Staphylococcus aureus and Health Care associated Infections

Common - but poorly measured

Prof Peter Collignon
The Canberra Hospital
Australian National University

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Doctors warn hospital death toll to mount

- Slapdash approach by governments
- Data on fatal mistakes 10 years old

Ruth Pollard
Health Reporter

Injuries and deaths will continue to mount in public hospitals because federal and state governments will not introduce a national strategy to deal with medical error, according to a warning endorsed by health safety experts.

Despite inquiries finding fatal flaws in patient care at five hospitals since 1999, including at Sydney's Campbelltown and Camden hospitals, governments continue to take a "leisurely bureaucratic approach to quality and safety", says an editorial in today's *Medical Journal of Australia*.

The lack of attention is highlighted by the fact the journal had to use a decade-old study as the basis for its critique – the most recent national data on safety in hospitals. Based on that study, 25 patients die each day from preventable adverse events and 22 suffer preventable permanent disability.

"Whether ... being treated in Australian hospitals still results in the same number of preventable human tragedies we simply do not know, and this ongoing vacuum is an indictment of our health ministers and organised medicine," wrote Martin van der Weyden, the journal's editor.

Safety and quality expert Ross Wilson, the director of the Northern Centre for Health Care Improvement at Royal North Shore Hospital, said the rate of preventable death and disability was undoubtedly higher now. "Preventable patient harm is a major problem in our health system, as it is in almost all of the Western world."

Dr Wilson called for a national strategy on safety and quality. "The real issue is that we just don't know ... we have not invested in it and it is an essential step to take."

A senior lecturer in medicine and law at the Australian National University, Thomas Faunce, said quality and safety in hospitals were being led by whistleblowers. Organisations such as the Australian Council on Safety and Quality in Health Care were failing to detect problems. "The only way to move forward is to encourage doctors to record incidents for themselves."

Dr Faunce said until the Federal Government adopted a uniform "red flag" approach to doctors who had been found to be incompetent and a mandatory requirement to report doctors to medical registration boards, the system would keep failing patients.

"The problem is that you need a lot of adverse incidents before someone finally puts it together – why should people have to die before you work out that somebody is incompetent?" Dr Faunce said.

The Australian Medical Association's president, Mukesh Haikerwal, called for a meeting of health ministers and senior doctors to discuss clinical outcomes.

Taking action was more important than conducting another survey to quantify harm in hospitals, he said.

"We know of many of the problems that are in the system, the last thing we need is another study – we need to start focusing on the solution to these problems."

Both Dr van der Weyden and Anthony Morton, a medical statistician from Princess Alexandra Hospital in Brisbane, said the recent Bundaberg Hospital scandal in Queensland was a symptom of the problems facing the entire health system.

"The current obsession with finding and punishing Dr Jayant Patei, instead of dealing with the system that sponsored him, seems likely to ensure that, when the dust has settled, the status quo will remain," Dr Morton wrote in the journal.

The NSW Health Minister, John Hatzistergos, said although the assessment and registration process for doctors differed between NSW and Queensland, the state was reviewing its processes.

SYSTEM FAILURE

Hospital faults revealed by whistleblowers:

2002 Deficiencies in obstetrics and gynaecology at King Edward Memorial Hospital in Perth.

2003 Problems with neurosurgical services at The Canberra Hospital.

2003 and **2004** Poor standards at Campbelltown and Camden hospitals.

2005 Questions over patient deaths associated with Dr Jayant Patel at Bundaberg Hospital.

What are health-care associated infections?

- Any infection that occurs following a health care procedure
  - All “hospital onset” infections
  - But many now also have a “community onset” but related to medical care
    - wound infection
    - many blood stream infections

Examples

- Blood stream infections
  - IV catheters
- Wound infections
  - After surgery
  - May be deep seated
- Urinary tract
  - Catheters
- Respiratory tract
  - Ventilators
  - drugs

Why do these infections occur?

- Breach normal defense barriers
  - Skin
  - Respiratory tract
  - Acid in stomach
- Lowered immune defenses
  - Chemotherapy
  - Part of disease
- Increased exposure
  - Resistant bacteria

Health care infections are common

- Very common;
  - various studies in many countries
  - Likely between 5 -10% of all admissions develop a new infection
- Most are relatively minor
  - UTI, superficial wound
- But many Serious and Life threatening
  - Blood stream
  - Prosthetic joints etc

Hospital-Acquired Blood stream infections; 8th leading cause of death in USA

The Impact of Hospital-Acquired Bloodstream Infections

Richard P. Wenzel and Michael B. Edmond
Medical College of Virginia, Virginia Commonwealth University, Richmond, Virginia, USA

Nosocomial bloodstream infections are a leading cause of death in the United States. If we assume a nosocomial infection rate of 5%, of which 10% are bloodstream infections, and an attributable mortality rate of 15%, bloodstream infections would represent the eighth leading cause of death in the United States. Because most risk factors for dying after bacteremia or fungemia may not be changeable, prevention efforts must focus on new infection-control technology and techniques.

