



# Infection Prevention and Control: the South African Landscape

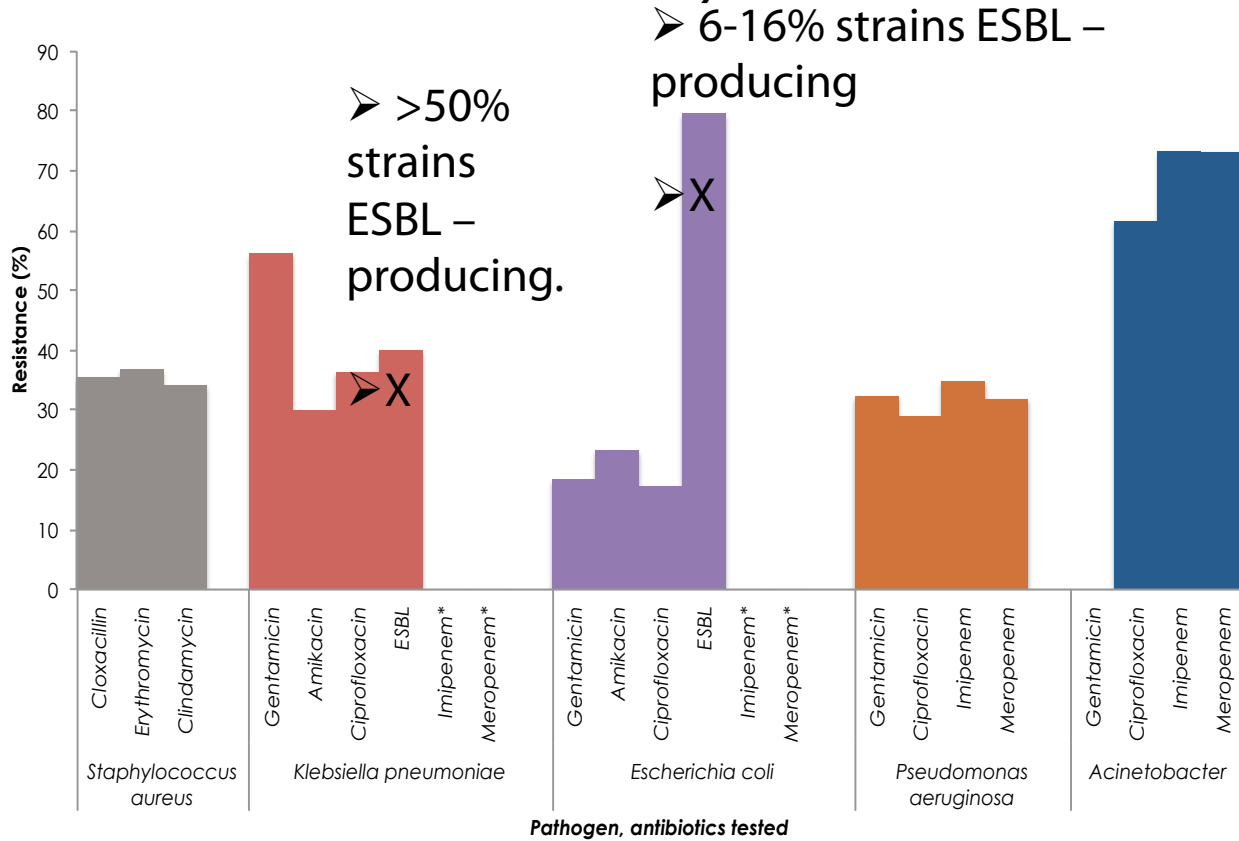
Adriano G Duse: Chair GARP-SA

# Healthcare-associated Infections (HCAIs)

- Are among the most common & serious adverse events in hospitals globally
- Occur in ~ 1 in 10 admissions overall
- Problem of HAIs bigger in developing countries: prevalence is 15.5%, at least double the overall rate in Europe & incidence in ICUs is 34.2/1000 patient days (triple the rate than in the US)
- In SA there have been, to date, no formal reporting schemes for HAIs in the public sector
- Ongoing active surveillance difficult given the shortage of infection prevention and control practitioners (IPCPs) in most facilities
- Point-prevalence surveys have, in some areas, been conducted but information derived from these is limited

# There is a high rate of resistance observed in the most common nosocomial pathogens

NHLS public sector resistance data of most common nosocomial pathogens from 8 laboratories (January-December 2009)



Source: 2009 National Health Laboratory Service /NASF

Notes: \* 0% resistance to imipenem and meropenem  
*E. coli* and *K. pneumoniae*.

# *Salmonella* Johannesburg

- First isolated in Johannesburg, South Africa – identified by Kauffmann & Henning (1952)
- SAIMR Annual Report 1966: alarming increase in incidence of *S* Johannesburg in Black patients from various hospitals
- Rare serotype; tendency to produce chronic infection; Strain R to commonly used antibiotics (amp, kana, tet, chlor); apparently higher infectivity
- ? Introduced in Honk Kong via imported foods; *S* Johannesburg isolated from a dog imported from SA under quarantine in 1974 in HK
- First detected in HK in 1971 (4 cases), 1972 (783), 1973 (1433), and 1974 (1411)
- Caused hospital outbreak in Hong Kong in 1974 – in a paediatric general hospital (overcrowding, heavy environmental contamination, no apparent faecal carriage in HCWs): 115 cases (1 Aug - 30 Sept 1974) – 24 (20.9%) primary admission for G/E with *S* Johannesburg; 22 of remaining initially non-infected children acquired it nosocomially (24.2% cross-infection rate) (J Hyg Camb. 1977;**78**:113-119)
- *S* Johannesburg was among the 20 most common salmonella serovars among Canadian registered commercial egg producing flocks (Epidemiol Infect 1991;**106**:259-270)

