

“With a little luck, they may revere us as gods.”

Infection prevention and control

David Speers

A difficult battle

Host - older, multiple medical problems,
immunosuppression, more invasive devices

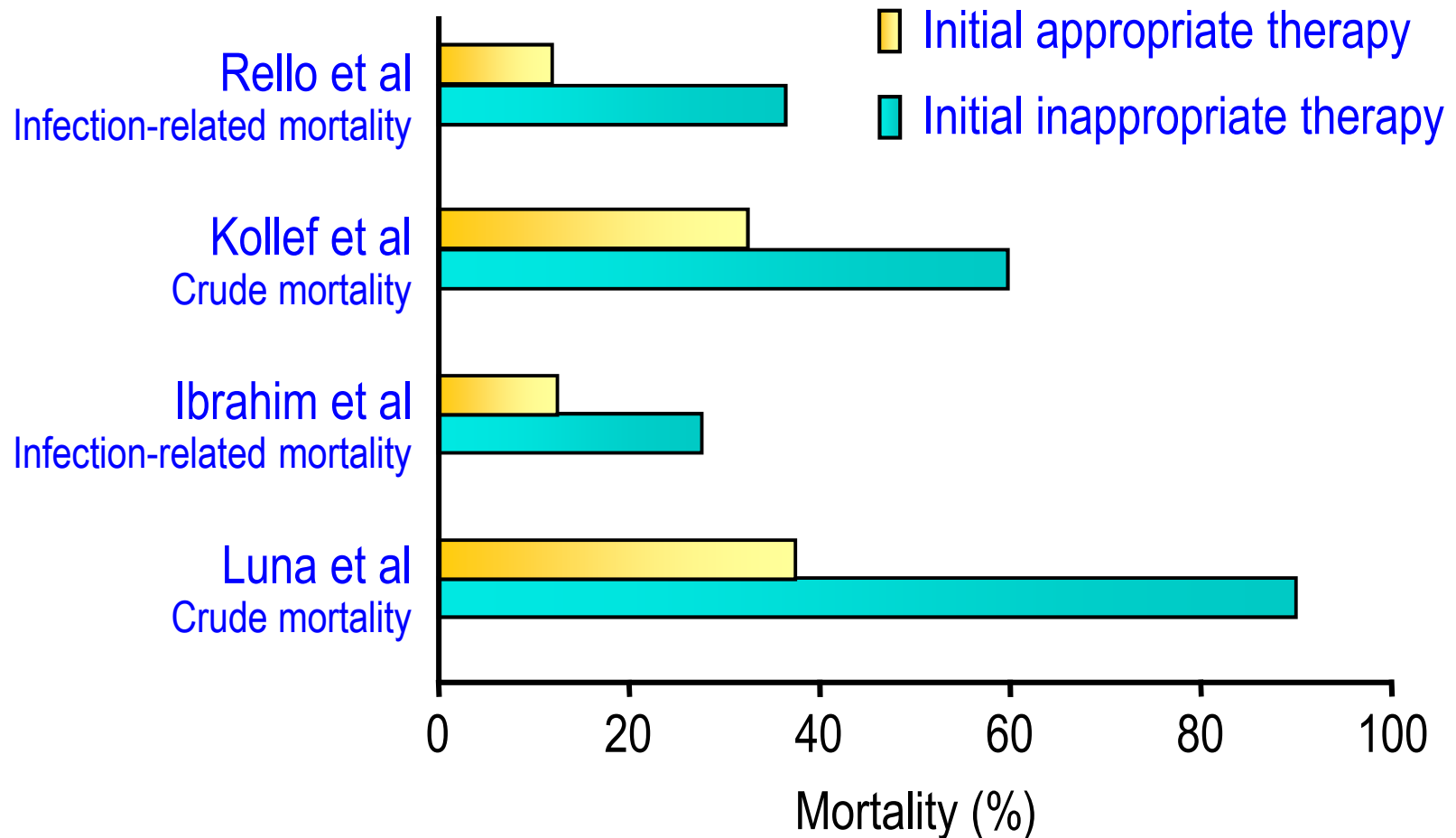


Bug - more resistant

Drug - few new classes

Does resistance matter?

Mortality associated with initial inappropriate therapy in patients with serious infections