Table 1. Deaths and death rates in the United States, 1997 (1)

Cause of death	No. of deaths (x 10^3)	Crude death rate (per 10^5)	% of all deaths
Heart disease	725.8	271.2	31.4
Malignancies	537.4	200.8	23.2
Cerebrovascular disease	159.9	59.7	6.9
Pneumonia and influenza	88.4	33.0	3.8
Septicemia	22.6	8.4	0.97

Emerging Infectious Diseases
April 2001
http://www.cdc.gov/ncidod/eid/vol7no2/wenzel.htm

Serious infections are common

- Blood Stream infections
  - Most from IV catheters
  - In Australia likely about 4,000 per year
  - In USA more than 200,000 per year
- High mortality and morbidity attached
  - With MRSA BSI - 35%
  - CNS lower but still >5%
  - In Australia thus about 400 deaths per year and USA 20,000 from JUST Intravascular catheters!

Patient safety is important

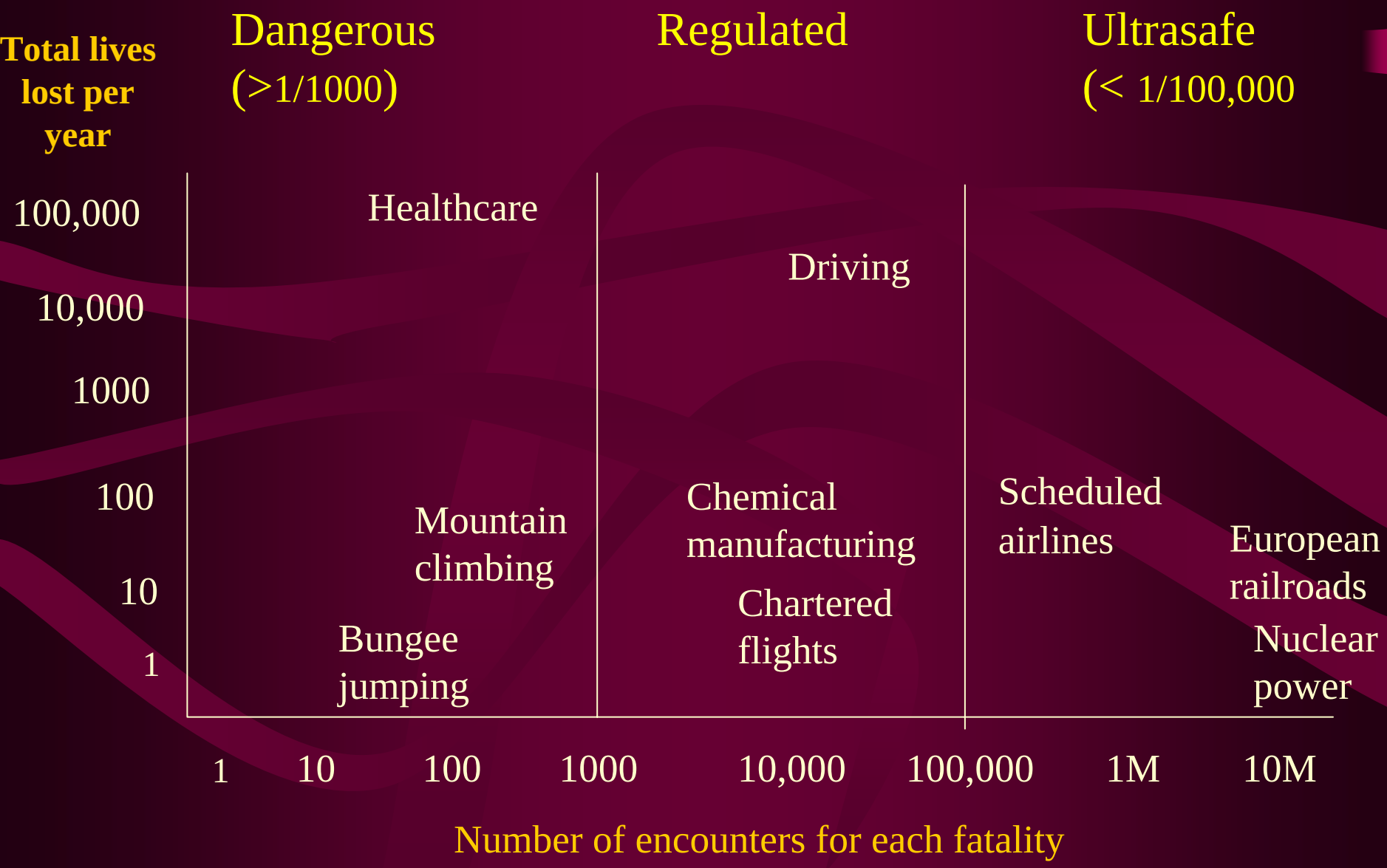
- Hospitalisation is inherently hazardous
  - Drug errors most common misadventure
  - But infections are 2nd biggest problem
  - Occur in at least 10% of acute admissions
    - 50-80% potentially preventable
- Misadventures primarily result from system failures not incompetence