# *Salmonella* Isangi

First described in Stanleyville “Belgian Congo” – 1947

- 1999-2001: outbreak of ESBL -producing S Isangi in paediatric wards at CHB
- March – Dec 2002:CHB Hospital : 60 cases of ESBL-producing S Isangi; 2 HCW colonised, no treatment
- May 2002: 18 children at Lambano Baby Sanctuary, 1 death – children admitted either from CHB or from Natalspruit Hospital; 3 Caretakers colonised, eradication attempted on all 3
- Interventions: IC procedure review and implementation, HCW education, ciprofloxacin administration

Wadula et al: Poster, Joint Congress of HIV Clinicians, ID, IC, Travel Medicine, STD Societies and Veterinary and Public Health, 2-6 December 2001

Govender et al: Poster, 23<sup>rd</sup> ICC, Durban, South Africa, 7-10 June 2003

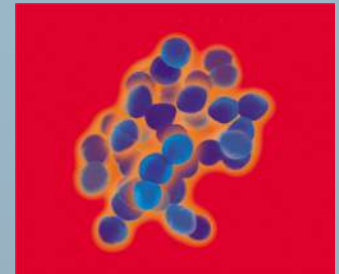
# Spread Of Resistant Clones Of GRE

➔ **Clonal spread** of *vanA* and *vanB* strains with different hospitals



➔ **Interhospital** spread

➔ **Persistence** of one *E.faecium vanA* strain within hospitals



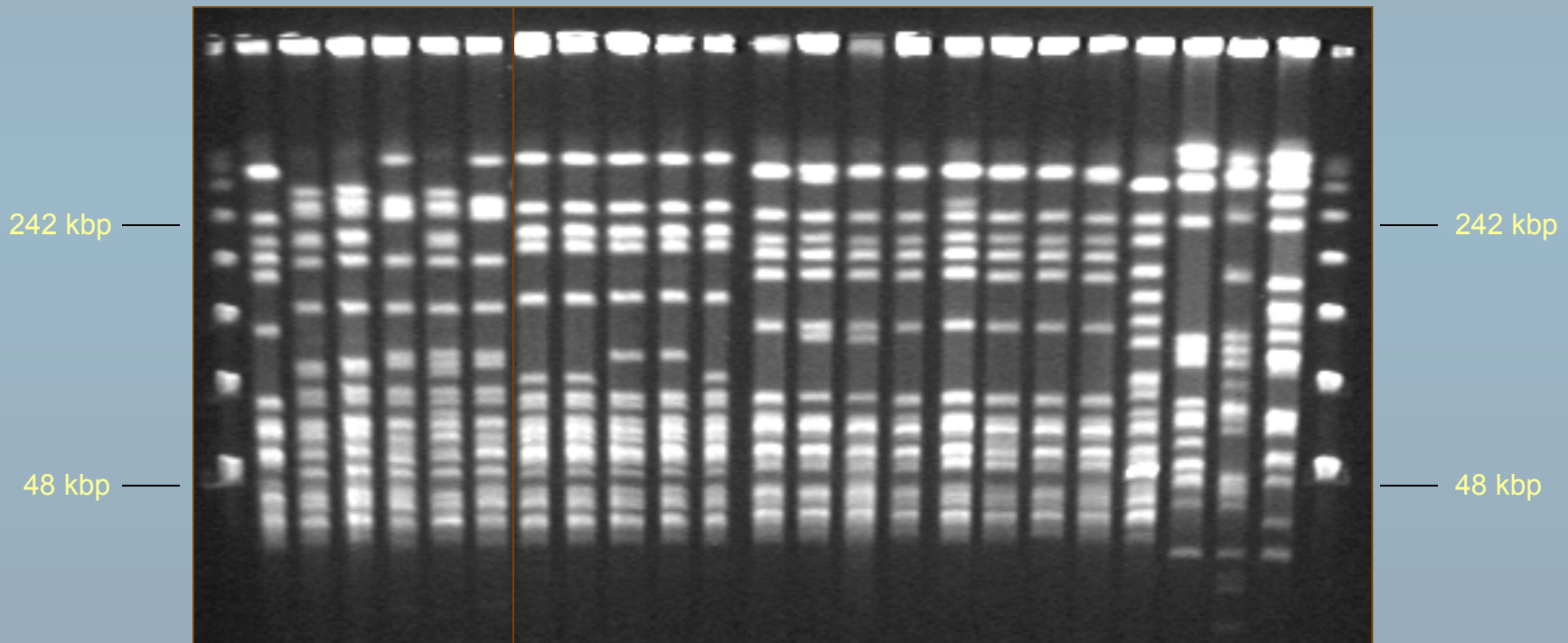
Von Gottberg et al. Epidemiology of glycopeptide-resistant enterococci colonizing high-risk patients in hospitals in Johannesburg, Republic of South Africa. J Clin Microbiol 2000;38:905-909



# Spread Of Resistant Clones Of GRE

- Garden City 7-11
- Milpark 12-13,19
- JHB Gen 14
- Morningside 15
- Arwyp 16-17
- Mulbarton 18

