

# State of the nation of Australian RRSs

A/Prof Daryl Jones

# Welcome to country

- I would acknowledge the traditional owners (Iwi) of this land (Tainui)
- And would like to pay my respects to their elders past and present

# Overview

- Background to MET = old paradigm
- What's wrong with current paradigm
- Moving things upstream = future paradigm
- Warning signs before MET calls
- National standards in Australia
- Effects of national standards on patient outcomes
- Conclusions

# Background to the MET

- Serious adverse events are common in hospitalized patients
  - Australia<sup>1</sup>
  - New Zealand<sup>2</sup>
  - USA<sup>3</sup>
  - Canada<sup>4</sup>

Adverse events  $\cong$  10% admissions

# Are there warning signs

- Serious adverse events were preceded by signs of instability in up to 80%

– Schein etal	Chest 1990	USA
– Buist etal	MJA 1999	Aus
– Hodgets etal	Resuscitation 2002	UK
– Nurmi etal	Act Anaes Scan 2005	Fin
– Bell etal	Resuscitation 2006	Swe

# Australia

- Wilson study
  - 14,000 admissions in 28 hospitals
  - 16.6% associated with an adverse event
  - 8.3% thought to be highly preventable
  - 13.7% resulted in permanent disability
  - 4.9% resulted in death

1. Wilson et al MJA 1995

# New Zealand

- 6579 medical records 13 hospitals 1998
- 858 adverse events
- 315 (36.7%) highly preventable
- 489 (57.0%) associated with surgery
- 303 (35.5%) associated with medicine

# History of MET in Australia

- Hillman (Liverpool) 1992
- Buist (Dandenong) 1997
- Bellomo (Austin) 2000

Anaesth Intens Care 1995; 23: 183-186

## The Medical Emergency Team

A. LEE\*, G. BISHOP†, K. M. HILLMAN‡, K. DAFFURN#

*Department of Anaesthetics and Intensive Care, Liverpool Hospital, Liverpool, N.S.W.*

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Effects of a medical emergency team on reduction of incidence of and mortality from unexpected cardiac arrests in hospital: preliminary study

Michael D Buist, Gaye E Moore, Stephen A Bernard, Bruce P Waxman, Jeremy N Anderson, Tuan V Nguyen

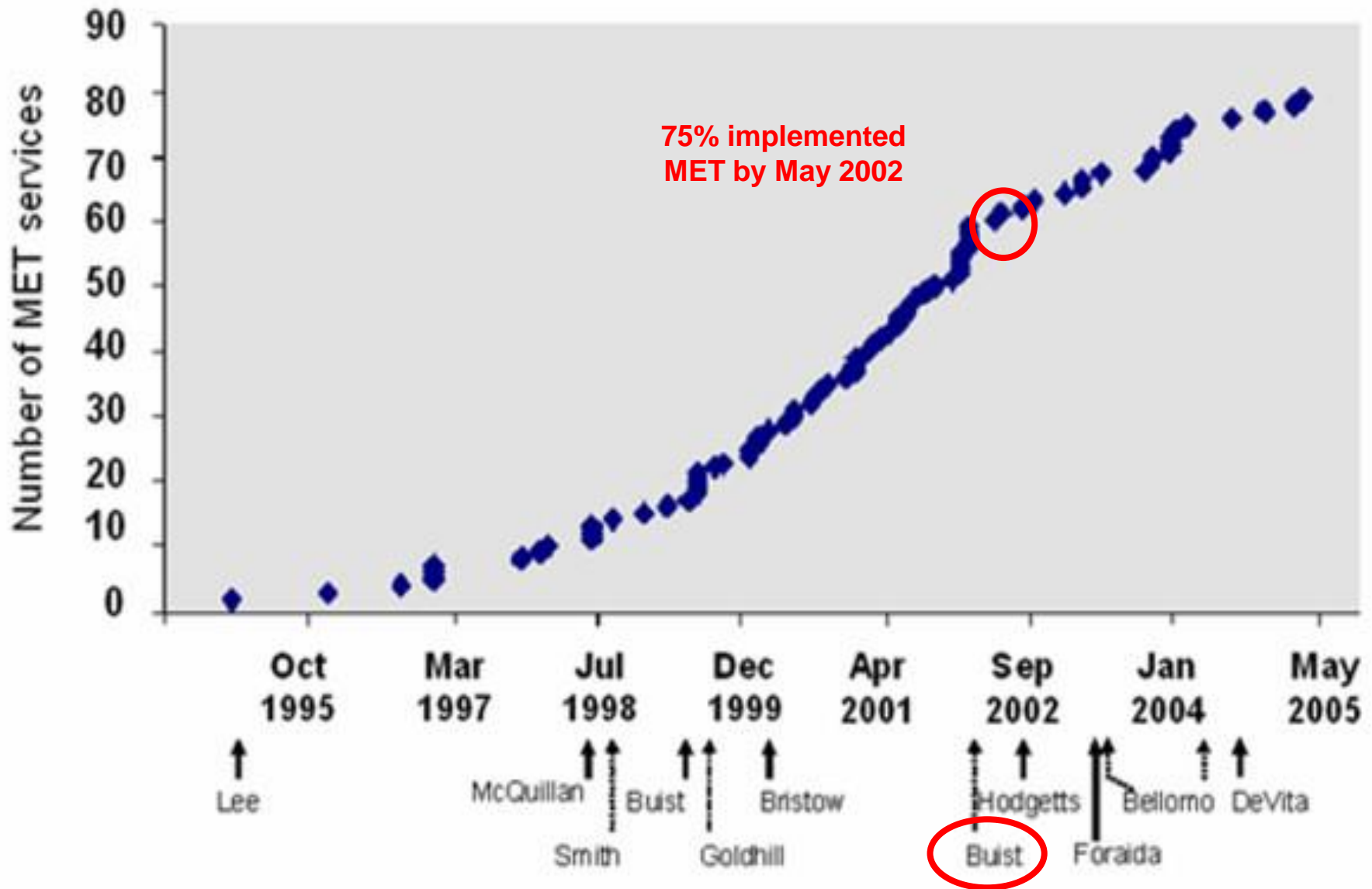
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### RESEARCH

