* isolates are of concern

Carbapenemase producing genes not detected in isolates with reduced carbapenem susceptibility (*Proteus mirabilis* and *K pneumoniae*)

No VRE isolated, while two patients had methicillin resistant *Staphylococcus aureus* colonisation at admission

Seven participants died during the course of the study – none were attributed to nosocomial infection
<table>
<thead>
<tr>
<th>ANTIMICROBIAL</th>
<th>MIC RANGE (mg/L)</th>
<th>PERCENTAGE RESISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BASELINE ISOLATES (n=13)</td>
<td>HOSPITAL-ACQUIRED ISOLATES (n=49)</td>
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<tr>
<td><strong>PENICILLINS/CEPHALOSPORINS</strong></td>
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<tr>
<td>AMPCILLIN</td>
<td>16 - ≥32</td>
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<tr>
<td>AMOXICILLIN</td>
<td>16 - ≥32</td>
<td>76.9</td>
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<tr>
<td>PIPERACillin/TAZOBACTAM</td>
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<tr>
<td>CEFuroxime</td>
<td>≥64</td>
<td>100</td>
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<tr>
<td>CEFuroxime AXETIL</td>
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<tr>
<td>CEFOXITINE</td>
<td>16 - ≥32</td>
<td>76.9</td>
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<tr>
<td>CEFOTAXIME</td>
<td>2 - ≥64</td>
<td>100</td>
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<tr>
<td>CEFAZIDIME</td>
<td>16 - ≥32</td>
<td>100</td>
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<tr>
<td>CEFEPIME</td>
<td>16 - ≥32</td>
<td>92.3</td>
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<td><strong>CARBAPENEMS</strong></td>
<td></td>
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<tr>
<td>ERTAPENEM</td>
<td>1 - &gt;32</td>
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<tr>
<td>IMPIPENEM</td>
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<tr>
<td>MEROPENEM</td>
<td>16 - 32</td>
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<td><strong>AMINOGLYCOSIDES</strong></td>
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<tr>
<td>AMIKacin</td>
<td>32 - ≥64</td>
<td>53.9</td>
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<tr>
<td>GENTAMYCIN</td>
<td>8 - ≥16</td>
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<td><strong>FLUOROQUINOLONES</strong></td>
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<td>CIPROFLOXacin</td>
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<tr>
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<td>NITROFURANTOIN</td>
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<td>COLISTIN</td>
<td>≥16</td>
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<tr>
<td>SULPHAMETHOXAZOLE/TRIMETHOPRIM</td>
<td>≥320</td>
<td>92.3</td>
</tr>
</tbody>
</table>
CONCLUSION

• Insight into the spectrum of bacterial pathogen colonisation
• Prior exposure to healthcare facilities put patients at higher risk of being colonised
• *Enterobacteriaceae* were the most prevalent nosocomial pathogens colonising TB patients
• Prolonged admission drug resistant-TB patients at higher risk of colonisation with other drug-resistant pathogens
• Guidance for Antibiotic Stewardship and Infection Control Programmes
ACKNOWLEDGEMENTS

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My co-authors
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- Dale Annear
- Ilse Truter

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Thank you