MW 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 MW



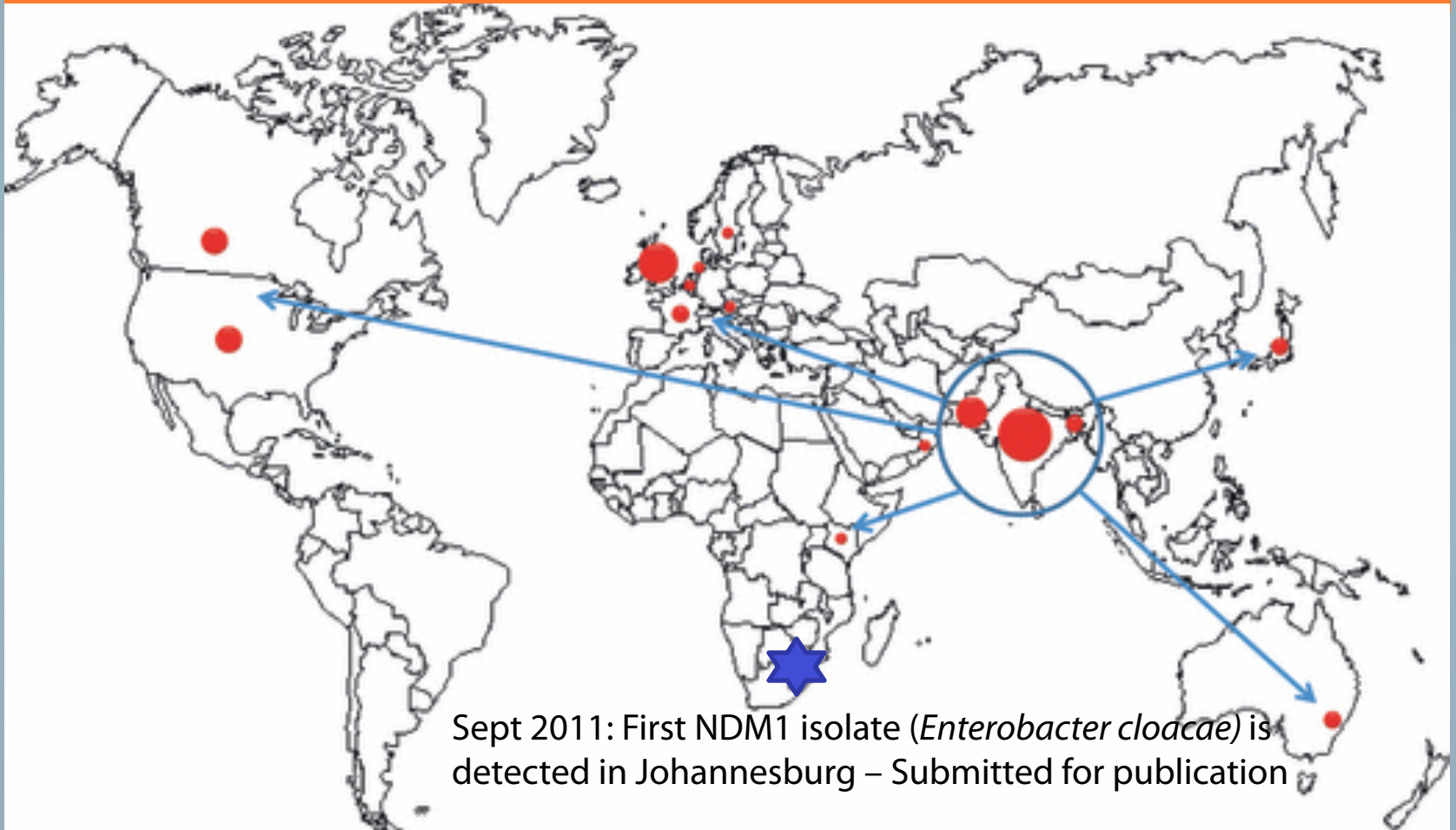
Lane 1-6 *E. faecium* isolates from hospital S1, Lane 7-11 *E. faecium* isolates from hospital P1, Lane 12-13 *E. faecium* isolates from hospital P2, Lane 14-19 *E. faecium* VanA isolated from S1 in 1997 and four private hospitals in 1998, Lane 20 *E. faecium* VanA ATCC 51559, Lane 21-22 *E. faecalis* Van A isolates from S1 and S2, Lane 23 *E. faecalis* Van A ATCC51299







## New Delhi metallo-beta-lactamase (NDM-1): towards a new pandemic?



Clinical Microbiology and Infection

Volume 16, Issue 12, pages 1699-1701, 12 NOV 2010 DOI: 10.1111/j.1469-0691.2010.03385.x

<http://onlinelibrary.wiley.com/doi/10.1111/j.1469-0691.2010.03385.x/full#f1>

# Outline of Presentation:

- The Problems (the status quo)
- Potential Solutions
- Current Activities

# Documented (published) practices in SA that have led to breaches in IP&C:

- Overcrowding
- Inter-hospital transfer of patients colonized / infected with drug-resistant microorganisms
- Inadequate disinfection of medical equipment e.g. nasopharyngoscopes
- Poor practices w.r.t. injection safety, sharps disposal & blood splatters
- Contamination of parenterally administered fluids, medication and supplements

# Reducing HCAs – the problems:

- Insufficient commitment of HCF managers to strengthening Infection Prevention and Control (IPC) in SA – excuse: limited resources
- Inadequate staffing & training of Infection Prevention and Control Practitioners (IPCPs); failure to relate education to practice
- Infection control procedures compromised in the face of
  - High patient throughput
  - Low staff: patient ratio
  - High level of patient movement from ward to ward
  - The 'moonlighting' phenomenon
  - Inadequate infrastructure
  - Dysfunctional procurement processes
- Insufficient unit-based instruction and supervision
- Inadequate quality control for cleaning services
- Lack of career paths for IPCPs & SANC recognition of IPC as a specialty

# Reducing HCAs –the problems:

- Insufficient expertise (especially microbiological) & leadership in IP&C
- Lack of surveillance data & failure to recognize that surveillance is the cornerstone of an IPC program and should direct its activities
- Evidence of guidelines policies but not of implementation
- Insufficient expertise (especially microbiological) & leadership in IPC
- Scant reports (with limitations) on infection prevention and control-related issues
- Outbreak responses are REACTIVE not PROACTIVE
- Evidence of guidelines & policies but not of implementation / evaluation (outcome measurements)