#### **A prospective before-and-after trial of a medical emergency team**

Rinaldo Bellomo, Donna Goldsmith, Shigehiko Uchino, Jonathan Buckmaster, Graeme K Hart, Helen Opdam, William Silvester, Laurie Doolan and Geoffrey Gutteridge





Jones et al Crit Care 2008

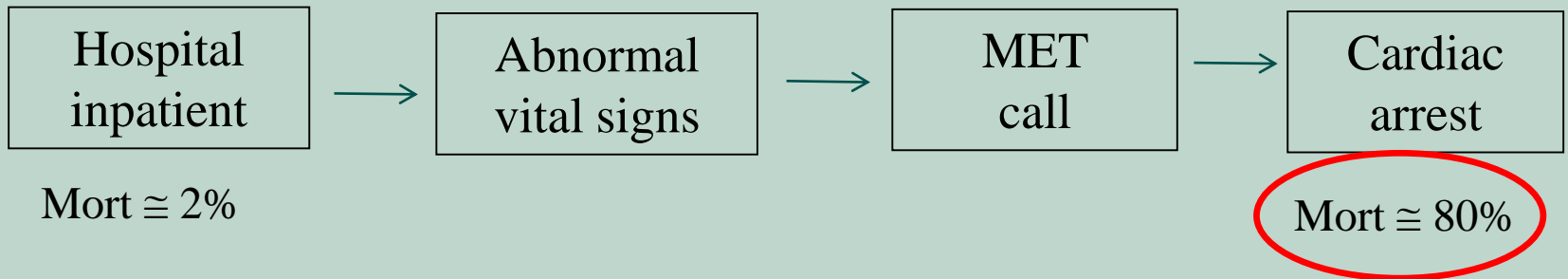
Effectiveness of the MET

Year and related publications

# Rapid Response Teams / Systems

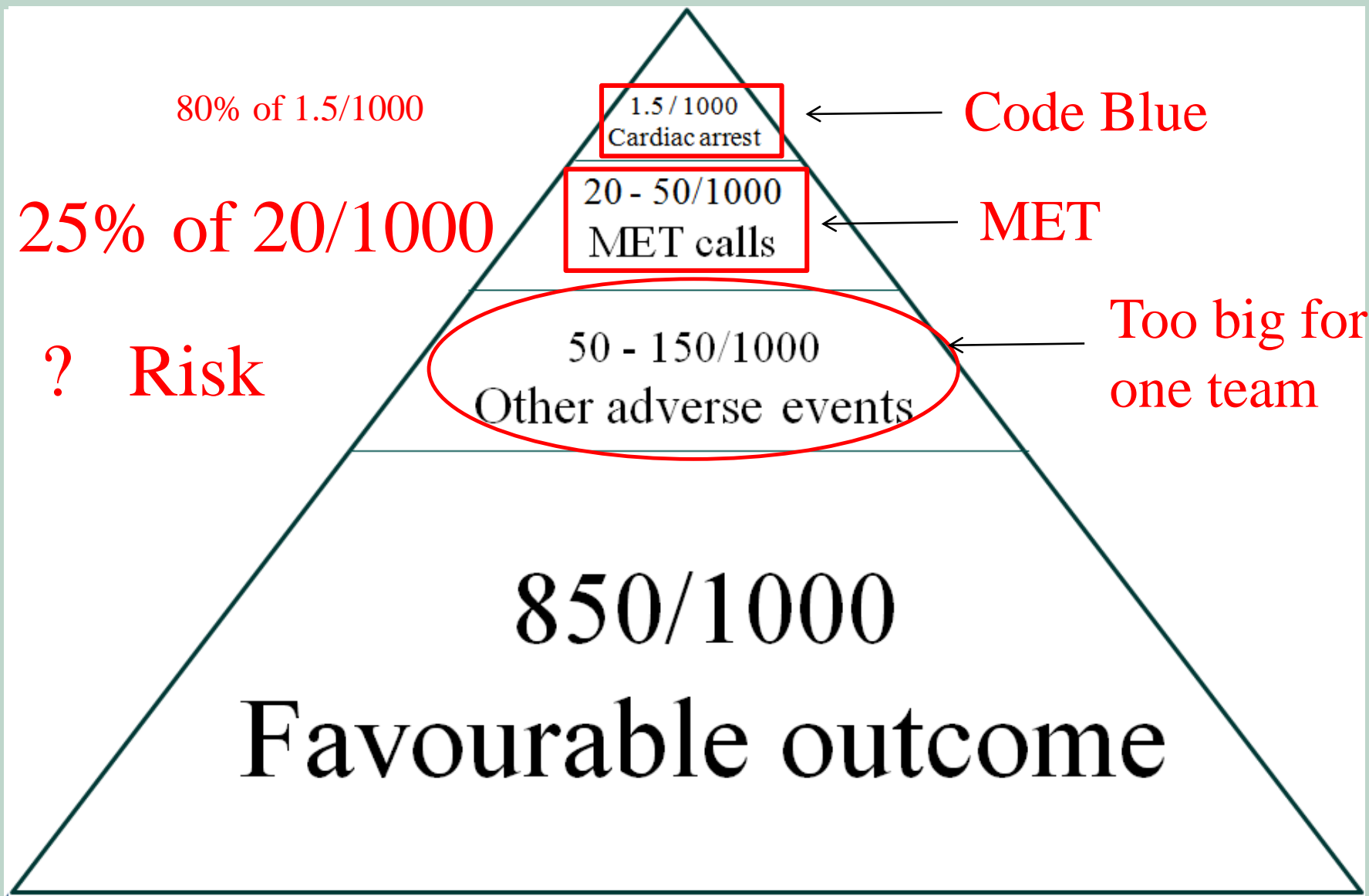
- Calling criteria
  - Objective criteria for = “this patient is sick”
  - Unambiguous indication about
    - » When to call
    - » How to call
- Response team
  - The people responding are clear
  - They are often relatively senior

- 3 meta-analysis show reduction IHCA's
  - Maharaj 2015
    - RR 0.65 (95 % CI 0.61–0.70) for adults
    - RR 0.64 (95 % CI 0.55–0.74) for paediatrics
  - Winters 2013
    - RR 0.66 (95 % CI 0.54–0.80) for adults
    - RR 0.62 (95 % CI 0.46–0.84) for paediatrics
  - Chan PS 2010
    - RR 0.66 (95 % CI 0.54–0.80) for adults
- One meta-analysis shows decreased hospital mortality



# MET = the current paradigm

- Increasing number with time
- High risk population
  - Very high mortality
    - » Overall  $\cong$  25%
    - » If EOLC issues  $\cong$  50-60%
    - » If no EOLC issues  $\cong$  15%
  - Approx 1/10 admitted to ICU
- Better than cardiac arrest  
.....however



# How big is the problem ?

- In 35 hospitals 2000-2009 (10 years)
  - 99,377 RRT calls
  - 17,260 deaths / 70,924 patients (24.3%)
- 138 hospitals in Australian-ICU equipped hospitals
  - 92,858 RRT calls in 2013-2014 FY

