

# A Statewide surveillance program for Healthcare Associated Infections

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Victorian Healthcare Associated Infection  
Surveillance System (VICNISS) Coordinating Centre

# VICNISS Coordinating Centre

- Established 2002 to coordinate standardised statewide surveillance of hospital –acquired infections
- Large and small hospital programs
- Quarterly reporting to hospitals with comparison of rates with state aggregate rates
- VICNISS performance indicators included in DH hospital reporting structures – SoP, IPR etc

# Victorian Large Hospital (> 100 acute beds) Program

- Surgical Site Infections
- Central line associated bloodstream infections in ICU
- Line associated bloodstream infections in NICU
- Pathogens and antibiotic resistance
- Outpatient Haemodialysis events
- Surgical Antibiotic Prophylaxis
- Influenza staff vaccination
- *Staphylococcus aureus* bloodstream infections
- *Clostridium difficile* infections

# Victorian Small Hospital (<100 acute beds) Program

- Outpatient Haemodialysis events
- Multi resistant organism infections
- Surgical Antibiotic Prophylaxis
- Influenza staff vaccination
- PVC insertion/maintenance
- Staff vaccination – HepB, Measles
- *Staphylococcus aureus* bloodstream infections
- *Clostridium difficile* infections

# Contributing hospitals as of 2011

- 27 large public and 9 large private hospitals
- Approximately 80 small public hospitals

# Data collection/collation

- Paper forms
- Web forms
- Excel/Access
- Specialist software (SHIINe)

# Large Hospital Data Holdings

(Nov 2002 – Dec 2010)

- Data including infections on:
  - 17,000 coronary artery bypass grafts
  - 23,000 Hip replacements
  - 16,000 Knee replacements
  - 36,000 Caesarean sections
  - 6,000 Colorectal procedures
- 1900 central line-associated bloodstream infections in ICUs

# Surgical site infection data

- Infections are classified as
  - Superficial
  - Deep
  - Organ space
- For rate calculations deep and organ space are often combined as both are considered “serious” infections
- Hospitals provided with rates of total and deep/os infections

# Surgical site infection data

- Risk stratified using CDC NHSN risk index
- Based on
  - ASA score
  - Wound class (clean/dirty etc)
  - Procedure duration