Clinical Excellence Commission, 2005; Leape 2000; Wilson et al 1995

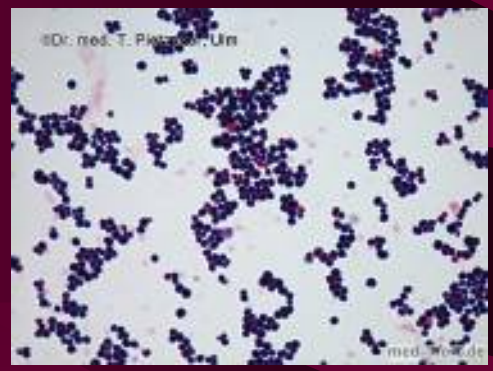
- We need national and comparative data

How hazardous is healthcare?

Dr. Lucien Leape Harvard Medical School. USA



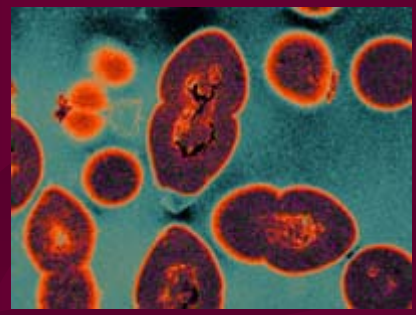
Staphylococcus aureus



- Common
  - Many sites especially blood, wounds
- Bacteraemia likely 7,000 per year in Australia
  - 50% hospital onset
  - 1/3 of community onset are health care related
- High mortality in bacteraemia
  - Pre-antibiotics 82%
  - MSSA median 25%
  - MRSA median 35%

Antibiotic Resistance is common

- Penicillin



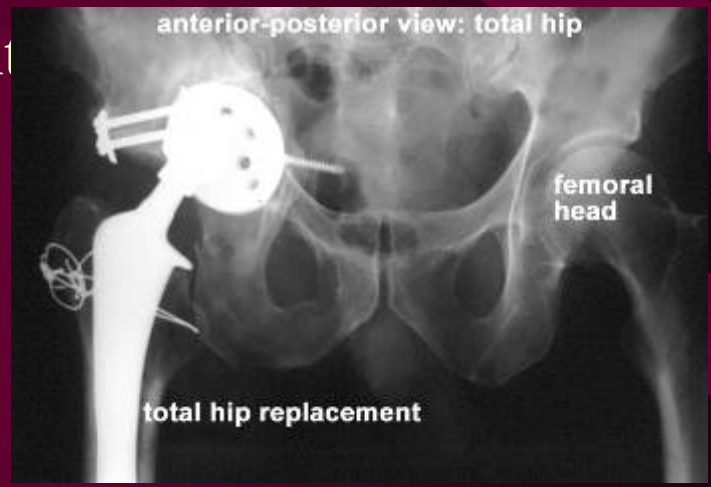
- Beta-lactams
  - MRSA

- Other common agents
  - macrolides etc
- Vancomycin
  - New forms of resistance
- New agents
  - linezolid

Serious Morbidity also common

Prosthetic joint infection (hip, knees)

- To cure need 2 major operations, 8- 10 weeks incapacitated.
- > $100,000 per episode
- 1% to 2% of all joint replacement
  - when things go well!



Blood stream infections; serious morbidity

- Blood stream infections
  - Complications include renal failure, osteomyelitis, prolonged antibiotic therapy etc

Blood stream infections are common;

and more than 60% of these are health care associated

	1990*	1998	1999	2000	2001	2002	2003	2004	2005
Total significant episodes	**317**	**337**	**307**	**320**	**288**	**271**	**316**	**354**	**339**
Total indeterminate episodes	32	37	37	37	36	30	32	25	35
Total Contaminant episodes	125	245	200	195	197	217	210	235	266
Total positive Blood cultures	474	619	544	552	521	518	558	614	640

This means that at the Canberra Hospital each year over 200 BSI episodes are Health-care associated