Mortality of rapid response team patients in Australia:  
a multicentre study

Crit Care Resusc 2013; 15: 273-278

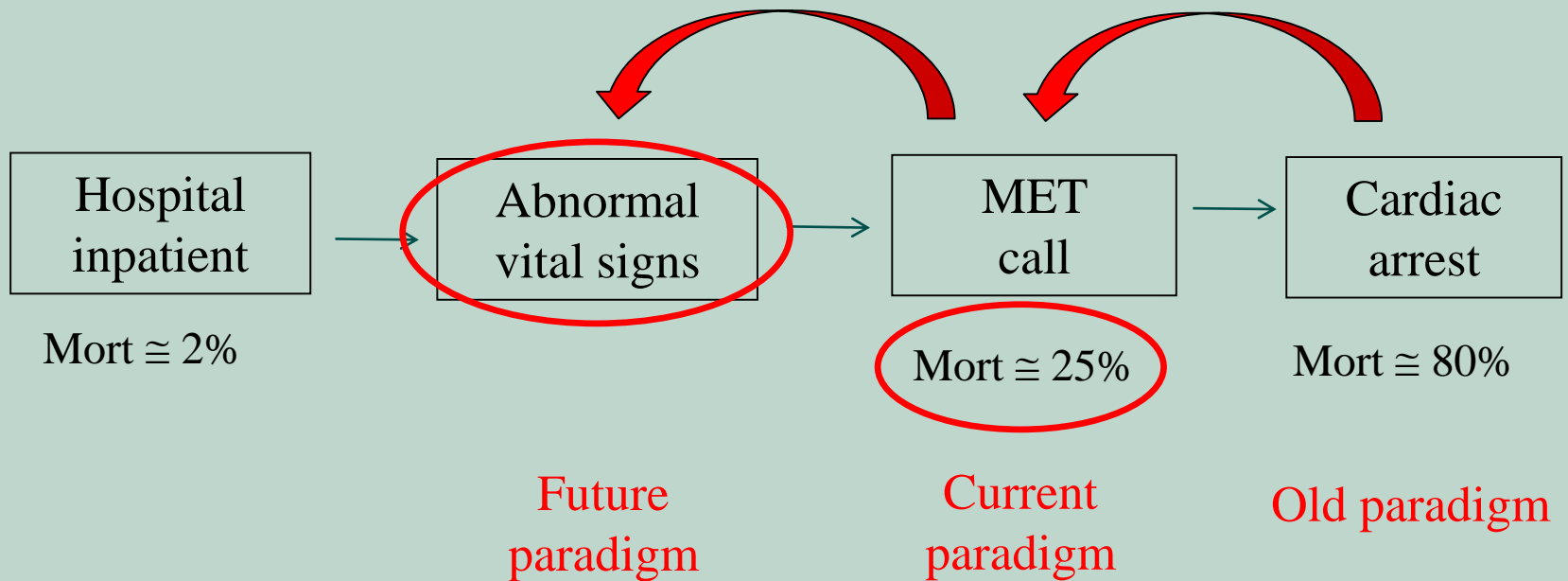
The ANZICS-CORE MET dose investigators

Resource use, governance and case load of rapid response  
teams in Australia and New Zealand in 2014

The Joint College of Intensive Care Medicine and Australian and New Zealand  
Intensive Care Society Special Interest Group on Rapid Response Systems,  
and ANZICS Centre for Outcome and Resource Evaluation