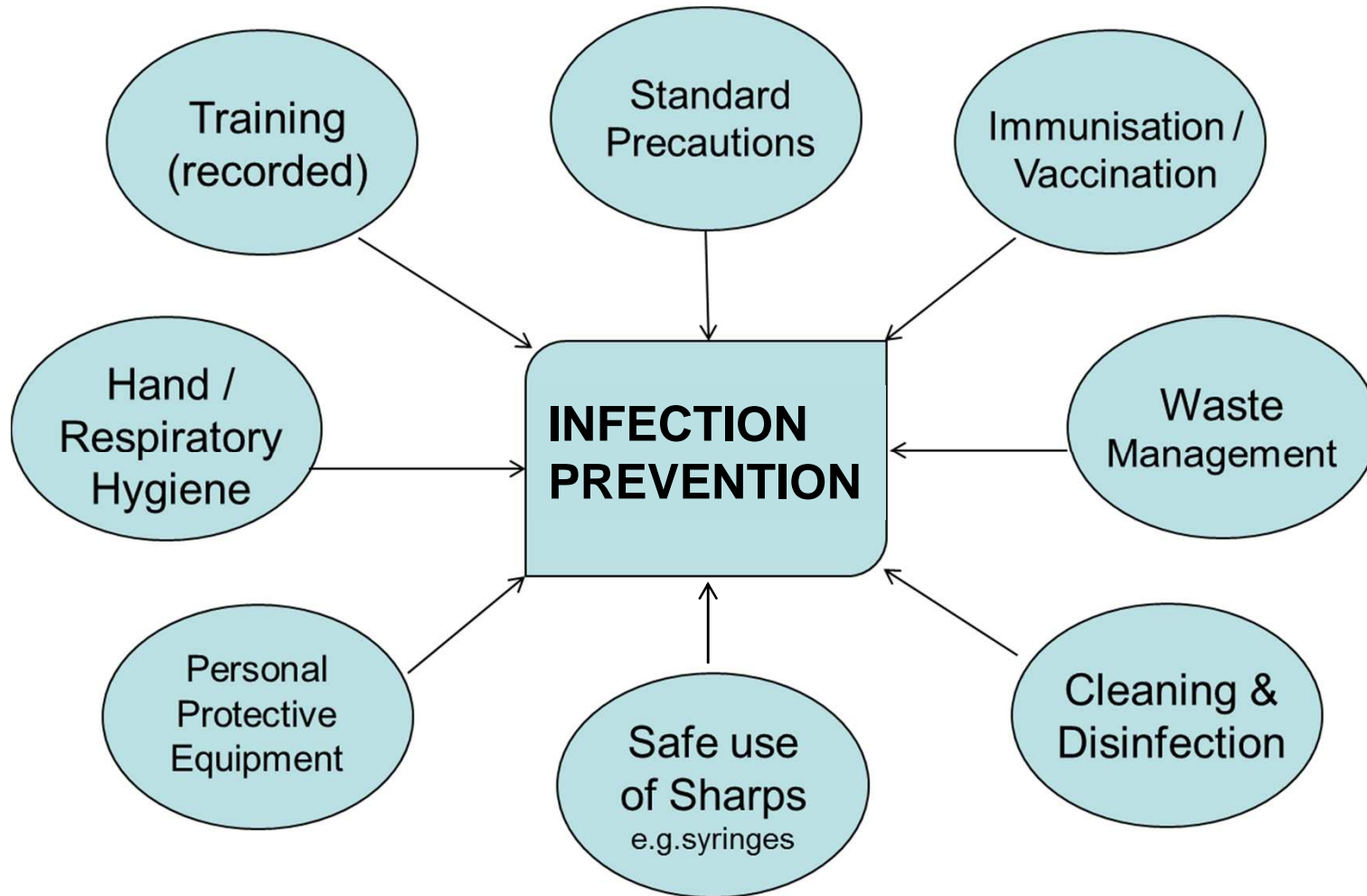


Rello et al. Am J Respir Crit Care Med 1997;156:196–200; Kollef et al. Chest 1998;113:412–420
Ibrahim et al. Chest 2000;118:146–155; Luna et al. Chest 1997;111:676–685

Addressing the Spread of Antibiotic Resistance

- Antimicrobial stewardship
- Infection **prevention** and control
 - Concentrate on prevention because control is after the fact
 - *We need to be proactive, not reactive*
 - If you stop the patient acquiring the Superbug you don't have to treat them and therefore don't contribute to the selective pressure for resistant organisms
 - *The better the job of prevention the less you notice the problem avoided*

An effective infection prevention program has many elements



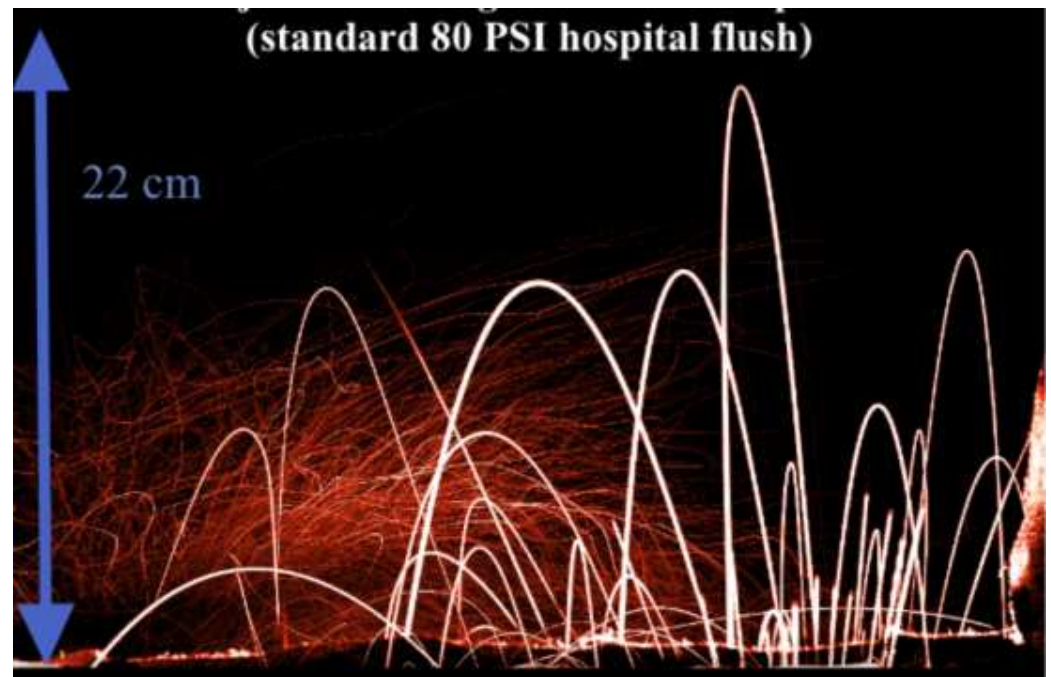
Infection prevention must be part of standard practice

- Governance to have the appropriate processes and protocols in place:
 - For MRSA, MSSA: aseptic technique, e.g. for venous cannula insertion
 - Equipment sharing, environmental cleaning
- Staff must be aware of the importance of prevention
 - Education, awareness, e.g. hand hygiene signage
- Staff must know how to prevent infections
 - e.g. training in aseptic technique, aware of equipment disinfection protocols
- Funding must be adequate
 - Must have funds allocated to provide the appropriate facilities and equipment, training, monitoring, auditing



Prevention is about understanding the modes of transmission

- Superbugs can only pass from one patient to another by physical contact with the bacteria:
 - The hands of healthcare workers
 - On contaminated shared equipment
 - From contact with contaminated environmental surfaces
- Superbug transmission
 - MRSA
 - skin
 - CPE, ESBL, VRE
 - faeces