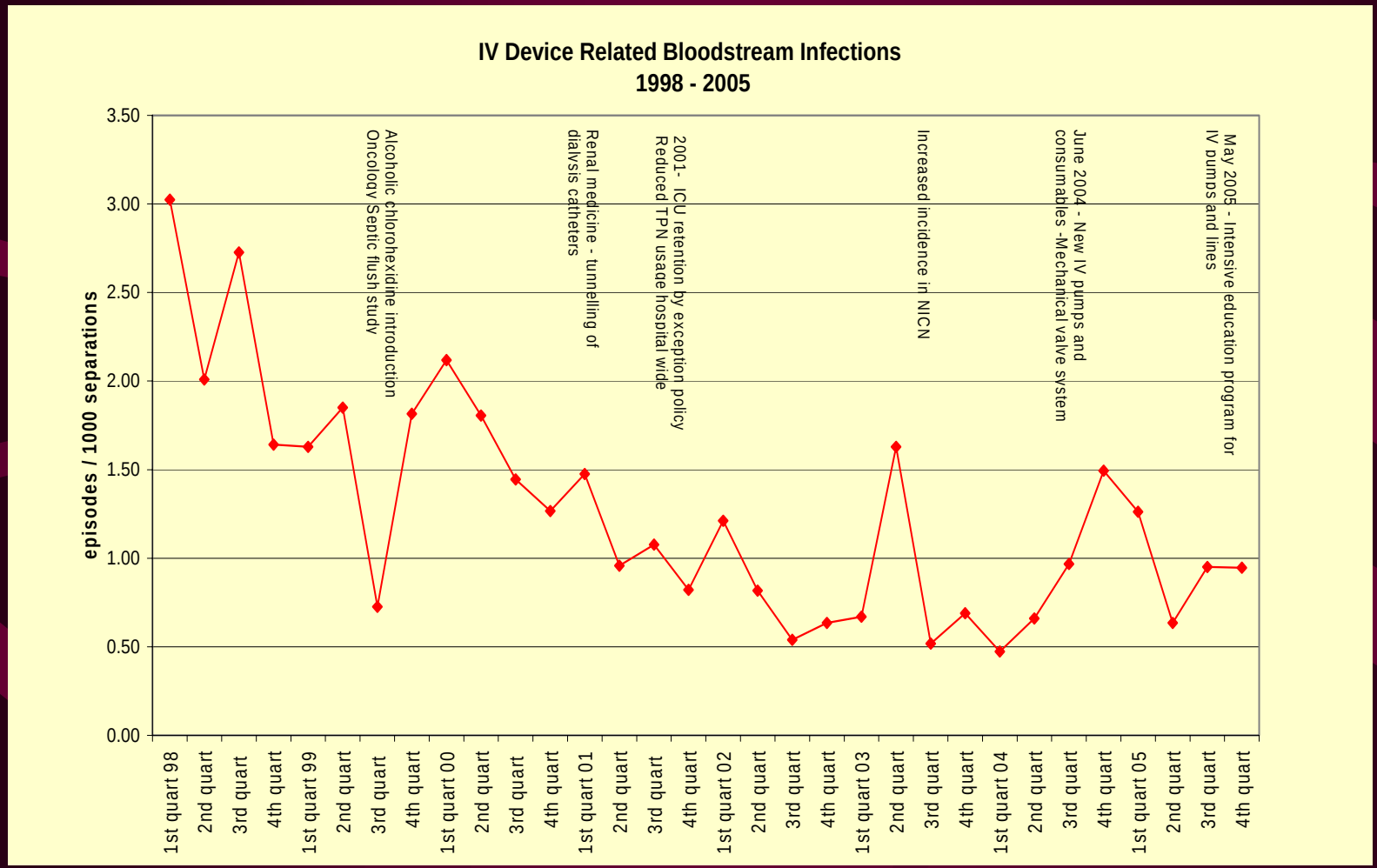
Many primary sites for BSI;

but IV catheters main site at all major hospitals

Body system (TCH data)	1998	1999	2000	2001	2002	2003	2004	Total
IV Device	**109**	**72**	**81**	**54**	**39**	**45**	**42**	442
Respiratory	**50**	**36**	**54**	**31**	**41**	**49**	**47**	308
GIT	**47**	**38**	**46**	**43**	**40**	**41**	**59**	314
Genito-urinary	**43**	**38**	**38**	**43**	**45**	**54**	**70**	331
Skin	**24**	**22**	**22**	**19**	**18**	**27**	**35**	167
Unknown	**19**	**39**	**32**	**37**	**32**	**28**	**27**	214
Cardiovascular	**13**	**9**	**10**	**12**	**8**	**19**	**14**	85
Musculo-skeletal	**10**	**14**	**5**	**13**	**12**	**20**	**19**	93
Haematology	**9**	**17**	**10**	**15**	**16**	**15**	**20**	102
Maternal	**9**	**4**	**5**	**5**	**6**	**3**	**2**	34
Neurology	**4**	**13**	**8**	**7**	**6**	**5**	**5**	48
Other	**0**	**0**	**2**	**1**	**1**	**1**	**0**	5
Prim Bacteraemia	**0**	**5**	**7**	**8**	**7**	**9**	**14**	50

Infections can be reduced

BSI from IV catheter sepsis (The Canberra Hospital)