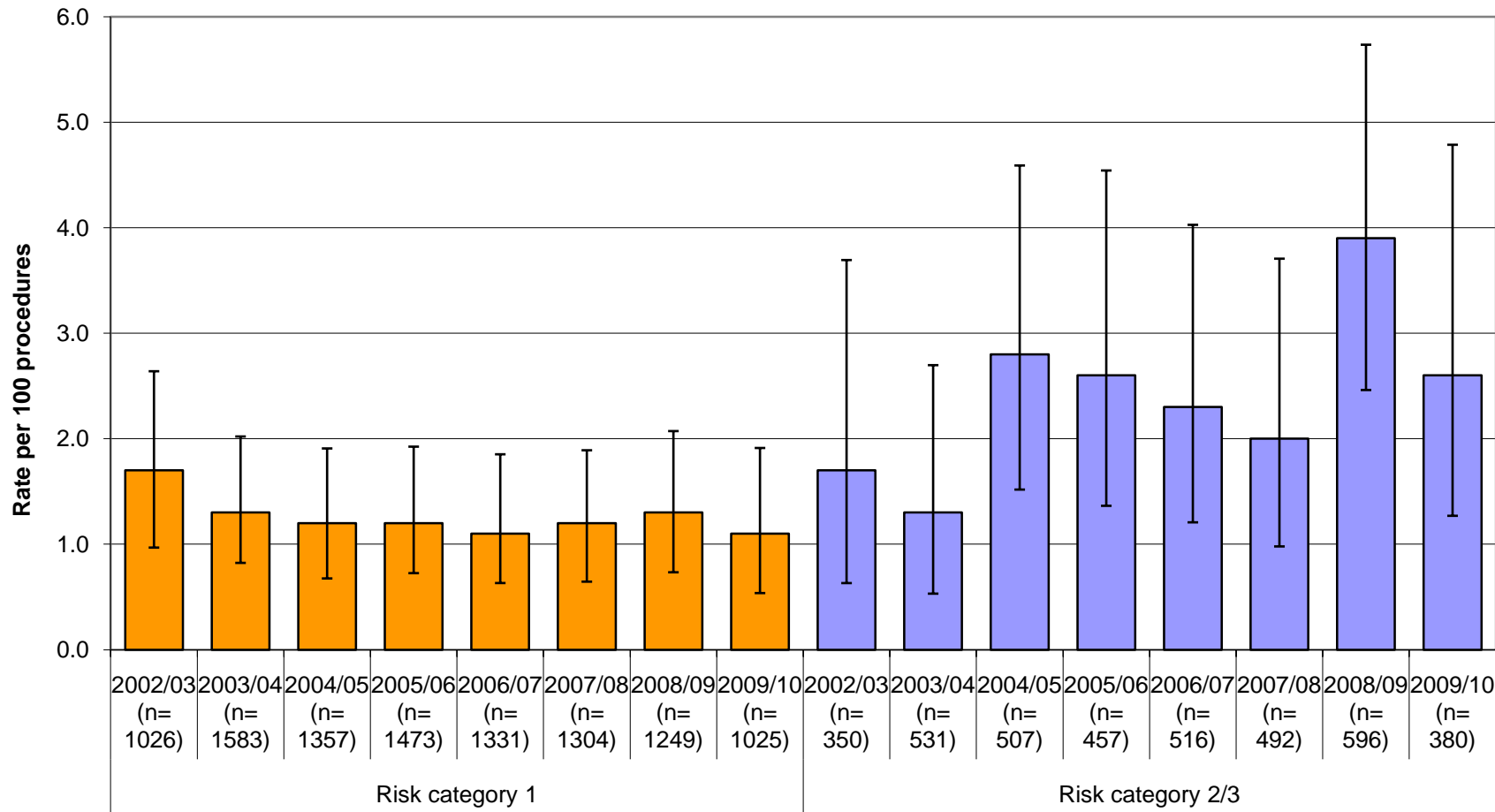
# Surgical site infection data

- General move towards more sophisticated risk adjustment
- Logistic regression models
- Standardised infection ratios
  - Observed infections/Expected infections

# NHSN Basic Risk Index

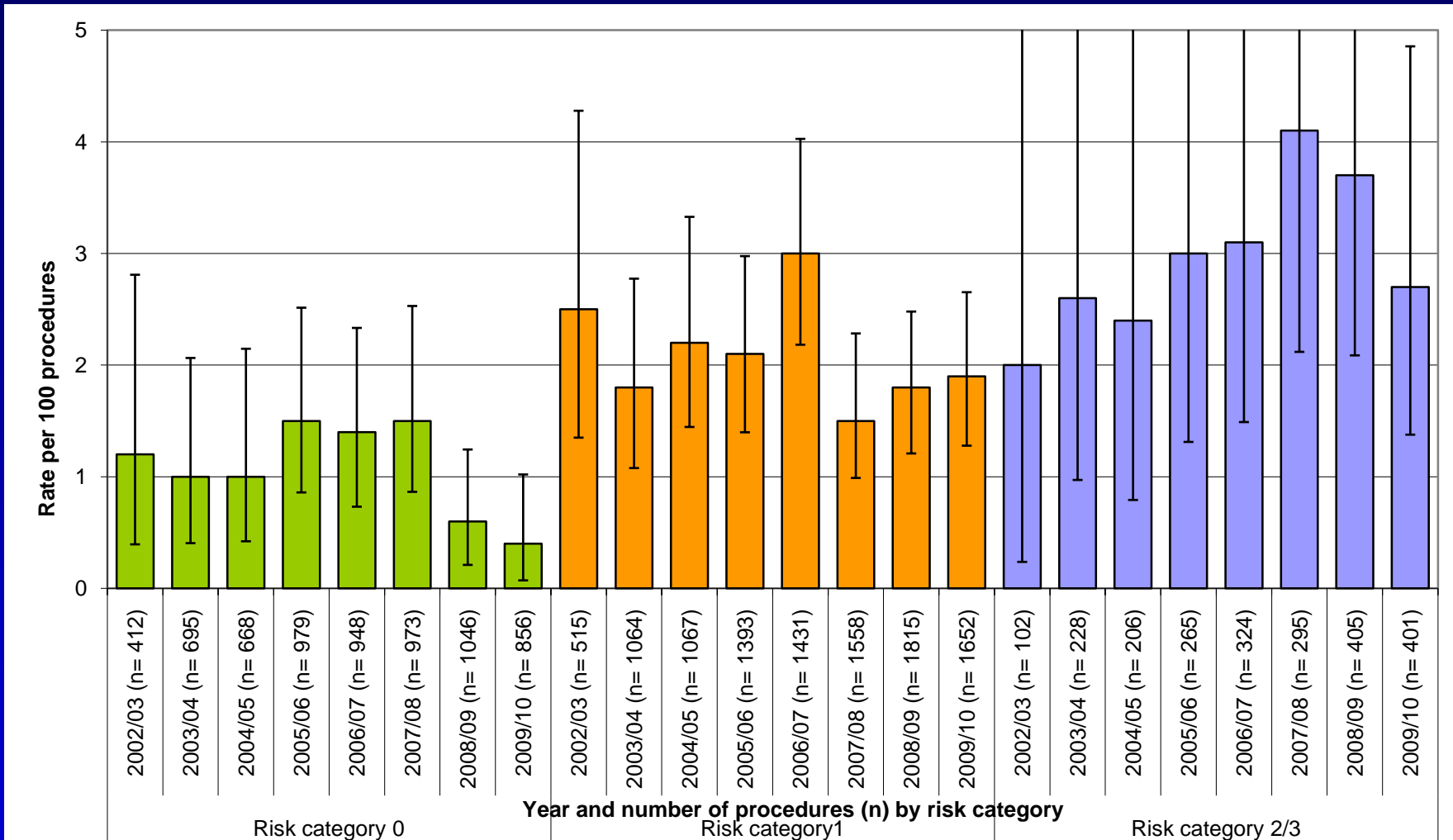
- ASA score  $> 3 = 1$  point
- Wound class dirty/infected = 1 point
- Procedure duration  $> 75^{\text{th}}$  percentile = 1 point
- Scores range from 0-3
- Works well for many procedures - not as well for cardiac, csec