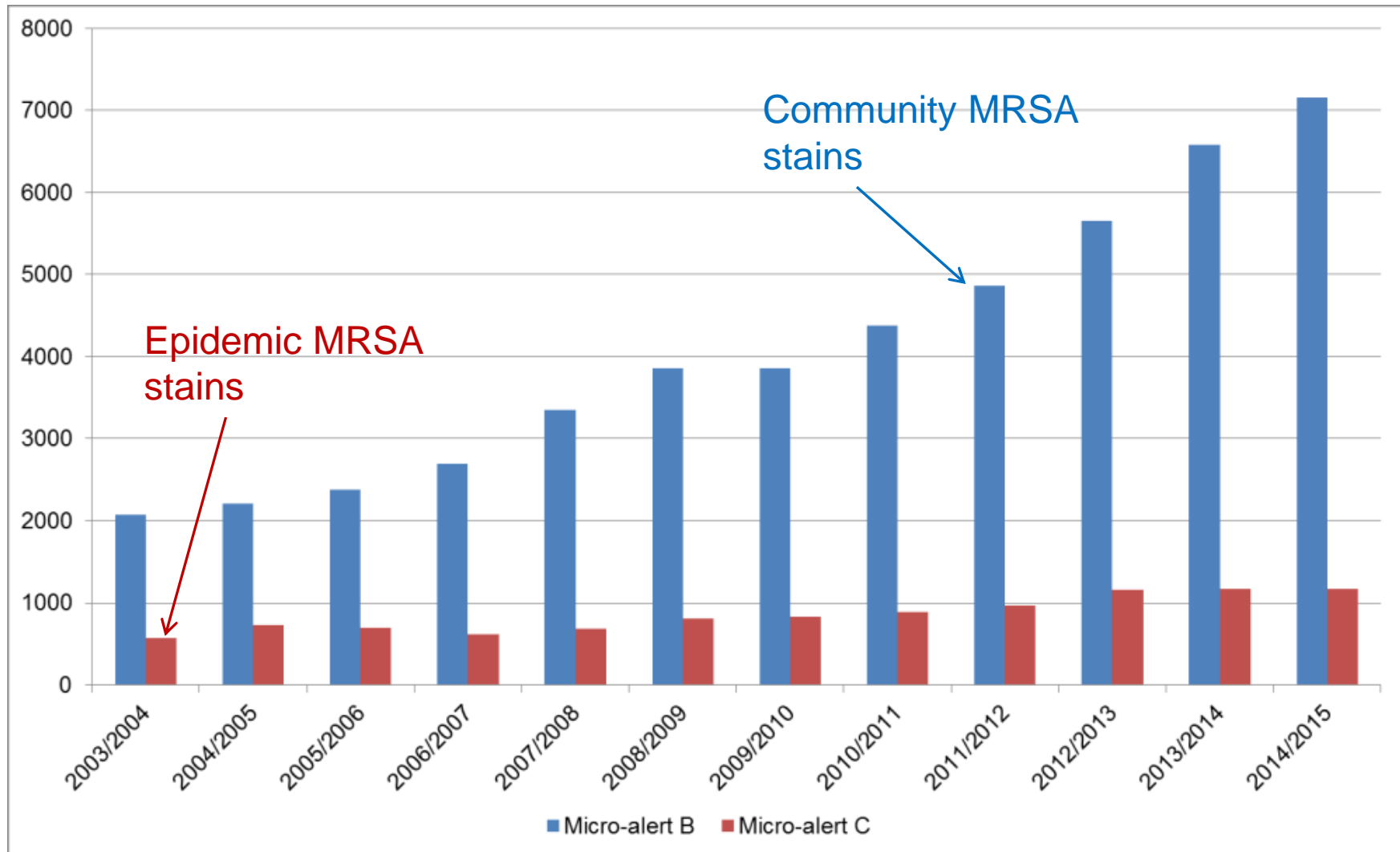
Prevention is about understanding the epidemiology

- Is the superbug endemic or exotic?
 - Endemic:
 - No easily identifiable risk factor for screening
 - Risk of any patient being colonised greater
 - > *concentrate on universal precautions rather than screening and use a set of precautions as part of standard practice to stop all MRO transmissions*
 - Exotic:
 - Easily identifiable source, e.g. recent admission to overseas hospital
 - Screen only those at increased risk
 - > *concentrate on source identification by screening and place barrier precautions around screen positive patients*

The most challenging MROs

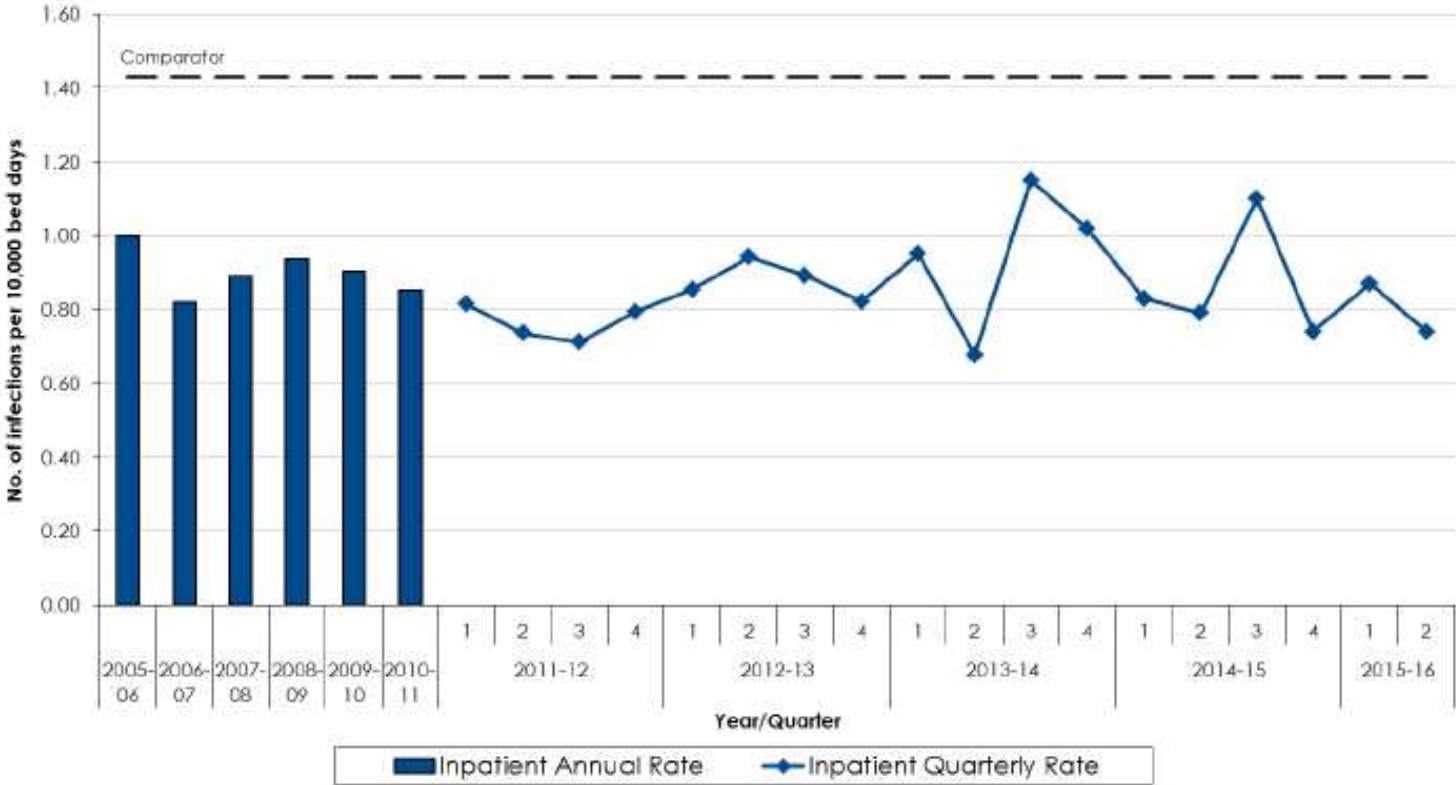
- MRSA
- VRE
- **Multi-drug resistant gram negative organisms**
 - Carbapenemase producing *Enterobacteriaceae* (CPE)

