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

R Gaida[1,2], J Black[1], S Govender[3], D Annear[3] and I Truter[4,5]

[1]Research Associate, Drug Utilisation Research Unit, Nelson Mandela University
[2]Human Sciences Research Council, Post-doctoral fellow
[3]Department of Microbiology, Nelson Mandela University
[4]Drug Utilisation Research Unit, Nelson Mandela University
[5]Department of Pharmacy, Nelson Mandela University

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BACKGROUND

- Hospital acquired infections (HAIs) – cornerstone
- of Infection Control Programmes

- Neglected and under-practiced in South Africa[1]

- Tuberculosis (TB) burden in South Africa - ~ 295 000 new notified cases in 2015, 10 000 of these being multidrug resistant and rifampicin-resistant cases[2]

- Lack of literature concerning nosocomial infections in
- TB hospital settings

http://zululandobserver.co.za/103679/tb-awareness-comes-under-the-spotlight-this-month/

1. Lowman, W. 2016. Active surveillance of hospital-acquired infections in South Africa: implementation, impact and challenges. *South African Medical Journal*, 106(5).
2. World Health Organisation. 2016. Global TB Report: Annex 2 Country Profiles. Available at http://www.who.int/tb/publications/global_report/gtbr2016_annex2.pdf?ua=1 [Date accessed: 06/08/2017].

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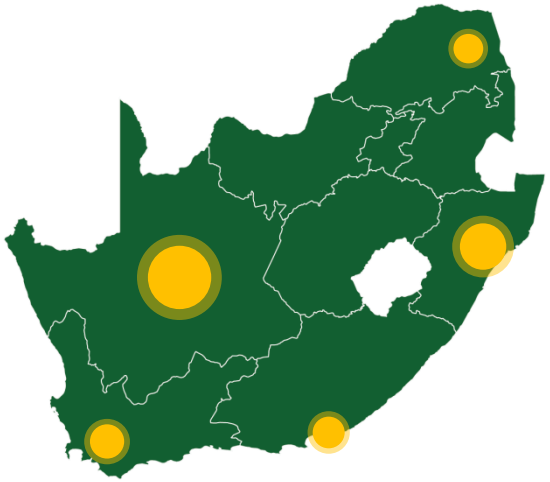
BACKGROUND



Extended spectrum beta-lactamase (ESBL) producing bacteria

Carbapenem resistance on the increase[1,2,3]

Vancomycin-resistant enterococci (VRE)[4]

1. Bamford, C., Badenhorst, L., Duse, A.G., Hoosen, A.A., Nchabeleng, M., Oliver, S., Perovic, O., Sein, P.P., Simpson, J., Wadula, J. and Wasserman, E. 2007. Antimicrobial susceptibility patterns of selected invasive pathogens from public sector hospitals in South Africa, 2007. *South African Journal of Epidemiology and Infection*, 24(2): 28-30.

2. Ehlers, M.M., Veldsman, C., Makgotlho, E.P., Dove, M.G., Hoosen, A.A. and Kock, M.M. 2009. Detection of bla_{SHV},bla_{TEM}, and bla_{CTX-M} antibiotic resistance genes in randomly selected bacterial pathogens from the Steve Biko Academic Hospital. *FEMS Immunology and Medical Microbiology*, 56(3): 191-196.

3. Usha, G., Chunderika, M., Prashini, M., Willem, S.A. and Yusuf, E.S. 2008. Characterization of extended-spectrum β-lactamases in *Salmonella* spp. At a tertiary hospital in Durban, South Africa. *Diagnostic Microbiology and Infectious Disease*, 62(1): 86-91.

4. Mahabeer, Y., Lowman, W., Govind, C.N., Swe-swe-han, K. and Mlisana, K.P. 2016. First outbreak of vancomycin-resistant Enterococcus in a haematology unit in Durban, South Africa. *Southern African Journal of Infectious Diseases*, 31(1): 20-24.

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AIM

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

METHODOLOGY

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

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®

August to December 2016

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METHODOLOGY

Ethics

Nelson Mandela Metropolitan University Research Ethics Committee (Human) – H15-HEA-PHA-017

Eastern Cape Department of Health – EC_2016RP1_50

Declaration of Helsinki[1]

1. World Medical Association. 2013. Declaration of Helsinki: ethical principles for medical research involving human subjects: 1-8.