# Annual deep/os infection rates – Cardiac Bypass Surgery

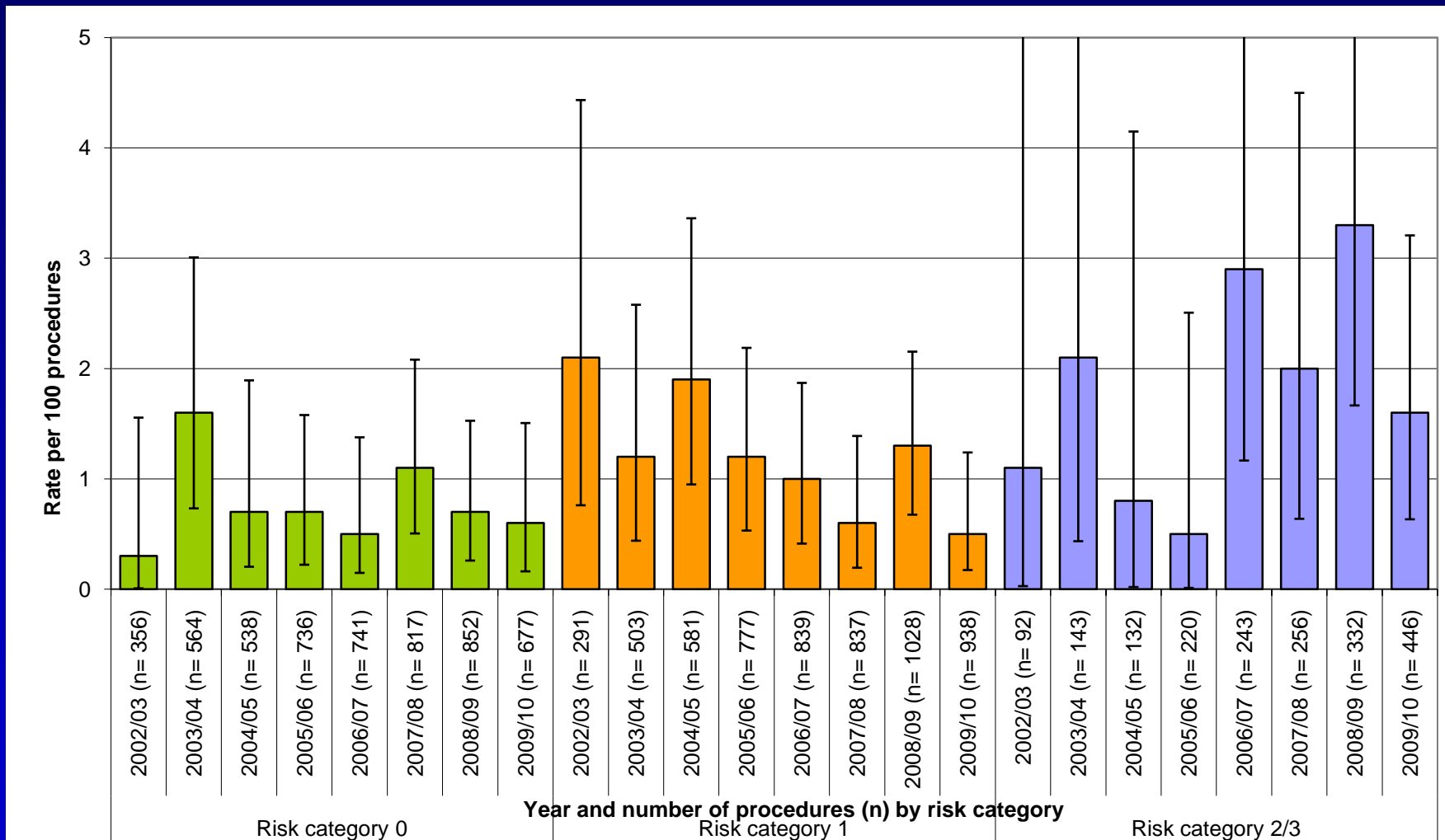


Year and number of procedures (n) by risk category

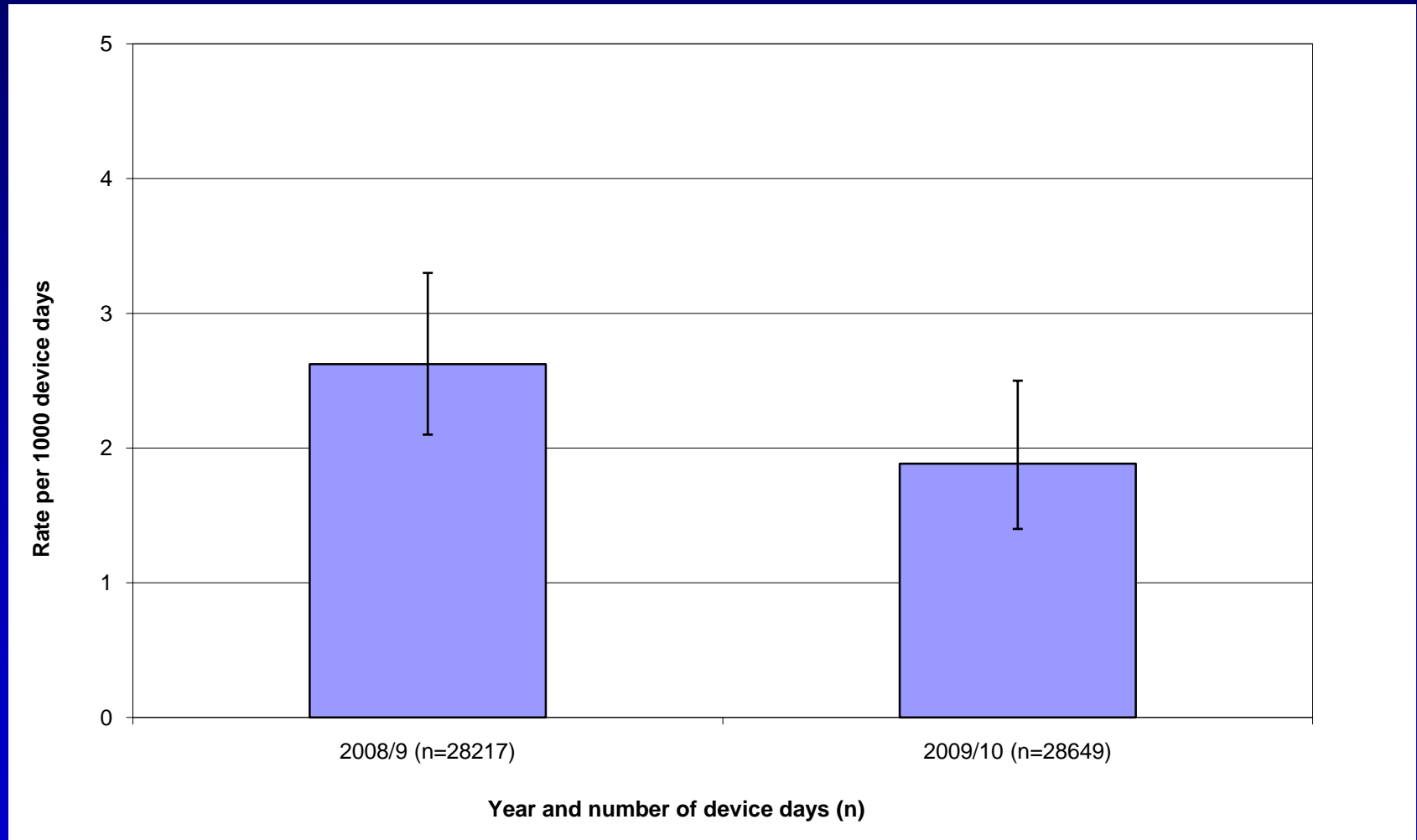
# Annual deep/os infection rates – hip prosthesis



# Annual deep/os infection rates – knee prosthesis



# Intensive care unit CLABSI surveillance



# Other projects

- Interventions
  - Colorectal bundle
  - Central line insertion practices
- Validation – CLABSI Reporting, ASCTS
- Costing of orthopaedic infections
- Outbreak investigations – regional hospitals
- Evaluating risk score performance
- Improved risk stratification/adjustment for cardiac bypass procedures