WA Referred MRSA isolates



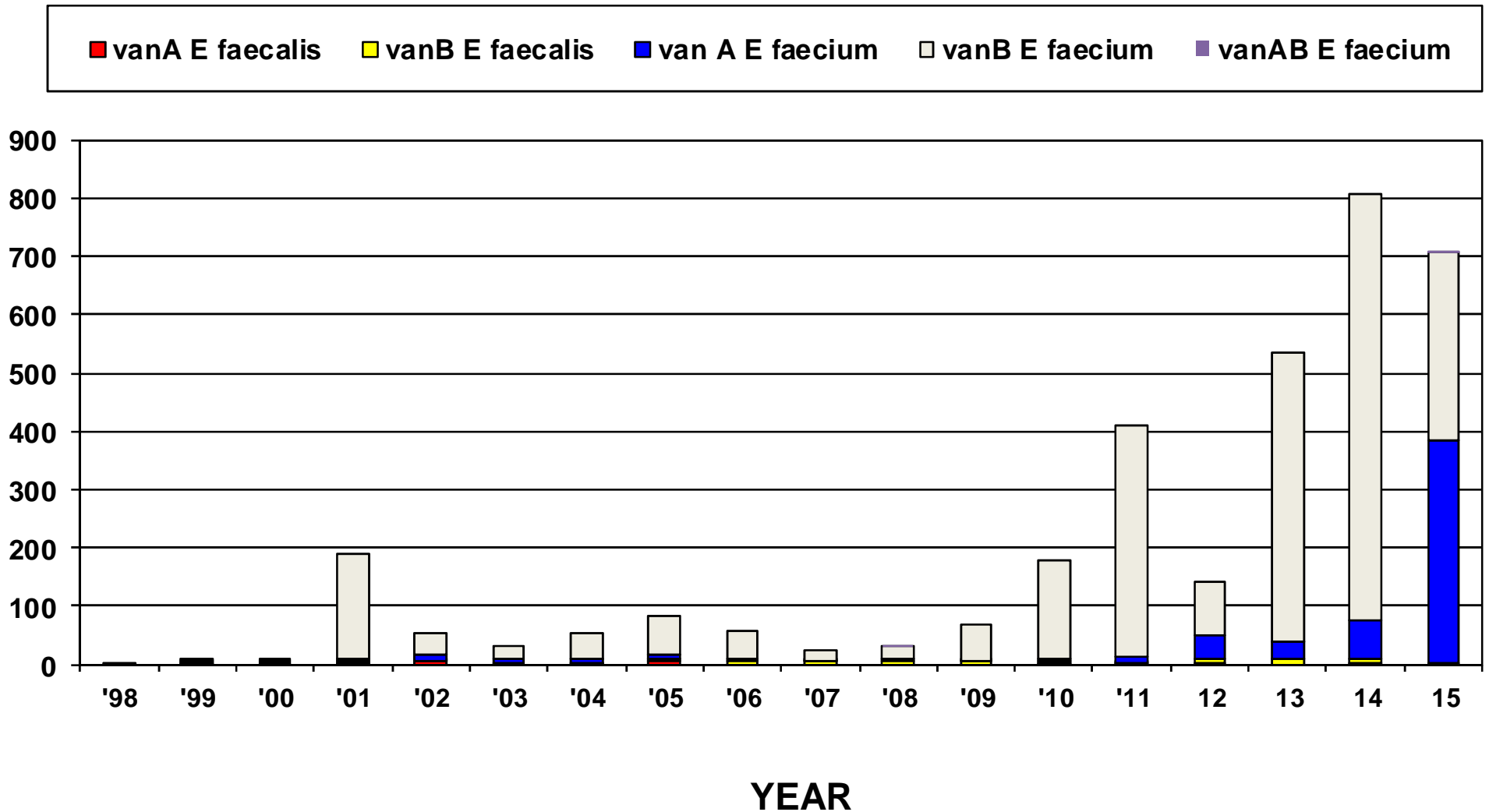
HISWA MRSA Data

Aggregate inpatient healthcare associated MRSA infections



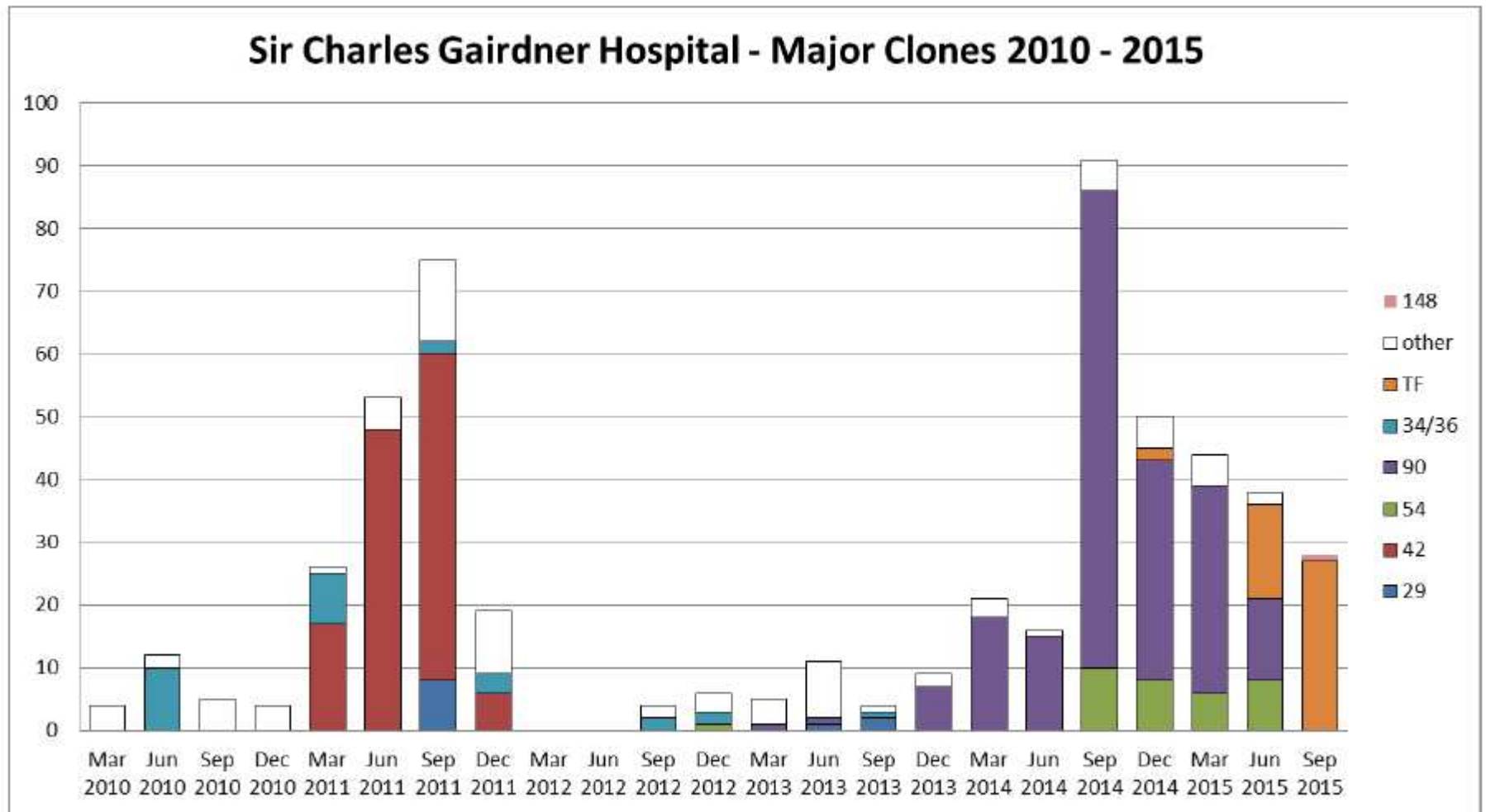
Vancomycin Resistant Enterococci

Western Australia 1998 – 31st December 2015: 3,386 *vanA* and *vanB* *E faecalis* and *E faecium* isolates



