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# **CHALLENGES IN INFECTION CONTROL IN SINGAPORE**

# MILESTONES IN THE HISTORY OF INFECTION CONTROL IN SINGAPORE

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- 1974: Infection Control Program began with focus on surveillance
- 1985: MRSA
- 1998: ICA(S)
- 2003: SARS
- 2005: Launch of the National Infection Control Surveillance Program
- 2006: Signed pledge with WHO Hand Hygiene program
- | Year | Milestone   |
|------|---|
| 1974 | Infection Control Program began with focus on surveillance    |
| 1985 | MRSA  |
| 1998 | ICA(S)  |
| 2003 | SARS  |
| 2005 | Launch of the National Infection Control Surveillance Program |
| 2006 | Signed pledge with WHO Hand Hygiene program                   |

# NATIONAL INFECTION CONTROL SURVEILLANCE SYSTEM

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## □ NNIS methodology

## □ Indicators

- Nosocomial MRSA infections per 1000 patient days
- Device-associated infections in ICUs per 1000 device days
- SSI for hip arthroplasty

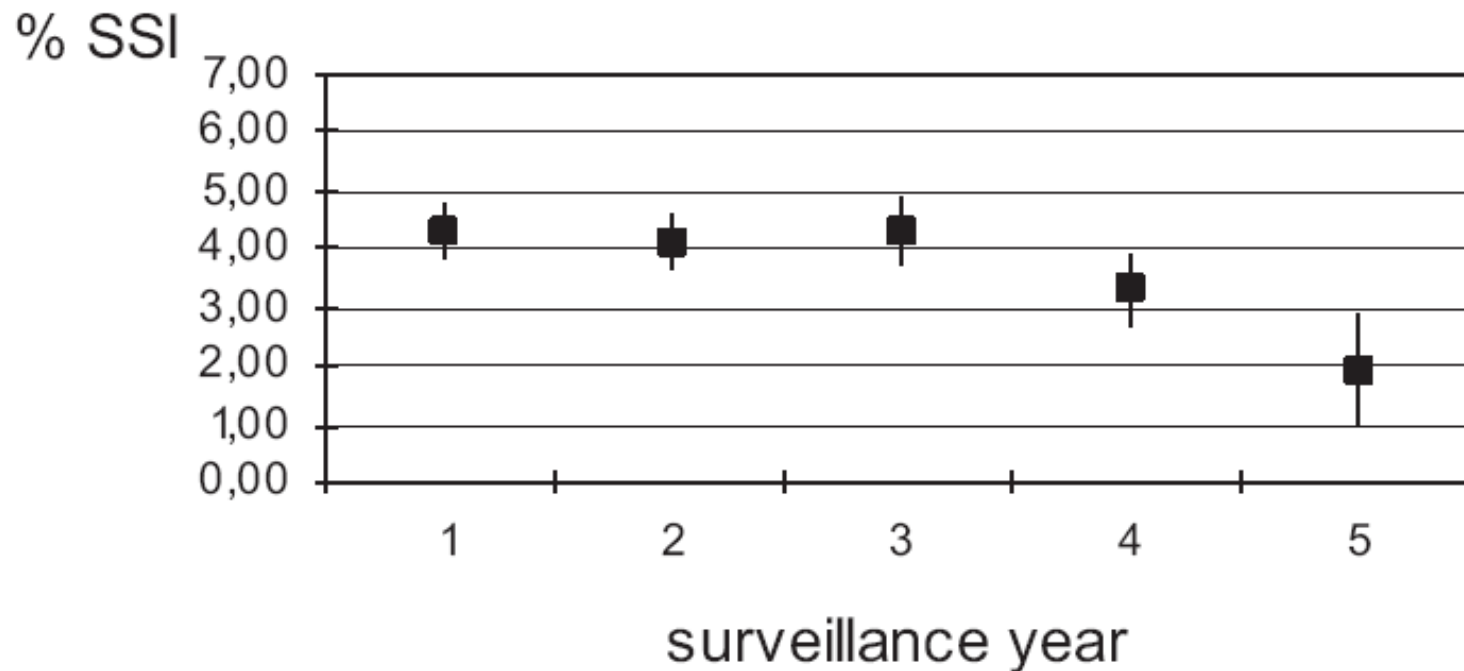


# IMPACT OF SURVEILLANCE IS WELL KNOWN

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- ❑ 30% reduction in healthcare-associated infections – Haley
  