RESULTS

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)

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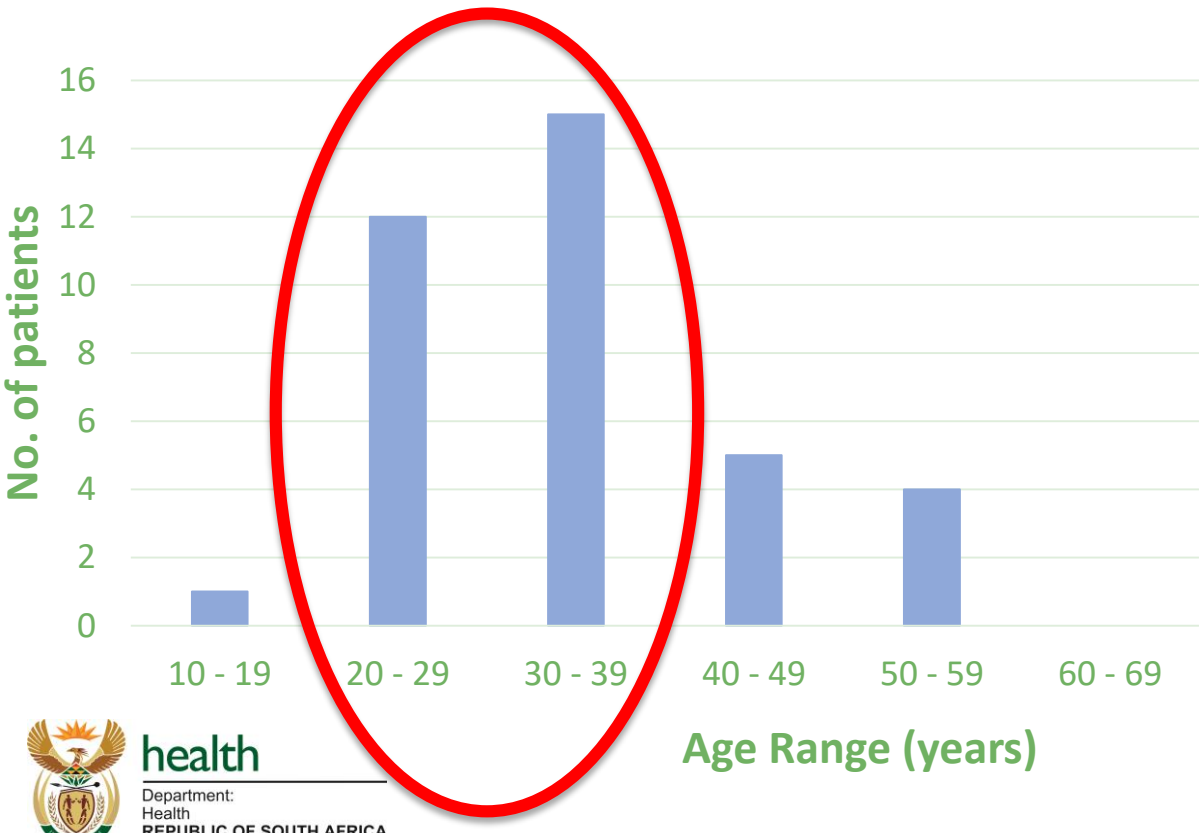
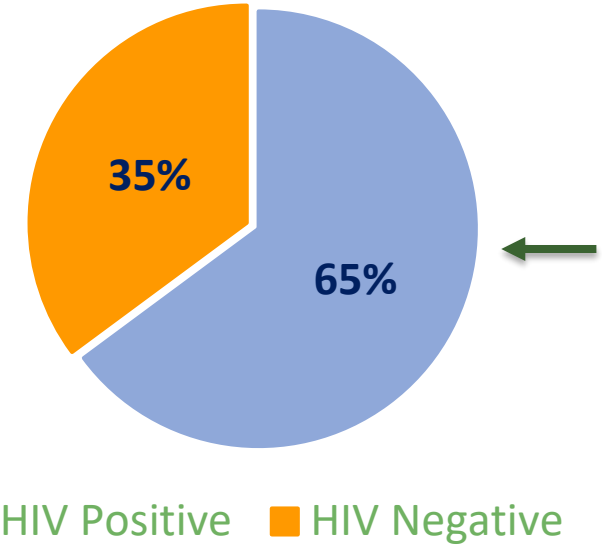
PATIENT SPECIFICS