SCGH

vanA and *vanB* *E faecium* and *E faecalis*



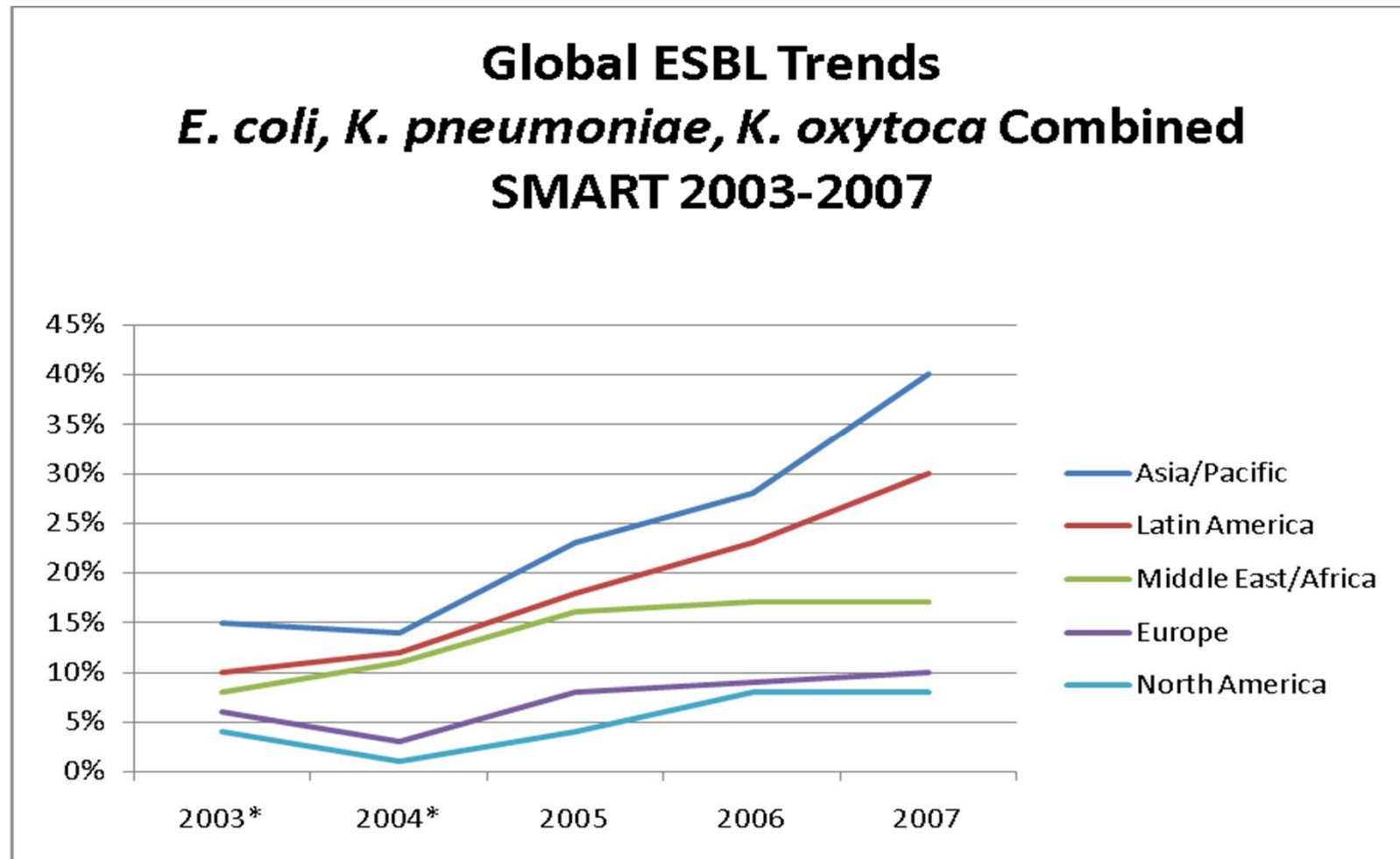
Quarterly

CPE is riding the crest of the worldwide ESBL wave

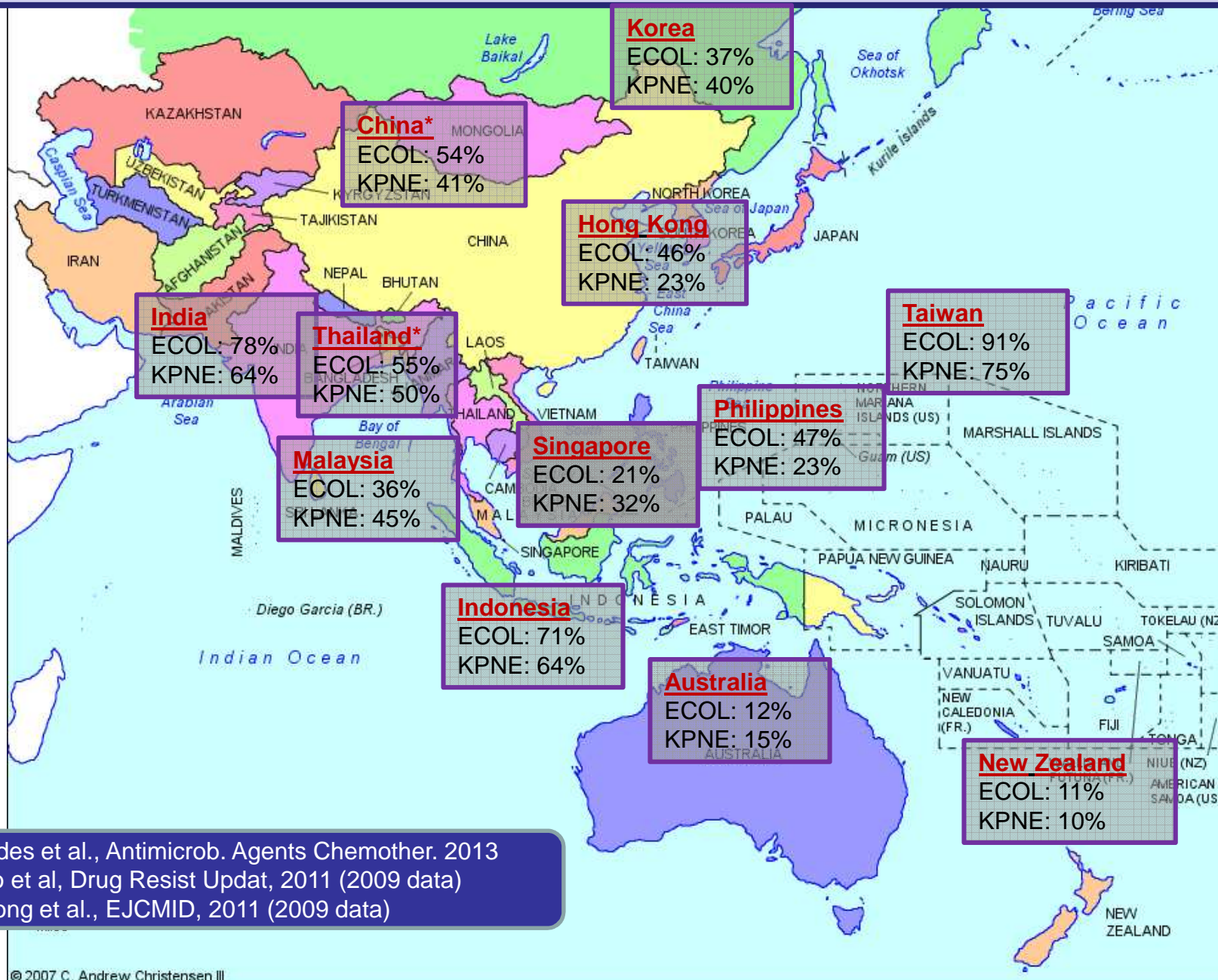
- ESBL
 - *E. coli, Klebsiella pneumoniae*
- Carbapenem resistant enterobacteriaceae
 - *E. coli, Klebsiella pneumoniae*