# Some currently available Infection Prevention & Control policies and guidelines:

- [Morrow BM, Argent AC, Jeena PM, Green RJ.](#)  
[Guideline for the diagnosis, prevention and treatment of paediatric ventilator-associated pneumonia.](#) S Afr Med J. 2009 Apr;99(4 Pt 2):255-67.
- [Brink A, Feldman C, Duse A, Gopalan D, Grolman D, Mer M, Naicker S, Paget G, Perovic O, Richards G; South African Thoracic society \(SATS\).](#)  
[Guideline for the management of nosocomial infections in South Africa.](#) S Afr Med J. 2006 Jul;96(7 Pt 2):642-52.
- Department of Health, South Africa 2010. Healthcare acquired infections in South Africa: A national intervention programme 2010-2013
- Department of Health, South Africa, 2007. The Draft National Infection Prevention and Control Policy for TB. MDR-TB and XDR-TB
- Quality Assurance Directorate National Department of Health 2010. Obligatory list of supply needs for core infection prevention and control interventions.

# IPCP staffing & skills levels:

- In RSA currently recommended IPCP staffing level is 1 per 200 beds (draft legislation, Govt gazette, 2008)
- Recent survey (unpublished) of IPCPs throughout the country, excluding W Cape, identified 253
- Few HCFs complied with recommended ratio. In tertiary hospitals, ratio of IPCPs to acute beds was 1:400, while in smaller hospitals it ranged from 1:250-1:300
- 116/253 IPCPs were not employed primarily as IPCPs or had other primary responsibilities
- 149/253 (59.8%) had no formal IPC training. Of those that did, 78 had a certificate, 14 a diploma & 12 a BSc (Hons) in IPC



# Dedicated Infection Prevention and Control Units in SA are few!

- Currently there are 4 Academic Centres with dedicated IP&C Units in SA:
  - University of the Witwatersrand / NHLS
  - Stellenbosch University
  - University of KwaZulu-Natal
  - University of Cape Town / NHLS/ NICD

# Gauteng's hospitals of neglect



Why was my sister left to rot to death?  
 99

# Fury over 'hospital from

CEO in wake of child



WIN!



Pierre Cardin hampers PAGE 3



MANUEL ON SA'S four-letter word BUSINESS TIMES

HEIRS AND GRACES Why Harry's crazy over local babe PAGE 3



# Sunday Times

December 12 2004 / R7.50 INC. VAT

## Killer bugs strike hospitals

One in seven patients at risk of picking up life-threatening infection

LOTTO 6 13 21 23 30 48 + 22 LOTTO PLUS ROYAL

NEW TREASURES



Lost Bosman works discovered P13

# Sunday Times

JULY 10 2005 / R8.50 INC. VAT



Sw yet sca

ANGU TASCHICA RE KEETON

ay asked if her two-infected with dead-steria the doctor's that she was not or baby Kiara was air only child, the 6th grief and 10 000 vital health depart. Another 21 babies Mahatma Gandhi (al north of Durban report released on ed that in the neore the babies died -cking lack of basic simple hand-wash-ination by treating aines - apparently ut of the very drug- k babies.

acks the lungs, leav-erly infected, leary oodstream and tur-ially shutting down events that, over five he hospital where, once you enter you eath warrant".

HE 20 Ellen Sturm, a med-ist from the Univer-sity-Natal's medical a fax from Dr Sibon- general manager health services, ap-ent of a compilation the deaths of the 22



UNDER THE MICROSCOPE The neonatal nursery at Mahatma Gandhi Memorial Hospital where 22 babies died recently

## Hospital diagnosis is no comfort to bereaved parents

Chlorobacillus pneumoniae bacteria that were also found in 17 of the babies. "Apparent bottles did not cover the bacteria so the contamination took place in the ward during the handling of the bottles and not at the production plant," Innes said. Minister of Health Manto. "The babies-Minimum said that team's re-ports did not indicate any single in-dividual or section of the hospital responsible." The reasons it reported for the outbreak included: ● Multiple use of units of intravenous medication in out hospital units; ● Inadequate hand-washing practices and facilities; ● Reliance on alcohol disinfectant solution instead of hand-washing at bedside; ● Insufficient availability of the disinfectant solution and staff not rubbing it into their hands properly; ● Inappropriate use of sterile gloves; ● White coats worn in the rest of the hospital not being removed before staff entered the nursery; and ● Understaffing. The team recommended that neonatal nursery staff should be forbidden to wear long sleeves as these prevented proper hand-wash-ing. Washbasins and taps should be removed for the same reason. It suggested the infection-control officer at the hospital be given more authority to stop any malpractice she observed and that training in infection-prevention practices be stepped up throughout the province. But for the Pillars, the recom-mendations are cold comfort. "The 12 000 they gave us means nothing," said Katie Pillay. "Kiara

# SA's deadly new plague

Top doctor warns that hospital infections could soon rival Aids and malaria

DOMINIC MAHLANGU and CLAIRE KEETON

Memorial Hospital, where the 22 babies died, has found that the place still needs a major clean-up. A third of 39 swabs collected at the hospital by the Sunday Times only last week, and analysed by an in-

KILLER infections picked up in hos-pitals are fast becoming South Africa's new epidemic.