- ❑ National surveillance programs have shown its impact
  - NNIS, early 1990s
  - PREZIES, Dutch national nosocomial surveillance network, 1996 (“Preventie van Ziekenhuisinfecties door Surveillance”)
  - KISS, Krankenhaus-Infektions-Surveillance-System, 1996
  - NINSS, UK, 1996
  - VICNISS, Victorian surveillance programme, 2002
  - Pan-Celtic Group, 2004

**The incidence of SSI remained relatively stable at around 4.3% in the first three surveillance years and then dropped to 3.3% in the fourth year and further down to 1.8% in the last surveillance year.**



# **SURVEILLANCE FOR HAIs IN SINGAPORE**

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- Where are we now after 30 years?
- We have moved away from hospital-wide surveillance, focusing on target surveillance
- Lack of standardised methodology apart from national indicators
- Impact not known at national level



# CHALLENGE

#1

- Surveillance program
  - Integration
  - Information rich
  - Impactful

# MRSA IS AN ACCEPTED MDRO

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- We have other MDROs
  - ESBLs
  - *Stenotrophomonas maltophilia*
  - MDR – ACBA
  - MDR – *Pseudomonas aeruginosa*
  - CA-MRSA
  - VRE



# MDRO OUTBREAKS – FIRST PUBLISHED REPORT IN 1996

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## A Nosocomial Outbreak of Multiresistant *Acinetobacter baumannii* Originating From an Intensive Care Unit

Moi Lin Ling, MBBS, FRCPA; Angela Ang, RN;  
Molly Wee, RN, BHS; Grace Chee Yang Wang, MSc

### ABSTRACT

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An outbreak of a multiresistant *Acinetobacter baumannii* in February through September 1996 affected 103 patients in a regional hospital in Singapore. We describe the effectiveness of closure of the outbreak area and the importance of good teamwork in the management of the outbreak (*Infect Control Hosp Epidemiol* 2001;22:48-49).

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# MDR-ACBA, 2001

ANTIMICROBIAL AGENTS AND CHEMOTHERAPY, Feb. 2001, p. 583–588  
0066-4804/01/\$04.00+0 DOI: 10.1128/AAC.45.2.583–588.2001  
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## Characterization of OXA-25, OXA-26, and OXA-27, Molecular Class D $\beta$ -Lactamases Associated with Carbapenem Resistance in Clinical Isolates of *Acinetobacter baumannii*

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Received 17 March 2000/Returned for modification 1 July 2000/Accepted 17 November 2000

Carbapenem resistance in *Acinetobacter* spp. is increasingly being associated with OXA-type  $\beta$ -lactamases with weak hydrolytic activity against imipenem and meropenem. Such enzymes were characterized from *Acinetobacter* isolates collected in Belgium, Kuwait, Singapore, and Spain. The isolates from Spain and Belgium had novel class D  $\beta$ -lactamases that were active against carbapenems. These were designated OXA-25 and OXA-26, respectively, and had >98% amino acid homology with each other and with the OXA-24 enzyme recently described by others from an *Acinetobacter* isolate collected elsewhere in Spain. The isolate from Singapore had OXA-27  $\beta$ -lactamase, another novel class D type with only 60% homology to OXA-24, -25, and -26, but with 99% homology to OXA-23 (ARI-1), described previously from an *Acinetobacter baumannii* isolate collected in Scotland. Sequence data were not obtained for the carbapenem-hydrolyzing OXA enzyme from the isolate from Kuwait; nevertheless, the enzyme was phenotypically similar to OXA-25 and -26. The enzymes OXA-23, -24, -25, -26, and -27 retained the STFK and SXV motifs typical of class D  $\beta$ -lactamases, but the YGN motif was altered to FGN. The KTG motif was retained by OXA-27 and -23 but was replaced by KSG in OXA-24, -25, and -26. OXA-25 and -26 enzymes were strongly active against oxacillin, but unusually for an OXA-type  $\beta$ -lactamase, OXA-27 had apparently weak activity, although measurement was complicated by biphasic kinetics. None of the new enzymes was transmissible to *Escherichia coli* recipients. Many *Acinetobacter* isolates are multiresistant to other antibiotics, and the emergence of class D enzymes with carbapenem-hydrolyzing activity is a disturbing development for antimicrobial chemotherapy.