Global ESBL Trends

Per Region

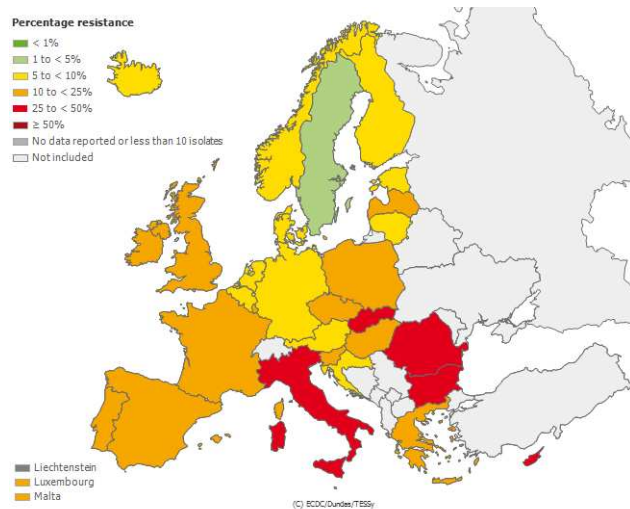
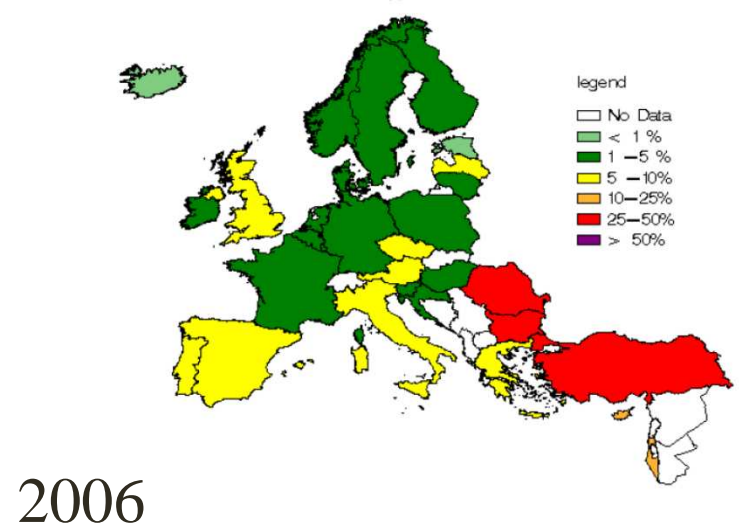
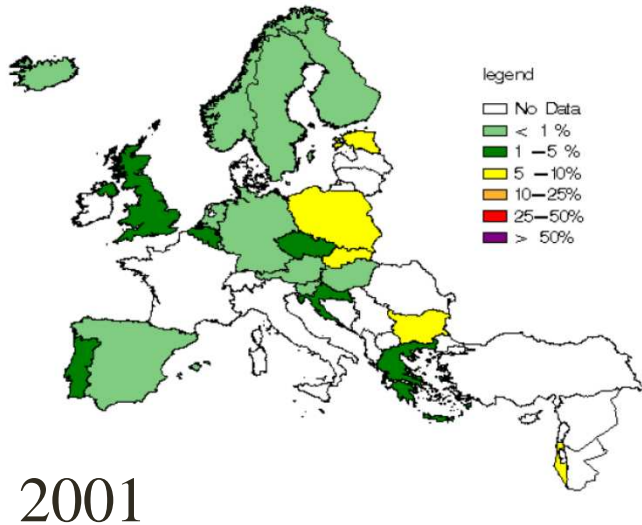


%ESBL in the Asia Pacific region



- 10. Mendes et al., Antimicrob. Agents Chemother. 2013
- 11. *Xiao et al, Drug Resist Updat, 2011 (2009 data)
- 12. †Chong et al., EJCMIID, 2011 (2009 data)

Proportion of 3rd generation cephalosporin-resistant *E. coli*, EARSS data



The treatment of ESBL