December 12 2004

NEWS

Sunday Times 5



## THE SUPERBUG MENACE

Superbugs are bacteria that are resistant to one or

# Worldwide alarm at virulence of bacteria

Misuse of antibiotics spawns bugs immune to every weapon in medicine's arsenal

CLAIRE KEETON and MEGAN POWER

RESISTANT bacteria are threatening to make drugs useless against them. Amid a worldwide battle between antibiotics and bacteria, South African doctors are being forced, in the case of one superbug, to resort to a toxic an-tibiotic developed in the 1940s. Antibiotics failed against 76% of 135 samples of this super-resistant bug tak-en from a trauma intensive-care unit this year.



SUPERBUGS

22

antibiotics," said Peter He said the Infectious Diseases Society of America had alerted authorities that while it was focusing on the threat of bio-terrorism, it was also aware of a smallpox-like virus that was causing a greater threat from drug-resistant bacteria in health-care facilities. The president of the South African Association of Hospital and Institutional Pharmacists, Barbara Raftery, said: "If nothing is done about this problem we could get back to a pre-penicillin state where we don't have effective ways will be then! It is a scary

Doctors not prescribing antibiotics properly. Dr Derrick Innes, medical director of Solihull Health Risk Management, said he had a "big responsibility" to prescribe antibiotics more appropriate. "Everybody with a sore throat is an antibiotic what only 10% are used for." "There is no doubt some of the patients in hospitals are brought in inappropriate medical practices," he said. But, said Innes, patients had to know the infection rates at hospitals in which they received treatment. "The public needs to be empow-ered and encouraged to take busi-





**NEW DIVISION**  
**Infection control services laboratory established to make hospitals safer**

"With all those bugs lurking around in hospital, you may end up sicker than when you were admitted." "You risk your life going into hospital!" We've all heard these warnings about the hazards of entering some of our hospitals, but the possibility of acquiring an infection while in hospital is not only a local problem, nor is it limited to developing countries – it is an ongoing worldwide problem of inadequate infection control policies, costing health budgets millions in additional health care costs.

Hospital-acquired infections are frequently caused by organisms resistant to certain antibiotics. Many of these organisms take advantage of the fact that the patient is debilitated,

either from underlying disease or the procedures to which the patient is subjected or from hospitalisation in general. The practice of invasive procedures and insertion of prosthetic devices may offer biological advantages for some bacteria. These problems can be controlled by the implementation of stringent infection control policies.

The value of infection control programmes is clearly shown in some first world countries where sound infection control policies are in place. In these countries both the incidence and cost of hospital-acquired infections are low. In particular, the problem of antibiotic-resistant organisms is low. In many developing countries, the use of antibiotics is poorly controlled, leading to bacteria becoming resistant to the antibiotics meant to kill them. New antibiotics are then required which can considerably increase the cost of infection control. Furthermore, the rapid spread of

HIV infection on the African continent, and indeed globally, has further emphasised the need for good infection control programmes.

In South Africa, the current drive towards hospital accreditation is forcing hospitals to review their infection control policies. As part of its commitment to disease prevention and management, the Department of Medical Microbiology has established the Division of Hospital Epidemiology and Infection Control, at Wits Medical School.

According to Dr Adrian Dusé, head of the Division, this service will initially operate at the Johannesburg Hospital but will, in the near future, be extended to other hospitals and related institutions in the Gauteng region.



Seen at the launch of the division (left) Mrs Marilyn Bittz and Mrs Yvonne Bilgeri, and below (l to r) Dr Nicola Jones, Prof Hendrik Koornhof,



Dr Adrian Dusé, Dr Lucille Blumberg, Dr Suzie Budaveri and Dr Olga Perovic

Dr Dusé says the scope of the laboratory will include adequate infection control-related laboratory facilities and expertise, microbiological sampling of the hospital environment, specialised bacteriology, investigation of hospital outbreaks, research relating to hospital epidemiology, and education regarding laboratory aspects of infection control.

"This division will not only help maintain health standards in critical areas of the hospital, such as intensive care units, operating theatres and neurology units, but it will also monitor intravenous fluids, infant feeds and water outlets for contamination. Advice on prevention of needle-stick injuries and ensuring staff safe from infections will also be part of the service.

"The types of tests that will be carried out will include bacterial counts of water and air samples, etc (to next page)









# DAMNATION ...

# SALVATION ...

**THE PRESENCE OF PATHOGENIC BACTERIA  
IN COMMERCIALY AVAILABLE POULTRY IN  
SOUTH AFRICA**

N Aithma, W van Nierop, A G Duse, M Kassel, A Potgieter, N Thothobolo, B Fernandes, R Stewart  
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Partnership







# The Role of Molecular Techniques in the Epidemiology of Potential Nosocomial Pathogens



B. Ahmadou Ahidjo, E. Marais and AG Duse

University of the Witwatersrand and the National Health Laboratory Service



## INTRODUCTION

nosocomial infections are increasingly recognised as a serious problem in developing countries. They are primarily caused by the contamination of hands of health-care workers, medical equipment and infusates with pathogenic bacteria<sup>1,2,3,4</sup>. Molecular techniques can be used in the investigation of the source of infection and epidemiology of pathogens.

Macro-restriction analysis of Hospital Epidemiology and Infection Control employs macro-restriction analysis, a well established method with standardised interpretation guidelines, and Arbitrarily Primed Polymerase Chain Reaction (AP-PCR) - also known as Randomly Amplified Polymorphic DNA (RAPD) - for epidemiological purposes.

Examples of the use of these techniques in the investigation of outbreaks and contamination of products are presented here.

## AIM

To highlight the utility of macro-restriction analysis and AP-PCR in the study of nosocomial infections.

### CASE 2: Fatal Contamination<sup>5</sup>

A fatal outbreak of *Serratia odorifera* Biotype 1 occurred in four hospitals in Johannesburg, and was linked to the use of intravenous parenteral nutrition. AP-PCR was performed on the isolates to determine if the contamination of the infusates given to the patients was intrinsic (pre-existing in the product) or extrinsic (during administration).