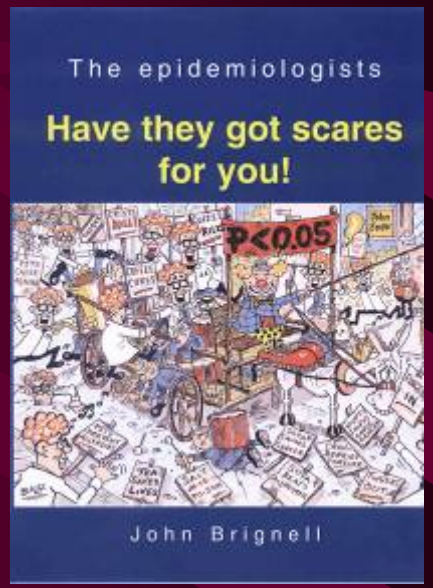
What can we do?

- Recognize there is a problem
  - No self justification
- Measure what is happening
  - Meaningful and easy
  - Research
- Change things
  - Education
  - Interventions “buy –ins”
- Measure again

The best laid plans!

Epidemiologists; are they a hindrance?

- Too much time and effort to get the perfect denominator
- This NOT research but quality improvement



Need to collect and have readily available some easy to measure but important RATES

- Will not be popular with hospitals
  - Always reason why my rates are worse than someone else's

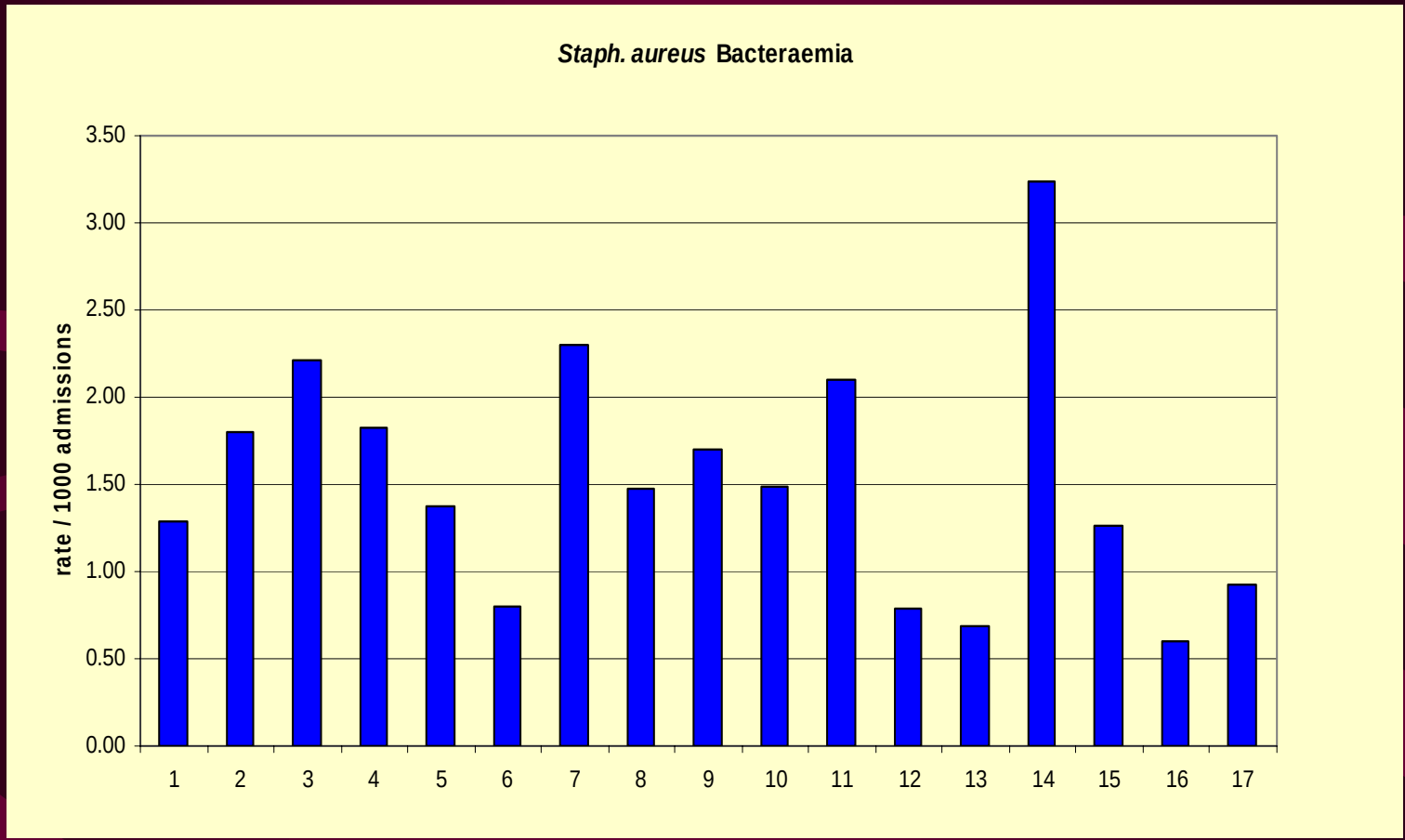
BUT

- We need to do it

What do we need to measure in all hospitals?