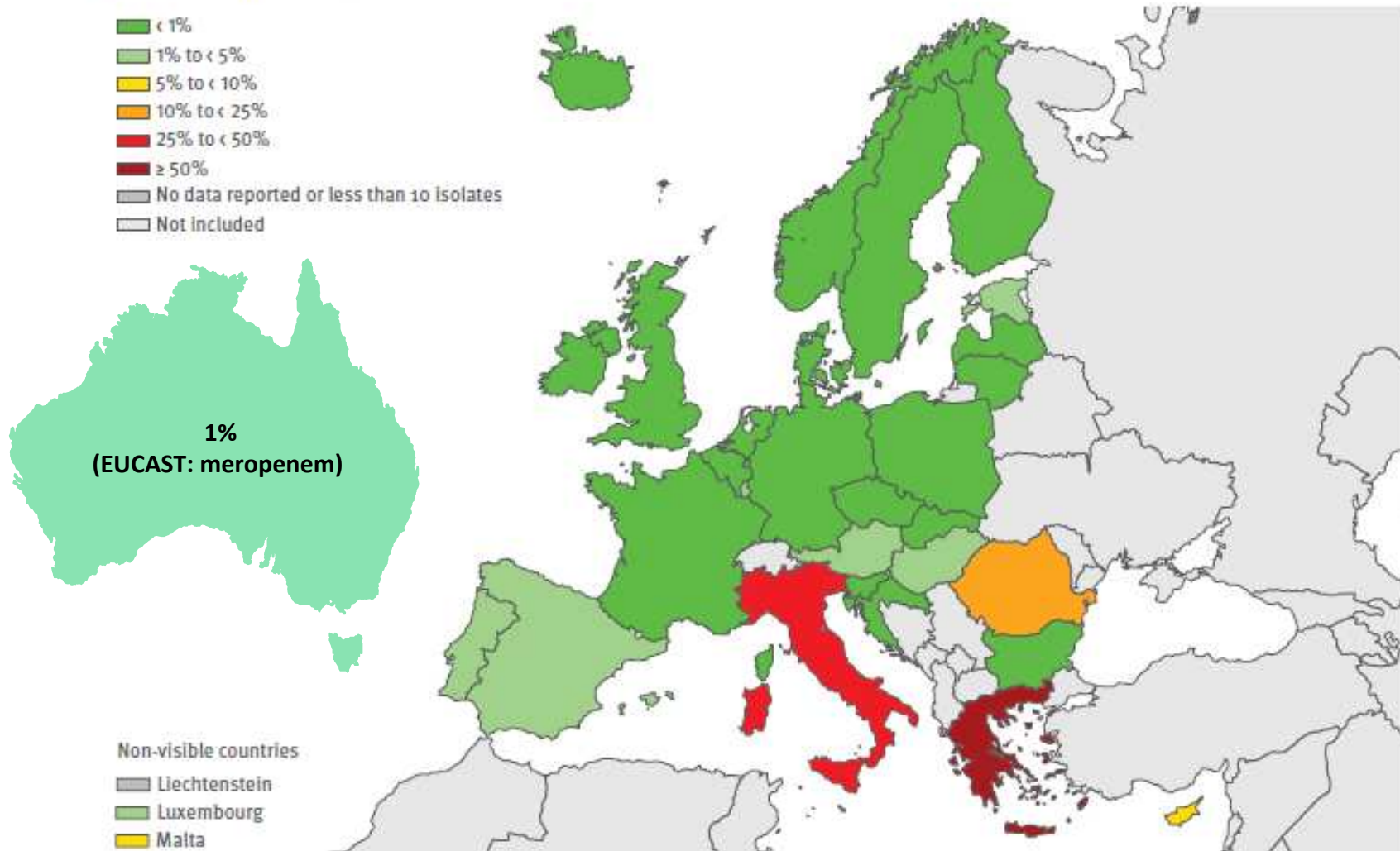
Antibacterial agent	<i>E. coli</i> (n = 98)			
	CTX-M positive (n = 72)		CTX-M negative (n = 26)	
	n	%	n	%
Gentamicin	63	88	16	62
Trimethoprim	65	90	21	81
Ciprofloxacin	68	94	19	73
Piperacillin/tazobactam	32	44	5	19
Aztreonam	66	92	16	62
Cefoxitin	31	43	3	12
Ceftazidime	70	97	15	58
Cefotaxime	72	100	18	69
Cefpodoxime	72	100	26	100
Cefepime	61	85	12	46
Meropenem	0	0	0	0
Ertapenem	0	0	0	0