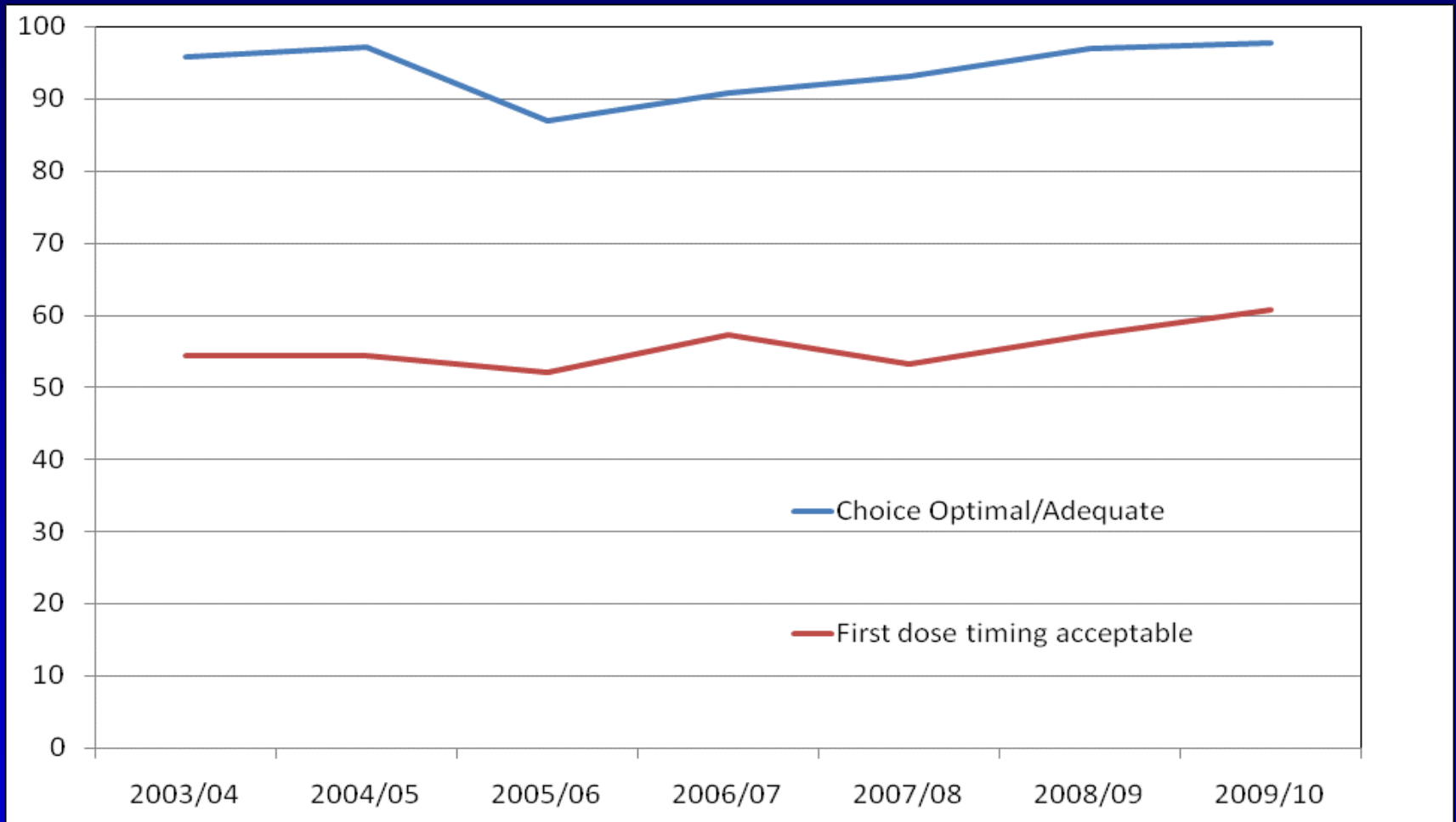
# Other projects (contd)

- Improving antibiotic prophylaxis
  - Cheat sheets
  - Feedback of detailed data
- Surveillance in aged care facilities
- SHIINe software implementation into large hospitals
  - Integration with existing hospital databases (theatre, pt admin, pathology)