Isolates used for the AP-PCR were obtained from patients as well as the environment i.e. infusates and surface swabs at the manufacturing facility.

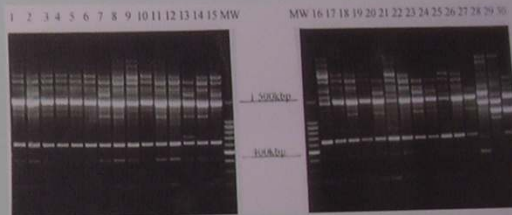


Figure 2. AP-PCR of *Serratia odorifera* Biotype 1 DNA isolates using primer HWL 74

# ON ANALYSIS FOR THE OF OUTBREAKS OF ENTEROCOLITIS

SEL, A. DUSE, M NICOL, W VAN NIEROP

South African Institute for Medical Research and the Wits School of Pathology



## *Klebsiella pneumoniae*

An outbreak of NEC occurred during April and May 1998 in a tertiary health care institution. *K. pneumoniae* with extended beta-lactamase activity was isolated from the blood culture of 7 neonatal infants (2). Macro-restriction analysis was performed on isolates of *K. pneumoniae* during the course of the outbreak (Figure 1). This proved to be a useful educational tool to highlight the importance and effectiveness of infection control implementation. The technique was used to distinguish outbreak from non-outbreak *K. pneumoniae* isolates from other wards in the hospital.



09.11.2004 12:00

# PSEUDO-OUTBREAK OF *BURKHOLDERIA CEPACIA* IN CYSTIC FIBROSIS PATIENTS AT JOHANNESBURG HOSPITAL



O. Perovic, A. Duse, R. Stewart, D. ...  
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## INTRODUCTION

*Burkholderia cepacia*, originally described as a plant pathogen, has become an important opportunistic pathogen in patients with cystic fibrosis (CF) and an infrequent cause of nosocomial infection in patients without CF (1). There is increased evidence of transmission among patients with CF by social contact; the environment is also a potential source. One risk factor for *B. cepacia* acquisition by patients with CF appeared to be hospitalisation (2).

Most of *B. cepacia* are resistant to many, if not all, of the antibacterial agents commonly used in cystic fibrosis (3). Selection of appropriate antibiotics for treatment of pulmonary "cepacia syndrome" is very difficult (4,5).

A number of *B. cepacia* isolates from CF patients were isolated in our laboratory, which were all sensitive to antibiotics tested for this organism. This outbreak of *B. cepacia* in CF Unit was studied in Infection Control Services at Johannesburg hospital.

## METHODS AND RESULTS

# TRANSMISSION OF CARBAPENEM RESISTANT *A. BAUMANII* IN A TRAUMA INTENSIVE CARE UNIT



MRB Maloba, A Duse, W Van Nierop, G Sharp, F Brown, W Mangwedi, J Goosen

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## INTRODUCTION

Over a one year period (June 2000 to July 2001) it is noted that approximately 35% of 193 *A. baumannii* isolates from patients admitted to the Trauma ICU (TICU) of an academic hospital in Johannesburg were resistant to carbapenem antibiotics (imipenem and meropenem). During a week period (14 June 2001 to 19 July 2001) eight patients were noted to be colonised and/or infected with carbapenem resistant *A. baumannii*. The high number of carbapenem resistant isolates, and the suspicion of an outbreak due to the clustering of colonised and/or infected patients prompted a thorough infection control investigation that was initiated at the beginning of July 2001.

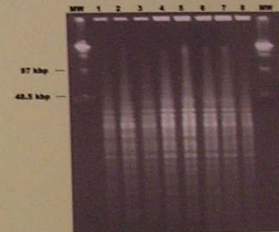
## RESULTS AND DISCUSSION

Table 1 summarises patient characteristics from whom carbapenem resistant *A. baumannii* strains were isolated.

Table 1. Characteristics of patients colonised and/or infected with carbapenem resistant *A. baumannii* strains (n=8)

Age (known for 5/8 patients)	25yrs - 56yrs (mean=40yrs)
Median duration of stay in TICU when 1 <sup>st</sup> isolate detected	10 days

Figure 2. PFGE patterns of 8 carbapenem-resistant *A. baumannii* isolates



INTERPRETATION OF PFGE RESULTS



# Vancomycin Resistance in a Clinical Isolate of *Bacillus* sp. in South Africa

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## INTRODUCTION

October 1999 a *Bacillus* sp. was isolated from blood culture taken on admission from an AIDS patient diagnosed with pulmonary tuberculosis at a state hospital in Gqeberha, South Africa. The isolate was thought not to be of clinical significance but on susceptibility testing was found to be resistant to vancomycin. The vanA genotype has been described previously in *B. cereus* and was found to be located on a plasmid other than Tn1546 which commonly occurs in VREs (vancomycin-resistant enterococci) (1). The *Bacillus* sp. described in this study was subjected to extensive phenotypic typing in order to establish a species identity. Molecular analysis of the strain was done to detect the vancomycin resistance gene and the similarity of the vancomycin resistance determinant to either the vanA gene common to many VREs or the genotype described in *B. cereus* strain VRO76.

## MOLECULAR TECHNIQUES

# VANCOMYCIN RESISTANT STAPHYLOCOCCUS AUREUS OCCURS IN SOUTH AFRICA

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## Introduction

Vancomycin resistant *Staphylococcus aureus* (VRSA) was first described in Japan in 1997. Since this worrying discovery, studies have been performed in various countries to assess the epidemiology of VRSA. We performed a retrospective study on stored methicillin-resistant *S. aureus* (MRSA) specimens to establish whether VRSA is present in the Johannesburg Hospital, South Africa. A single isolate of VRSA (23160) was identified. Retrospective analysis of the case history showed that the patient was not previously exposed to vancomycin.