N=37





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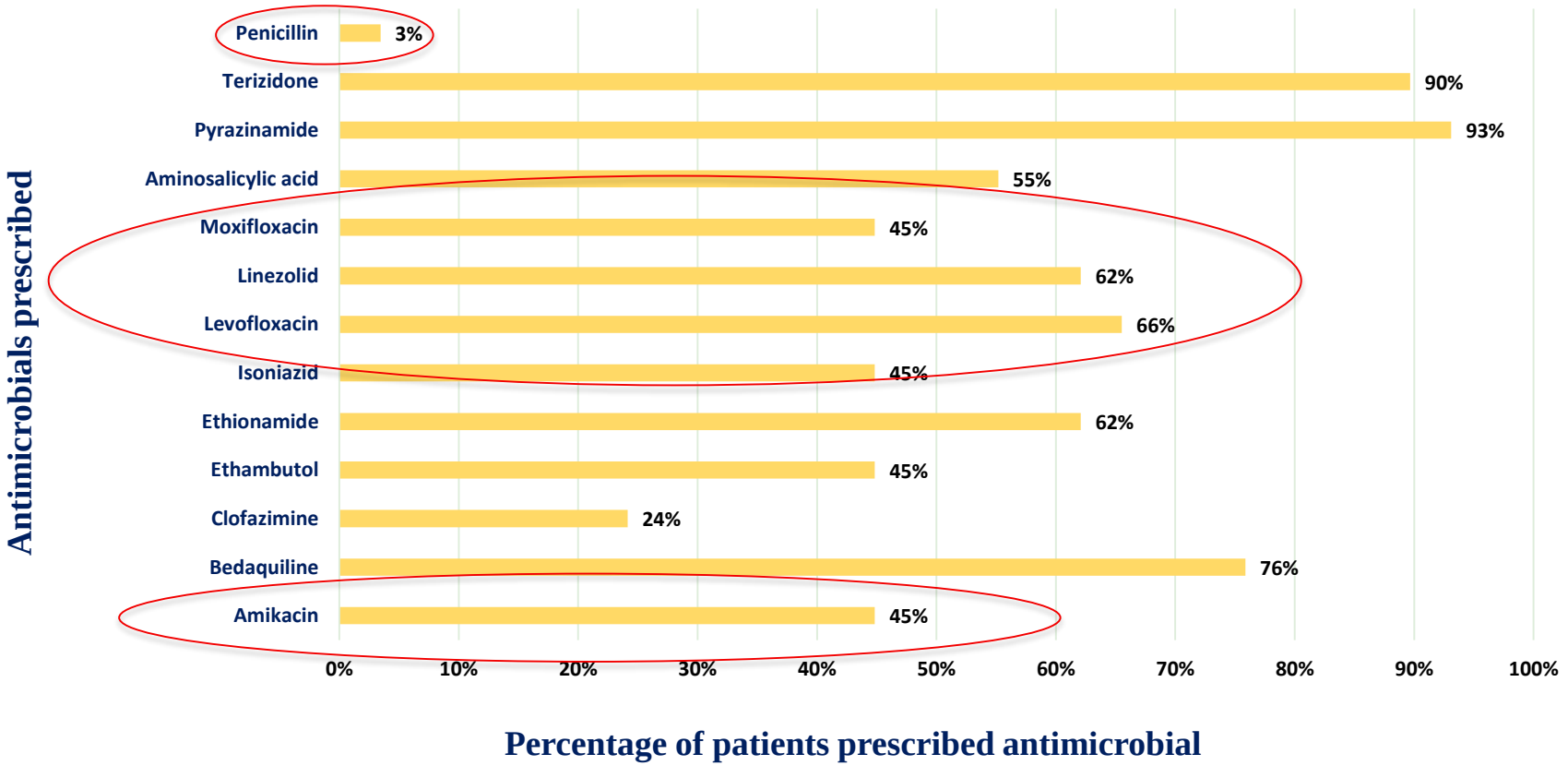
ANTIBIOTICS PRESCRIBED DURING HOSPITALISATION