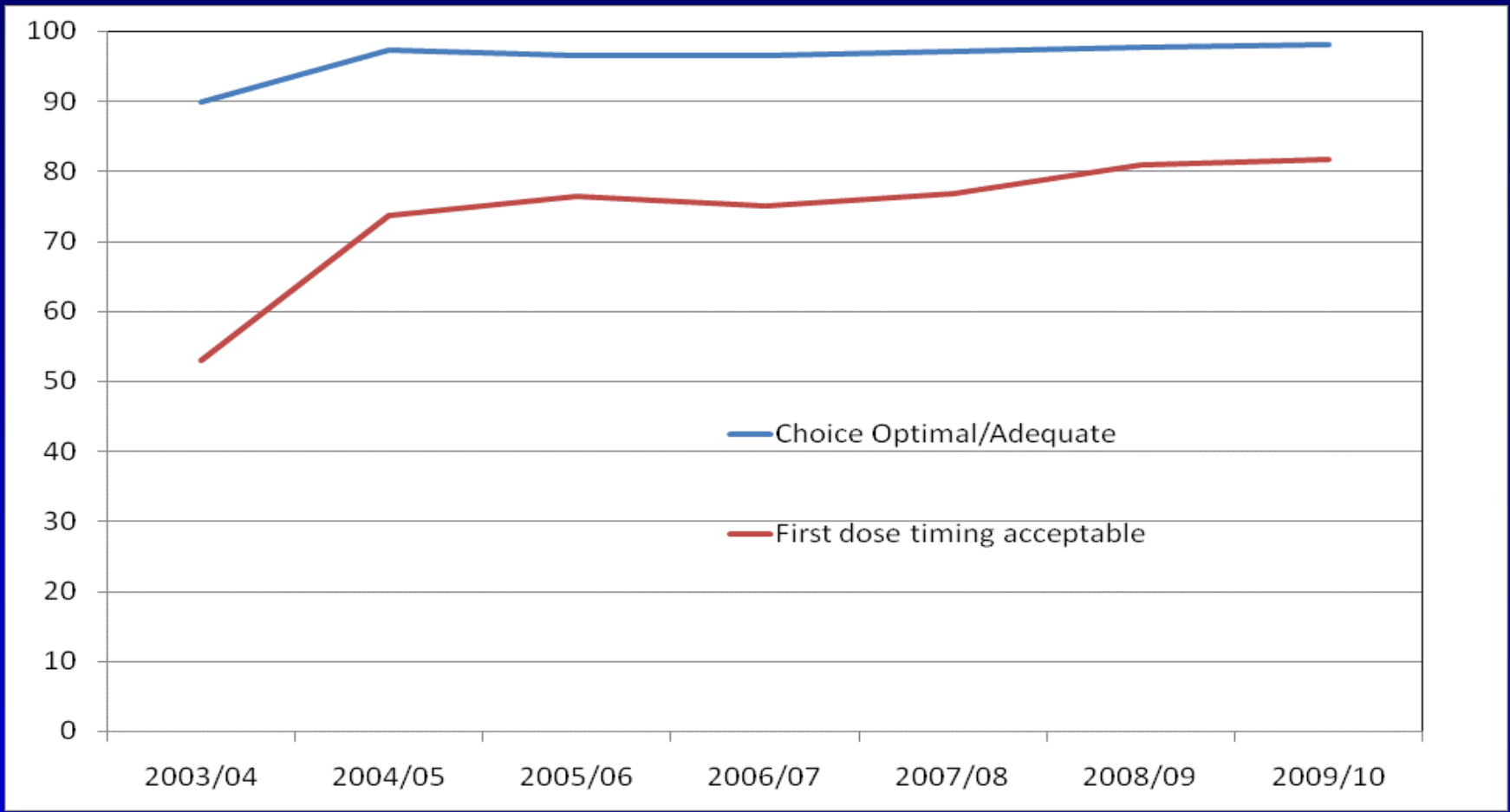
# Surgical antibiotic prophylaxis

- Assessed for compliance with national guidelines (Therapeutic guidelines antibiotic)0
- Assess choice, timing of first dose and duration of prophylaxis
- Choice is assigned as optimal (follows guidelines exactly) or adequate (considered adequate px by panel of ID physicians)
- Timing acceptable if within 1 hour prior to procedure

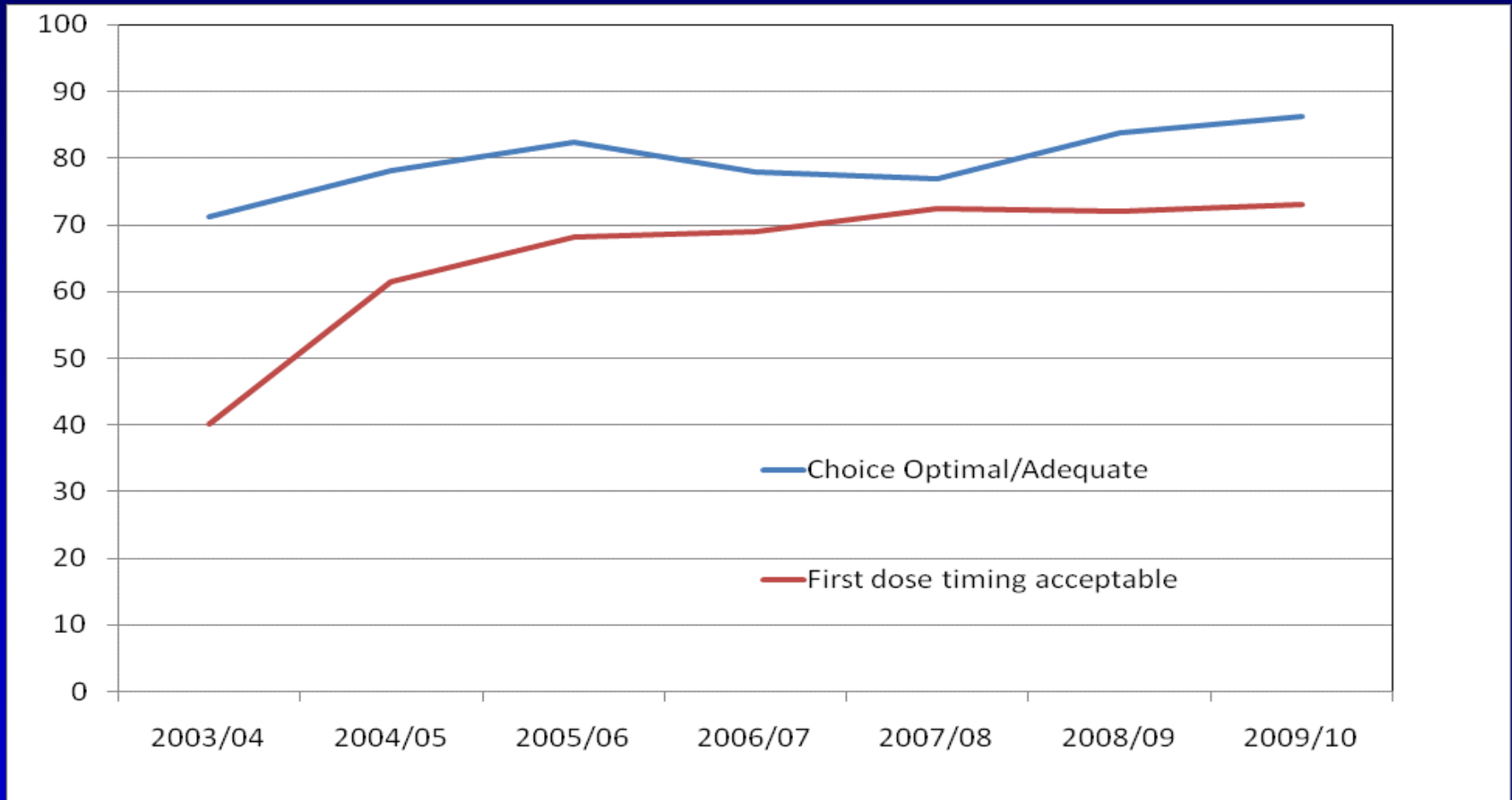
# Percentage compliance with recommended antibiotic choice and timing— all cardiac surgery