## Method

- 21 MRSA isolated from blood cultures during 1998 were stored on semi-solid media. They were confirmed as *S. aureus* using API 5.1 & B. D. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, M 4 reix.
- Methicillin resistance was confirmed by the disc diffusion method according to National Committee for Clinical Laboratory Standards (NCCLS) criteria.
- All MRSA isolates were emulsified in sterile distilled water to a 2 McFarland's standard and spread onto Brain Heart Infusion (BHI) agar containing vancomycin at a concentration of 4g/ml. The plates were incubated at 35°C, and were read after 24 and 48 hours. Minimum inhibitory concentrations (MICs) for vancomycin and teicoplanin were determined by the microbroth dilution method according to NCCLS criteria and by Etest® (AB Biodisk, Sweden) according to the manufacturer's instructions. Mu50, Mu3 and ATCC 29213 were used as controls.
- Population analysis was performed on four morphological variants of isolate 23160 as previously described.

## Objectives

To assess the clinical manifestations, outcome and prognostic factors associated with *Pseudomonas aeruginosa* bacteraemia; to describe and quantify resistance to anti-pseudomonal drugs; and to apply phenotypic and genotypic methods to clinical isolates for epidemiological purposes.

## Methods

The study was performed at Chris Hani Baragwanath Hospital, a tertiary hospital in Soweto, South Africa. Adult in-patients with positive blood cultures for *P. aeruginosa* were followed up during 1998 and 1999, and children were followed during 1999. An episode of *Pseudomonas* bacteraemia was defined as nosocomial if it took place >48 hours after admission.

Blood samples were processed using the BacT/Alert system (Organon Teknica, USA). One set or more of blood cultures were processed and maintained routinely for seven days. *Pseudomonas* was identified according to standard microbiological procedures including growth on MacConkey agar; colonial morphology, motility, and production of pyocyanin, positive cytochrome oxidase test, and other conventional biochemical reactions.

Susceptibility to the antibiotics was determined by the disk diffusion method according to NCCLS guidelines. For *Pseudomonas* resistant strains MICs (minimum inhibitory concentration) and MBCs (minimum bactericidal concentration) were determined by the standard NCCLS microdilution method in Mueller-Hinton broth. Epidemiological tools used included serotyping by phage agglutination (Sanofi Diagnostics Pasteur) and macro-restriction analysis for molecular typing of *P. aeruginosa* isolates using Xba I restriction endonuclease.

## Results

*Pseudomonas* is a highly prevalent, ubiquitous bacterial pathogen in healthy individuals (1). It causes infections in both immunocompetent and immunocompromised patients and in patients with immunological deficiencies, or cystic fibrosis. *Pseudomonas* is one of the most common nosocomial pathogens, causing a variety of infections in infants (2). Systemic infection due to *P. aeruginosa* is followed by the development of septic shock, meningitis, and death (1). The incidence of *Pseudomonas* nosocomial infections has increased over the past few decades and is still increasing worldwide, although the number of hospital-acquired bacteraemia caused by this organism is decreasing (3).

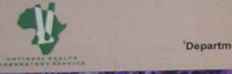
Table 1. Patient characteristics:

TOTAL NO. PATIENTS	14
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## ANTIBIOTIC RESISTANCE

Vancomycin	>64 µg/ml
Netilmicin	16 µg/ml
Clindamycin	4 µg/ml

## Multi-drug resistance



## Introduction

Several endemic strains of multi-drug resistant *Acinetobacter baumannii* have been previously identified in wards of a teaching hospital (1). However, from December 2001, a cluster of a pan-resistant strain of *Acinetobacter baumannii* emerged in a 12 bed, multi-disciplinary intensive care unit (ICU). Although this strain had appeared sporadically since January 2001, the appearance of several cases over a three month period required further investigation. Recognition of an initial cluster of 4 cases prompted the initiation of prospective surveillance for new cases and intensive infection control measures to prevent further dissemination.

# Multi-drug resistant *Acinetobacter baumannii* in a General ICU and Infection Control Perspective

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## ICU AND RESISTANCE

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# PHENOLOGY OF AN OUTBREAK OF INSTANT ENTEROCOCCI

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Table 1. MICs of morphological variants of *S. aureus* isolate 23160 using Etest®.

Variants	Vancomycin	Teicoplanin
1	16 µg/ml	4 µg/ml
2	16 µg/ml	4 µg/ml
3	16 µg/ml	4 µg/ml
4	16 µg/ml	4 µg/ml
5	16 µg/ml	4 µg/ml
6	16 µg/ml	4 µg/ml
7	16 µg/ml	4 µg/ml
8	16 µg/ml	4 µg/ml
9	16 µg/ml	4 µg/ml
10	16 µg/ml	4 µg/ml
11	16 µg/ml	4 µg/ml
12	16 µg/ml	4 µg/ml
13	16 µg/ml	4 µg/ml
14	16 µg/ml	4 µg/ml
15	16 µg/ml	4 µg/ml
16	16 µg/ml	4 µg/ml
17	16 µg/ml	4 µg/ml
18	16 µg/ml	4 µg/ml
19	16 µg/ml	4 µg/ml
20	16 µg/ml	4 µg/ml
21	16 µg/ml	4 µg/ml
22	16 µg/ml	4 µg/ml
23	16 µg/ml	4 µg/ml
24	16 µg/ml	4 µg/ml
25	16 µg/ml	4 µg/ml
26	16 µg/ml	4 µg/ml
27	16 µg/ml	4 µg/ml
28	16 µg/ml	4 µg/ml
29	16 µg/ml	4 µg/ml
30	16 µg/ml	4 µg/ml
31	16 µg/ml	4 µg/ml
32	16 µg/ml	4 µg/ml

# *Pseudomonas aeruginosa* bacteraemia at an academic hospital in South Africa

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Resistance to anti-pseudomonal antibiotics tested occurred in 21 (22%) strains. Of these, the percentage resistant to each antibiotic by MIC-breakpoint was as follows: imipenem 13.2%; meropenem 13.2%; ceftazidime 13.2%; cefepime 14.3%; piperacillin 16.5%; piperacillin-tazobactam 16.5%; ciprofloxacin 11.1%; amikacin 4.4%; gentamicin 4.4%; tobramycin 3.3% (Table 5).