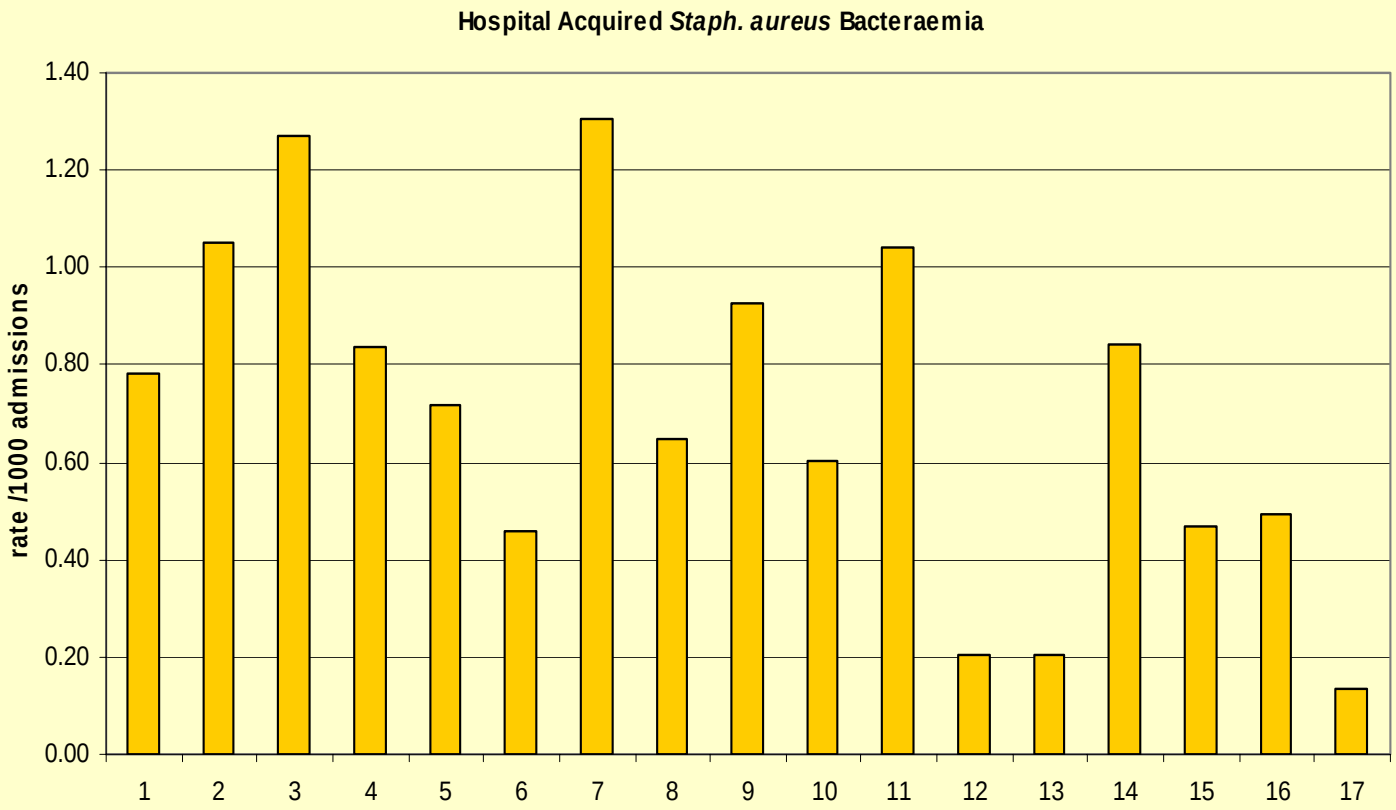
- ***S.aureus*** blood stream infection rates
  - All episodes- community and hospital onset
  - Separate MRSA and MSSA
  - Per 1,000 hospital separations
  - Should be on the web for each hospital
  - Based on pathology systems
  - But Language
    - OBDs – why not patient days
    - Separations – why not admissions

AGAR: Rates at different hospitals



Collignon P, Nimmo GR, Gottlieb T, Gosbell IB; Australian Group on Antimicrobial Resistance.
Staphylococcus aureus bacteremia, Australia.
Emerging Infect Dis. 2005 Apr;11(4):554-61.

Hospital onset



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Staphylococcus aureus bloodstream (SAB) infections (1)

- Common and serious causes of morbidity and mortality that incur considerable health care costs and are potentially preventable.

- It should be relatively easy for hospitals to collect data on the incidence of SAB episodes, to determine whether infections were acquired in hospital or in the community, and to establish whether they were health care associated.