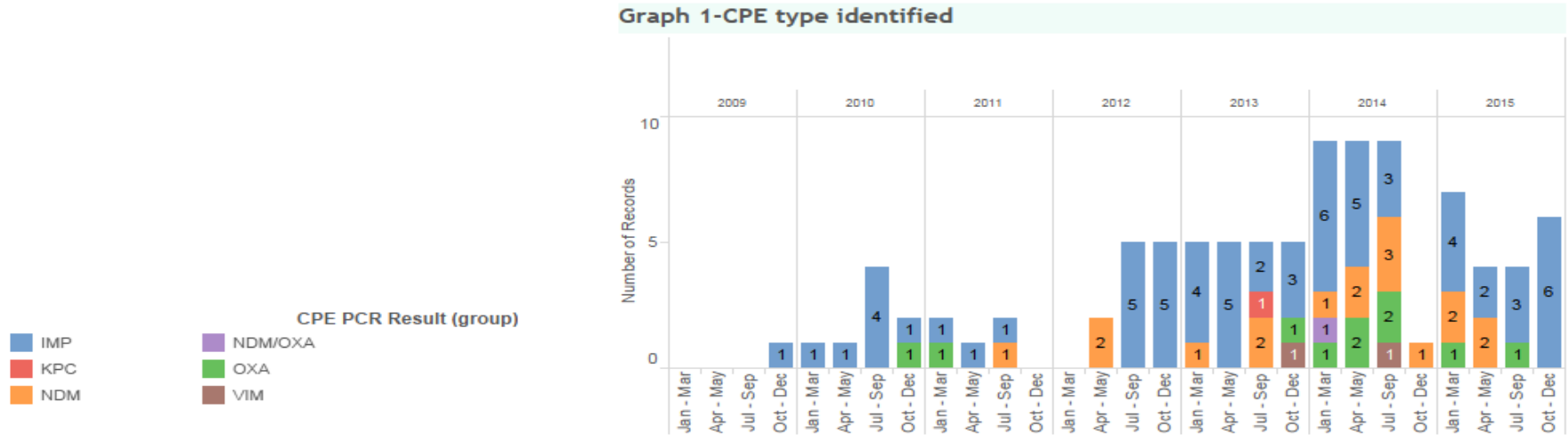
Australian Group on Antimicrobial Resistance



Figure 3.9. *Klebsiella pneumoniae*. Percentage (%) of invasive isolates with resistance to carbapenems, by country, EU/EEA countries, 2013



WA CPE Confirmations



- Most CPE detections are our endemic IMP CPE (blue) which show less epidemic potential

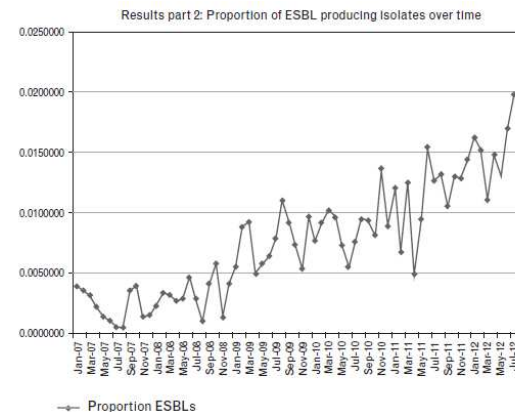
Where is the CPE risk in WA?

- Hospital ‘Border security’ in place
 - all those admitted to overseas HCF within last 12 months screened and isolated until cleared
- Hospital screening will not capture community introductions

Extended spectrum beta-lactamase testing of community Enterobacteriaceae in the west of Australia: poor performance of phenotypic methods

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- Community introduction most likely to be detected from UTI of RCF residents
 - Sentinel for MRSA, ESBL

What should we do to prevent the acquisition of superbugs?

- Prevention of Superbug infections
 - Continue to improve hand hygiene
 - Mandate aseptic technique training and competency
 - esp PVC insertion
 - Mandate shared equipment disinfection/cleaning protocols
 - Invest in environmental cleaning
 - Promote education to make infection prevention part of every HCW's practice
- Control of Superbug outbreaks
 - Roll out the state budget approved infection control and antimicrobial stewardship IT solution for Mx, surveillance and reporting
 - Currently using either outdated and unsupported EICAT (not Win7 compatible), Excel spreadsheets and card systems
 - We need the HIN support and ongoing maintenance funding
 - Invest in molecular typing (whole genome sequencing)