# MDR – PSEUDOMONAS AERUGINOSA, 2004

JOURNAL OF CLINICAL MICROBIOLOGY, Nov. 2004, p. 5378–5380  
0095-1137/04/\$08.00+0 DOI: 10.1128/JCM.42.11.5378–5380.2004  
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## Clonal Spread of IMP-1-Producing *Pseudomonas aeruginosa* in Two Hospitals in Singapore

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Received 8 March 2004/Returned for modification 16 April 2004/Accepted 20 June 2004

Thirty-six isolates of carbapenem-resistant *Pseudomonas aeruginosa* were studied. Pulsed-field gel electrophoresis revealed the presence of two clones. One clone carried a *bla*<sub>IMP-1</sub> gene identical to that first described in Japan. The other clone carried a *bla*<sub>IMP-1</sub> variant containing four silent mutations. One isolate with a unique pulsed-field gel electrophoresis pattern contained *bla*<sub>IMP-7</sub>.



# CA-MRSA, 2006

## Community-associated Methicillin-resistant *Staphylococcus aureus*: Overview and Local Situation

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### Abstract

**Introduction:** Community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) has emerged worldwide. In contrast to healthcare-associated MRSA (HA-MRSA), CA-MRSA isolates are usually susceptible to multiple non-beta-lactam antibiotics and cause a distinct spectrum of infections in epidemiologically disparate populations – in particular, cutaneous abscesses, necrotising fasciitis and necrotising pneumonia. They arise from a broader genetic background, and possess differing virulence genes. We aim to describe the distribution of different molecular subtypes of CA-MRSA among various regions and discuss briefly the implications of CA-MRSA from a local perspective. **Methods:** Literature review of articles on CA-MRSA, focusing mainly on reports where the genetic background of isolates had been analysed using multi-locus sequence typing (MLST). Singapore data were obtained from the local CA-MRSA database. **Results:** MLST analysis demonstrated the presence of epidemic subtypes of CA-MRSA within most geographic areas. In parts of the United States, community MRSA infections currently exceed those caused by their methicillin-susceptible counterparts. In Singapore, CA-MRSA infections are increasing, predominantly as a result of the spread of ST30 clones. **Conclusion:** Available evidence suggests that the emergence of MRSA from the community is not going to be a transient phenomenon. Local guidelines for dealing with this phenomenon at both therapeutic and preventive levels are needed prior to the potential development of a situation mirroring that of meso-endemic HA-MRSA in local hospitals or CA-MRSA epidemics in parts of USA.

# VRE, 2006

## First Outbreak of Colonization and Infection With Vancomycin-Resistant *Enterococcus faecium* in a Tertiary Care Hospital in Singapore

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Kue Bien How, RN; Li-Hwei Sng, FRCPA;  
Grace Chee Yeng Wang, MSc; Asok Kurup, MRCP(UK);  
Mei Ling Kang, MRCP(UK);  
Jenny Guek Hong Low, MRCP(UK)

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We report the first outbreak of vancomycin-resistant *Enterococcus faecium* colonization and infection among inpatients in the hematology ward of an acute tertiary care public hospital in Singapore. Two cases of bacteremia and 4 cases of gastrointestinal carriage were uncovered before implementation of strict infection control measures resulted in control of the outbreak.

*Infect Control Hosp Epidemiol* 2006; 27:991-993

# CHALLENGE

#2

- Urgent need for antibiotic stewardship program
  - Recognised
  - Rigorous
  - Robust



# HAND HYGIENE

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- ❑ Known to be the most effective measure against transmission of pathogens
- ❑ WHO Global Patient Safety Challenge is a timely reminder
- ❑ Singapore signed the pledge with WHO on 10 November 2006

# CHALLENGE

#3

- Hand Hygiene as a national program
  - **P**articipative
  - **P**ermeates
  - **P**ulsatile

# SO MUCH TO DO BUT....

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- ❑ We need ICNs
- ❑ To date, there is no official recommendation for number of ICNs



# CHALLENGE

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#4

- ICNs and ICOs
  - Adequate
  
  
  - Able

# CONCLUSION

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- Amidst myriad of challenges, life goes on.....

**THE SUN IS STILL SHINING!**

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**NEVER GIVE UP.....WE WILL GET THERE**