Collignon et al. MJA 2006; 184: 404–406

Staphylococcus aureus bloodstream (SAB) infections (2)

- The proportion of SAB infections caused by methicillin resistant *S. aureus* strains should be a useful indicator of the level of control of antibiotic resistance in the community and in the health care setting.

- Continuous monitoring of infection incidence would enable health care facilities to determine the effectiveness of interventions designed to minimise SAB infections.

Collignon et al. MJA 2006; 184: 404–406

SAB Canberra Hospital 2005

3 *Staphylococcus aureus* bloodstream (SAB) infections at the Canberra Hospital, 2005*

	MSSA	MRSA
Community associated	29	1†
Inpatient health care associated	23	10†
Non-inpatient health care associated	3	1
Total	55	12

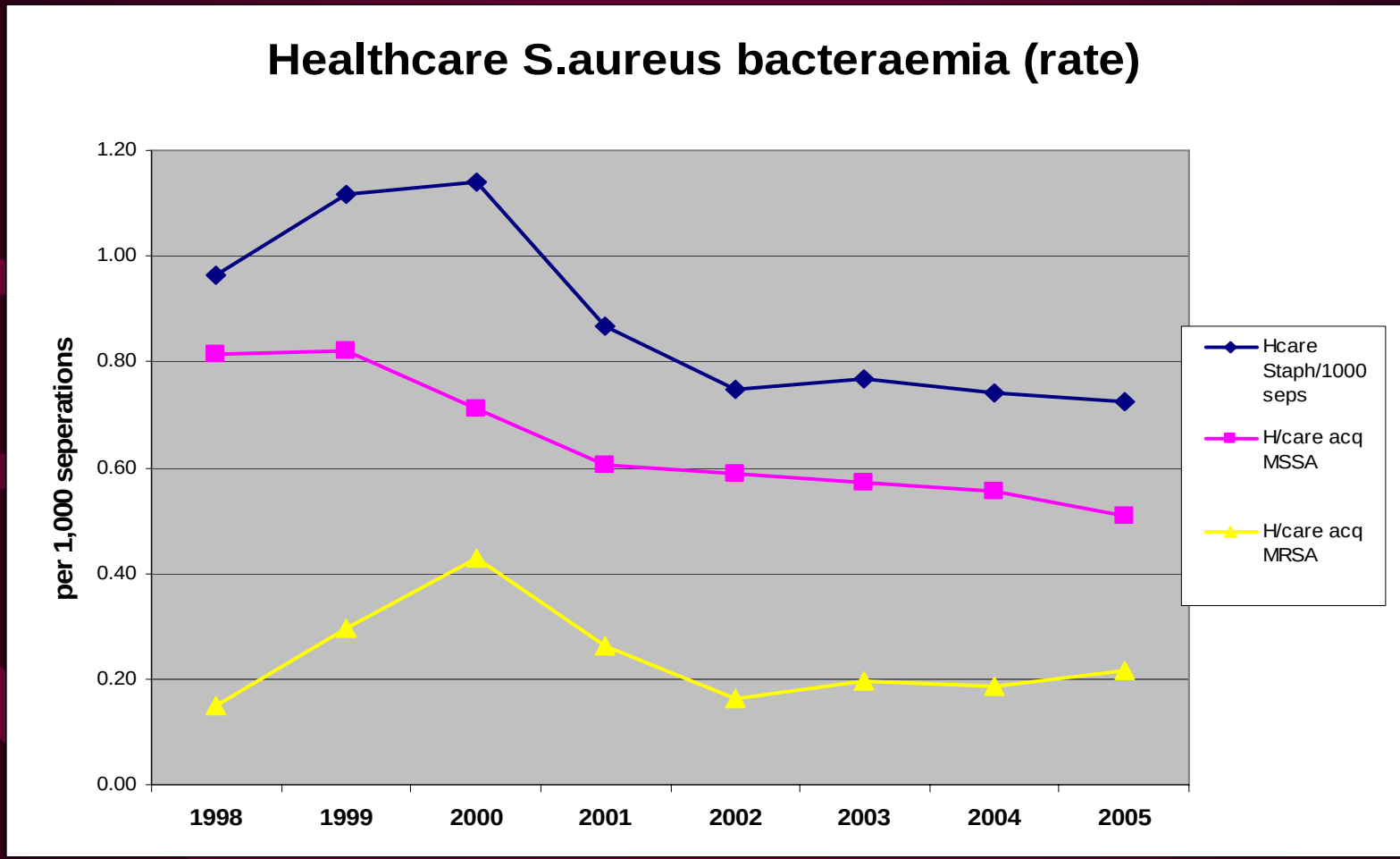
MRSA = methicillin-resistant *S. aureus*. MSSA = methicillin-sensitive *S. aureus*. * In 2005, there were 51 122 separations, of which 29 361 were same-day patients, and 177 239 occupied bed days (OBDs). There were 37 health care-associated SAB episodes. Thus, the rates for health care-associated SAB infection were 0.7 per 1000 separations and 2.1 per 10 000 OBDs. † One episode in each group involved non-multiresistant MRSA.