Crit Care Resusc 2016; 18: 275-282

# Need to develop preventative strategies

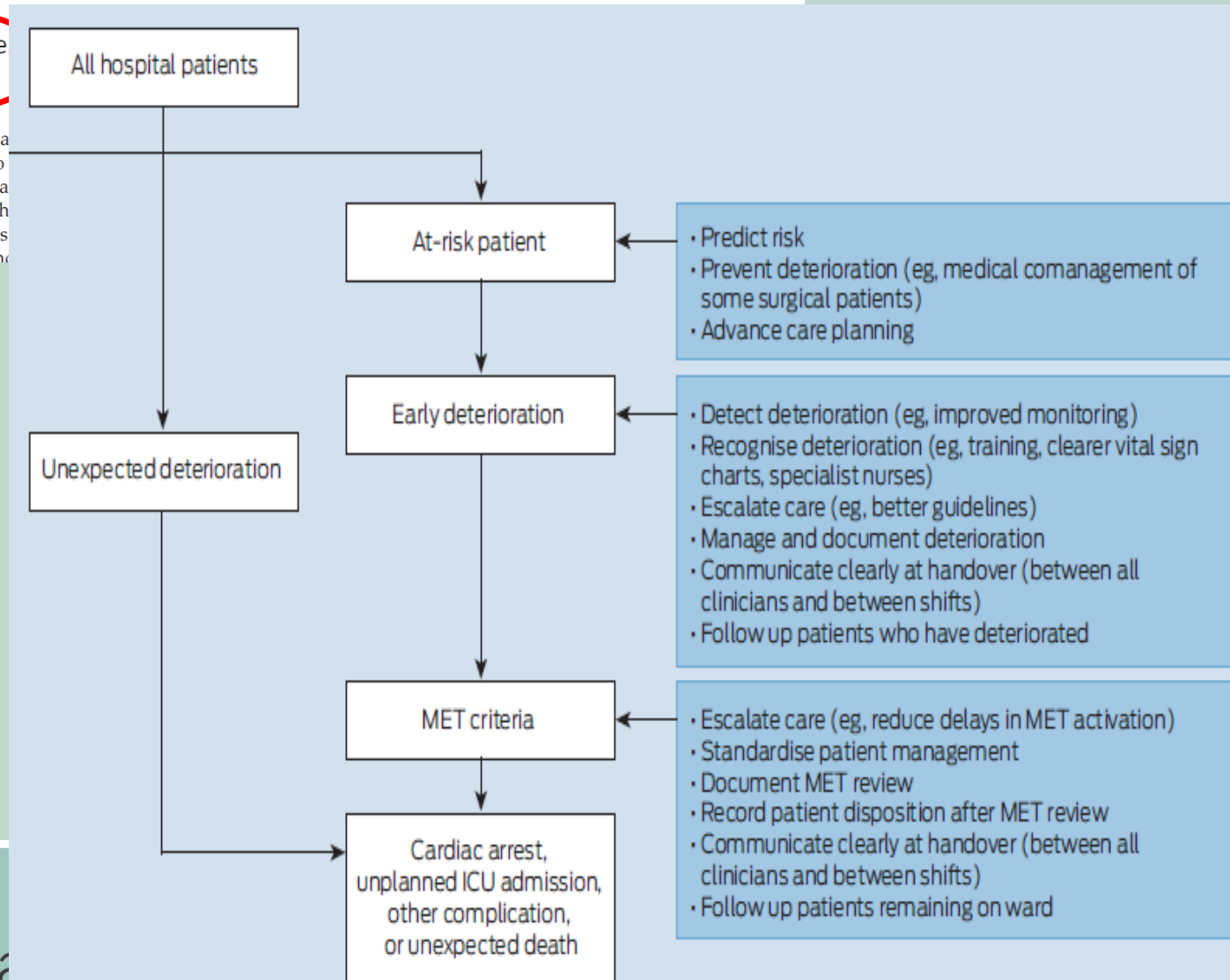




# Clinical deterioration in hospital inpatients: the need for another paradigm shift

Proactive recognition and response  
pre-emptive management

Despite improvements in medical therapy and improved outcomes, patients admitted to care hospitals may suffer clinical deterioration potentially avoidable morbidity. Recent reports show patients admitted to hospital suffer cardiac arrests between 0.66 and 11.2 per 1000 admissions.<sup>1,2</sup> and



Jones et al MJA 2012

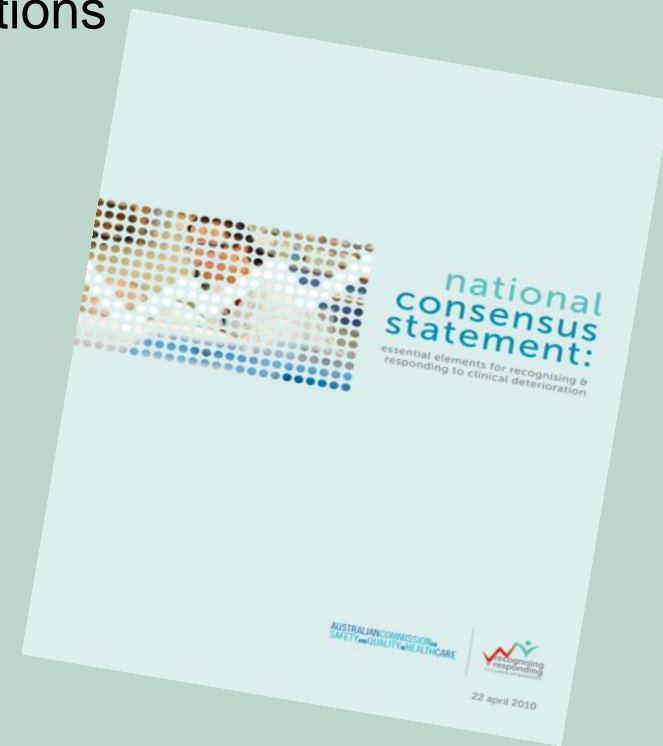
# ACQSHC consensus statement – deteriorating patients