*P. aeruginosa* serotypes could be determined in 77 isolates; serotype 3 was the most frequent serotype (23.1%) (Figure 1). The reproducibility of serotyping was problematic; out of 53 repeat strains 67.8% were the same serotype. RFLP by PFGE profiles were obtained in 91 strains and transmission was shown to be more prevalent in the burns unit (from the paediatric burns unit all strains were indistinguishable) than ICU (Figure 2) and in paediatric wards (Figure 3) compared with medical and surgical wards.

Table 1. Demographic and clinical data of 91 patients with *Pseudomonas aeruginosa* bacteraemia.

Characteristic	No. of patients (%)	Significance
Male	50 (55)	0.001
Female	41 (45)	
Age		
< 12 years	10 (11)	0.001
12-18 years	10 (11)	
19-64 years	42 (46)	
> 65 years	29 (32)	
ICU	22 (24)	0.001
Medical	12 (13)	
Paediatric	10 (11)	
Other	4 (4)	
ICU ward	12 (13)	0.001
ICU ward	10 (11)	
ICU ward	42 (46)	
ICU ward	29 (32)	
ICU ward	22 (24)	
ICU ward	10 (11)	
ICU ward	10 (11)	
ICU ward	4 (4)	
ICU ward	12 (13)	
ICU ward	10 (11)	
ICU ward	42 (46)	
ICU ward	29 (32)	
ICU ward	22 (24)	
ICU ward	10 (11)	
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ICU ward	10 (11)	

# Some current activities:

- Surveillance Education and Training
- Antimicrobial Stewardship - The Global Antimicrobial Resistance Partnership (GARP)
- Best Care...Always! Campaign
- Education & Training



# Infection Prevention and Control and antibiotic stewardship: the global antimicrobial resistance partnership (GARP) initiative



Global  
**Antibiotic  
Resistance**  
Partnership

**CDDEP**

THE CENTER FOR  
Disease Dynamics,  
Economics & Policy

WASHINGTON DC • NEW DELHI



Global  
Antibiotic  
Resistance  
Partnership

# Anti-infectives resistance policy strategies:

- Strategies that reduce demand
  - Extending the therapeutic life of existing drugs by reducing need for anti-infectives – antibiotic stewardship
    - Reduction of anti-infectives prescribing + ? other strategies: topical, antimicrobial impregnated devices, immunomodulation, probiotics)
    - **Lower burden of infections and therefore need of antimicrobials (immunization, infection prevention and control)**
    - Determine role of cycling, combination therapies & antibiotic heterogeneity, to delay emergence and spread of resistance
- Strategies that address supply
  - Development of new antimicrobials
  - Reduce incentives to oversell existing drugs

# THE BEST CARE ALWAYS (BCA) CAMPAIGN INITIATIVE

# Best Care...Always (BCA):

- Launched in 2009, initially primarily as a collaboration with the private sector
- Currently it is also being implemented in public sector (Gauteng, W Cape, Free State)
- Purpose: improve healthcare (& reduce HAIs) for prevention of VAP, CLABSI, CAUTI & SSI by using 'bundle' care packages; also involved in antibiotic stewardship programs
- 192 SA hospitals implementing 1/more 'bundle' care packages
- Success stories have been reported in relation to reduction of certain HAIs but none have yet been reported in the scientific literature



# Infection Prevention and Control training initiatives

# Infection Prevention and Control training courses:

- University of the Witwatersrand (IPC certificate, postgraduate diploma, MScMed in the field of IPC) \*
- Stellenbosch University (IPC certificate, postgraduate diploma)
- University of KZN (IPC certificate, BSc Hons) \*
- Other centres offering IPC certificates: NetCare, Life healthcare and MediClinic hospital groups

\*: Have been tasked by NDoH to develop a single standardized curriculum & training program for IPCPs countrywide.  
Commencement: August 2011

# Infection Prevention & Control (IPC) training at Wits:

- Certificate in Infection Prevention & Control [‘Infection Prevention and Control at the Cutting Edge’] – 1 year: 4, one-week training modules
- Advanced Diploma in Nursing (Infection Control) – above plus additional year in Department of Nursing Education, FHS, Wits University
- MSc (Med) in Infection Prevention and Control – 2 years by course work + research report. From 2012.
- FOR MORE INFORMATION, CONTACT DETAILS FOR PROF A G DUSE ARE: [Adriano.Duse@wits.ac.za](mailto:Adriano.Duse@wits.ac.za)



# Potential solutions:

- Urgent need to increase the pool of adequately trained IPCPs
- Training opportunities need to be increased
- Management must be made to see the importance of IPC – IPC Training of Managers absolutely vital
- Identification and ring-fencing of appropriate funding
- IPC job descriptions must be developed and endorsed nationally and regionally
- Address the creation of IPCP career paths
- Develop and implement a national strategy for HAI surveillance: prevalence, incidence



**Thank you !**