Collignon et al. MJA 2006; 184: 404–406

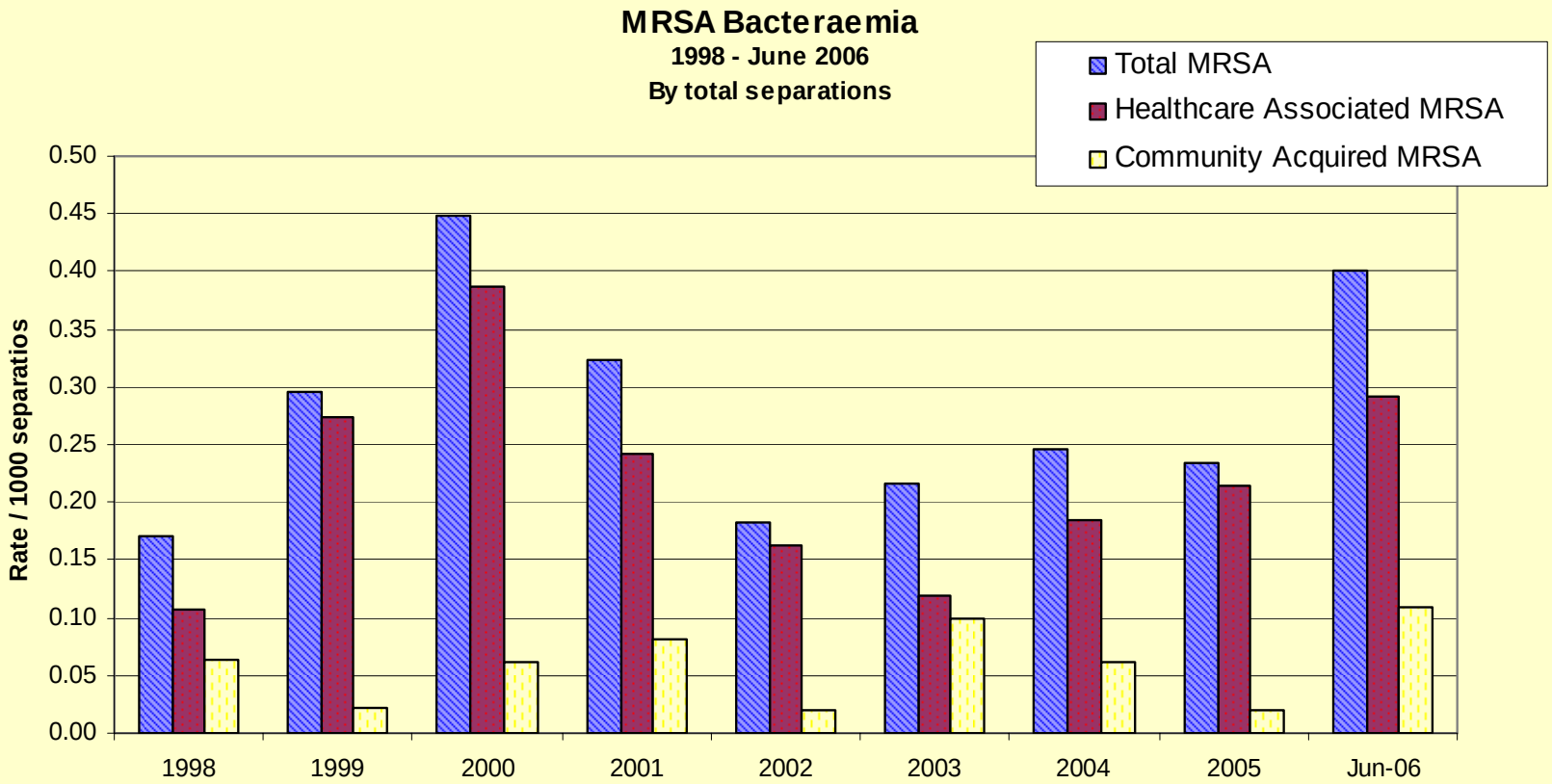
Canberra hospital *S.aureus* bacteraemia

	Total *Staph. Aureus* bacteraemia			
	community acquired	inpt h/care associated	non-inpt h/care associated	Total
1998	14	27	18	59
1999	20	36	17	73
2000	17	45	11	73
2001	22	29	14	65
2002	19	28	9	56
2003	40	30	9	79
2004	29	25	11	65
2005	30	33	4	67

Healthcare rates TCH



MRSA bacteraemia TCH (1998-2006)



We can improve things

- Need to be motivated
- Both inside and outside pressure for better QA is needed
- We need to aim for major improvements

- This can be achieved