# Percentage compliance with recommended antibiotic choice and timing— hip and knee replacements



# Percentage compliance with recommended antibiotic choice and timing– colorectal surgery



# Central line insertion practices (CLIP) in ICU

- Monitoring and documentation of insertion practices for central lines in intensive care units
- Five hospitals involved in trial
- Evidence based insertion practices
- Modelled on module from CDC NHSN

# Central line insertion practices (CLIP) in ICU: Data collection

- Inserter (coded identifier and occupation) and person documenting (inserter/observer)
- Time and date of insertion
- Reason for insertion
- Hand hygiene performed
- Maximal sterile barriers used
- Skin preparation
- Hand hygiene performed
- Insertion site
- Use of antimicrobial impregnated dressing

# Colorectal bundle project

- Evidence based interventions to reduce infections following colorectal surgery
- Trialled at one hospital
- Bundle
  - Correct antibiotic px (including second doses)
  - Increased oxygenation intra and post operatively
  - Normothermia pre, intra and post operative
  - Normoglycaemia

# Colorectal bundle project

- Compliance with processes was documented e.g. use of warmed blankets, Bair huggers, re-breather masks, 80% FiO<sub>2</sub>, BSL documented
- Full time project officer employed
- Compliance levels were never as high as desired
- Crude infection rate decreased from 14.8% to 7.0%

ORIGINAL ARTICLE

## Performance of the National Nosocomial Infections Surveillance Risk Index in Predicting Surgical Site Infection in Australia

N. Deborah Friedman, MBBS, FRACP; Ann L. Bull, PhD; Philip L. Russo, MClinEpid; Lyle Gurrin, PhD;  
Michael Richards, MBBS, FRACP, MD

**BACKGROUND.** The Victorian Hospital Acquired Infection Surveillance System (VICNISS) hospital-acquired infection surveillance system was established in 2002 in Victoria, Australia, and collates surgical site infection (SSI) surveillance data from public hospitals in Australia.

**OBJECTIVE.** To evaluate the association between the US National Nosocomial Infections Surveillance (NNIS) system's risk index and SSI rates for 7 surgical procedures.

**METHODS.** SSI surveillance was performed with NNIS definitions and methods for surgical procedures performed between November 2002 and September 2004. Correlations were assessed using the Goodman-Kruskal  $\gamma$  statistic.

**RESULTS.** Data were submitted for the following numbers of procedures: appendectomy, 545; coronary artery bypass graft (CABG), 4,632; cholecystectomy, 1,001; colon surgery, 623; cesarean section, 4,857; hip arthroplasty, 3,825; and knee arthroplasty, 2,416. NNIS risk index and increasing SSI rate were moderately well correlated for appendectomy ( $\gamma = 0.55$ ), colon surgery ( $\gamma = 0.48$ ), and cesarean section ( $\gamma = 0.42$ ). A fairly positive correlation was found for cholecystectomy ( $\gamma = 0.17$ ), hip arthroplasty ( $\gamma = 0.2$ ), and knee arthroplasty ( $\gamma = 0.16$ ). However, for CABG surgery, a poor association was found ( $\gamma = 0.02$ ).