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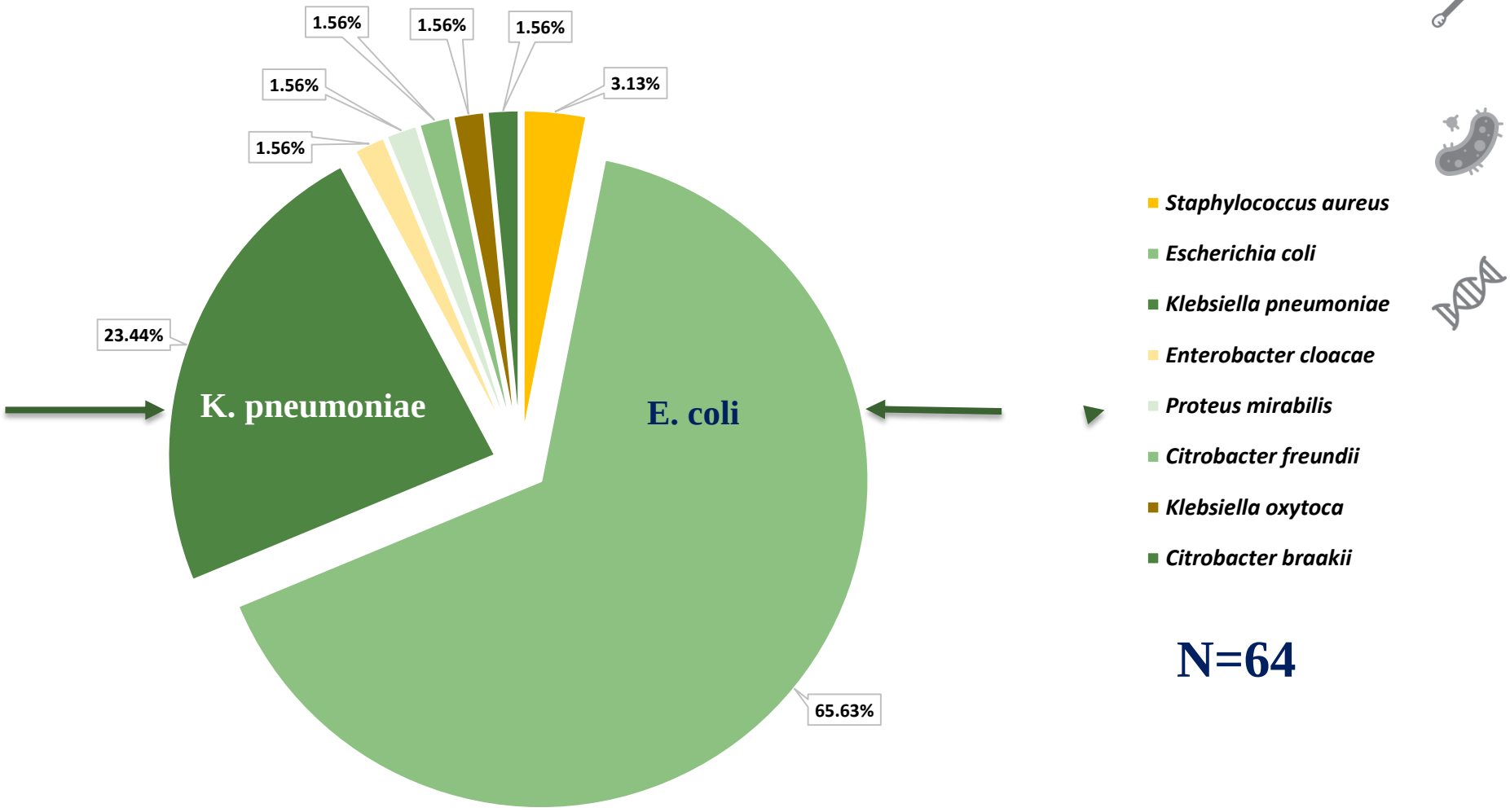
ESBL PRODUCING BACTERIAL ISOLATES



N=64

BACTERIAL ISOLATES

- 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

ANTIMICROBIAL SUSCEPTIBILITIES

ANTIMICROBIAL	MIC RANGE (mg/L)	PERCENTAGE RESISTANCE	
		BASELINE ISOLATES (n=13)	HOSPITAL-ACQUIRED ISOLATES (n=49)
PENICILLINS/CEPHALOSPORINS			
AMPICILLIN	16 - ≥32	100	100
AMOXICILLIN	16 - ≥32	76.9	77.6
PIPERACILLIN/TAZOBACTAM	64 - ≥128	23.1	57.1
CEFUROXIME	≥64	100	100
CEFUROXIME AXETIL	≥64	100	100
CEFOXITINE	16 - ≥32	76.9	77.6
CEFOTAXIME	2 - ≥64	100	100
CEFTAZIDIME	16 - ≥32	100	100
CEFEPIME	16 - ≥32	92.3	100
CARBAPENEMS			
ERTAPENEM	1 - >32	7.7	0
IMPIPENEM	8 - 32	0	0
MEROPENEM	16 - 32	7.7	0
AMINOGLYCOSIDES			
AMIKACIN	32 - ≥64	53.9	77.6
GENTAMYCIN	8 - ≥16	46.2	69.4
FLUOROQUINOLONES			
CIPROFLOXACIN	2 - ≥4	100	100
OTHER			
TIGECYCLINE	≥8	23.1	22.4
NITROFURANTOIN	≥512	53.9	22.4
COLISTIN	≥16	7.7	0
SULPHAMETHOXAZOLE/TRIMETHOPRIM	≥320	92.3	100

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

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My co-authors

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- Sharlene Govender
- Dale Annear
- Ilse Truter

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