**CONCLUSIONS.** The NNIS risk index was positively correlated with an increasing SSI rate for all 7 procedures; the strongest correlation was found for appendectomy, cesarean section, and colon surgery, and the poorest correlation was found for CABG surgery. We believe that risk stratification with the NNIS risk index is appropriate for comparison of data for most procedures and superior to use of no risk adjustment. However, for some procedures, particularly CABG, further studies of alternative risk indexes are needed to better stratify patients.

*Infect Control Hosp Epidemiol* 2007; 28:55-59

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY OCTOBER 2007, VOL. 28, NO. 10

ORIGINAL ARTICLE

# An Alternative Scoring System to Predict Risk for Surgical Site Infection Complicating Coronary Artery Bypass Graft Surgery

N. Deborah Friedman, MBBS, FRACP; Ann L. Bull, PhD; Philip L. Russo, MClInEpid;  
Karin Leder, MBBS, FRACP, MPH; Christopher Reid, PhD; Baki Billah, PhD; Silvana Marasco, MBBS, MS, FRACS;  
Emma McBryde, MBBS; Michael J. Richards, MBBS, FRACP, MD

# Towards an alternative risk score for CABG

## OBJECTIVE

- To analyse the risk factors for SSI – CABG using ASCTS Database
- Create an alternative SSI risk score based on the results of multivariate analysis

## SETTING

- 6 acute care hospitals
- Patients who underwent CABG surgery over 27 months

## RESULTS

- 4633 patients (93%) were combined from the 2 databases
- Univariate and multivariate analyses performed

# Towards an alternative risk score for CABG

## RESULTS

### A new pre-operative scoring system

- one point for diabetes,
- one point for BMI  $\geq 30 < 35$
- one point for BMI  $\geq 35$
- **The new scoring system performed better than the NNIS risk index at predicting SSI**

### Validation of the model- Duke University

- **40,000-50,000 CABGS procedures**

# Towards an alternative risk score for CABG

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY JANUARY 2010, VOL. 31, NO. 1

ORIGINAL ARTICLE

## Validating a 3-Point Prediction Rule for Surgical Site Infection after Coronary Artery Bypass Surgery

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Daniel J. Sexton, MD, FACP

**BACKGROUND.** Surgical site infection (SSI) after coronary artery bypass graft (CABG) surgery is an increasing healthcare problem. Investigators from Australia proposed a new, 3-point scale that assesses SSI risk on the basis of diagnosis of diabetes mellitus and body mass index.

**OBJECTIVE.** To validate the Australian Clinical Risk Index among patients undergoing CABG surgery in the United States.

**DESIGN AND SETTING.** Nested case-control study involving patients undergoing CABG surgery at 9 hospitals during 1991–2002.

**PATIENTS.** Case patients were those who developed SSIs after CABG surgery. Control subjects were matched to case patients on the basis of hospital, age, and procedure date.

**METHODS.** Odds ratios (ORs) for SSIs were calculated for the comparison of case patients with control subjects for all risk categories determined using the Australian Clinical Risk Index and National Nosocomial Infections Surveillance System (NNIS) risk index. An adjusted area under the curve was used to compare predictive values among risk indices.

**RESULTS.** Four hundred sixty patients were studied, including 269 patients with SSI and 191 control subjects. NNIS risk group 2 was associated with increased rate of SSI (OR, 1.79; 95% confidence interval [CI], 1.19–2.67). No patient had an NNIS risk index of 3. The remaining NNIS categories were not predictive of infection. In contrast, an increase in Australian Clinical Risk Index was associated with an increase in risk of SSI (category 2: OR, 2.39 [95% CI, 1.33–4.29]; category 3: OR, 4.46 [95% CI, 1.83–10.85]).

**CONCLUSIONS.** The NNIS risk index predicts the risk of SSI associated with many procedures, but it has limited use in predicting the risk of SSI after CABG surgery. The new Australian Clinical Risk Index stratified patients into discrete groups associated with increased risk of SSI. Data from our study support the use of this new risk index in the US population.

*Infect Control Hosp Epidemiol* 2010; 31:64-68

# Challenges: Going national

- National surveillance (SAB, Cdiff)
  - What is an occupied bed day
  - Which bed types to include in surveillance
    - Who is most at risk?
  - Definition – transfers etc
  - Target/Comparisons between hospitals

# Challenges – SHIINe software

- **Integration with hospital databases**
  - Wide variety of systems
  - Individual approach
  - Pathology data non-atomised
- **General issues**
  - Data inconsistent/incomplete eg procedure codes
  - What type of reports do hospitals require

# Challenges: Public Reporting

- Requires robust risk adjustment for outcome indicators
- Outcome vs Process indicators
- More emphasis on validation (experience in US)
- Explaining SIR or equivalent to the public
- Debate over how/whether public use information

# VICNISS: future developments

- Outbreak investigations
- Coordination of multicentre interventions
- Further development of surveillance software
- Antibiotic use
- Contribute to development of national surveillance indicators

# Acknowledgements

- **Infection control practitioners in all contributing hospitals**
- **Department of Health**