- **A. Clinical processes**

- Measurement and recording of observations
- Escalation protocols
- Rapid response systems
- Communication processes

- **B. Organizational pre-requisites**

- Organizational supports
- Education
- Evaluation and monitoring
- Use of new technology



# Recognition - ORC

- Between the flags

Date											
Time											
Respiratory Rate (breaths / min)	≥ 31									≥ 31	
	25-30									25-30	
	21-24									21-24	
	15-20									15-20	
	11-14									11-14	
5-10									5-10		
≤ 4									≤ 4		
O <sub>2</sub> Saturation (%)	≥ 95									≥ 95	
	90-95									90-95	
O <sub>2</sub> Flow Rate (L / min)	≤ 89									≤ 89	
	> 5									> 5	
	1-5									1-5	
Blood Pressure (mmHg) V             ^ Score systolic BP	Write > 240									Write > 240	
	230s									230s	
	220s									220s	
	210s									210s	
	200s									200s	
	190s									190s	
	180s									180s	
	170s									170s	
	160s									160s	
	150s									150s	
	140s									140s	
	130s									130s	
	120s									120s	
	110s									110s	
	100s									100s	
	90s									90s	
	80s									80s	
	70s									70s	
	60s									60s	
	50s									50s	
40s									40s		
30s									30s		
Heart Rate (beats / min)	Write > 180									Write > 180	
	170s									170s	
	160s									160s	
	150s									150s	
	140s									140s	
	130s									130s	
	120s									120s	
	110s									110s	
	100s									100s	
	90s									90s	
	80s									80s	
	70s									70s	
60s									60s		
50s									50s		
40s									40s		
30s									30s		
Temperature (C)	≥ 38.6									≥ 38.6	
	37.6-38.5									37.6-38.5	
	36.6-37.5									36.6-37.5	
	35.5-36.5									35.5-36.5	
≤ 35.4									≤ 35.4		
Consciousness If necessary, wake patient before scoring	Alert									Alert	
	To Voice									To Voice	
	To Pain									To Pain	
	Unresp.									Unresp.	
4 Hour Urine Output (mL)	≥ 800									≥ 800	
	100-799									100-799	
	≤ 99									≤ 99	
Pain Score None (0) - Worst (10)	Write									Write	
	Write									Write	
Intervention	E.g. 'a'									E.g. 'a'	

IG - ORC Name - U.P. 02/2011  
Insert left name

Board Clinical Safety  
and Quality Committee

Quality safety and risk  
committee

Deteriorating patient  
committee

Deteriorating  
patient  
education  
collaborative

Peri-operative  
medicine  
collaborative

End of life sub-  
committee

Sub-acute  
campus sub-  
committee

Patient and  
carer escalation  
sub-committee

Mental health  
sub-committee

Resuscitation  
sub-committee

MET panel

## • Parent unit review

- Know the patient
- Will follow them up
- Although ↑ workload → less calls per unit
- ? Reduce MET calls / further decrease AEs

### Clinical Review

#### Response Criteria

- Any observation is in an orange area
- New or unrelenting chest pain
- New or unrelenting shortness of breath
- Increased or unexpected fluid or blood loss
- You are worried about the patient but they do not fit the above criteria

#### Actions Required

- Registrar to review patient within 30 minutes
- Request review, and note on the back of this form
- Registrar to ensure consultant is notified
- Ward doctor to attend

# Antecedents to MET calls

- Single centre study 200 MET patients
- 78.5% breached UCR criteria in prior 24 hr
- Median time between MET and
  - First breach = 17.1 hr
  - Last breach = 1.2 hr

# Effect of national standard on patient outcome

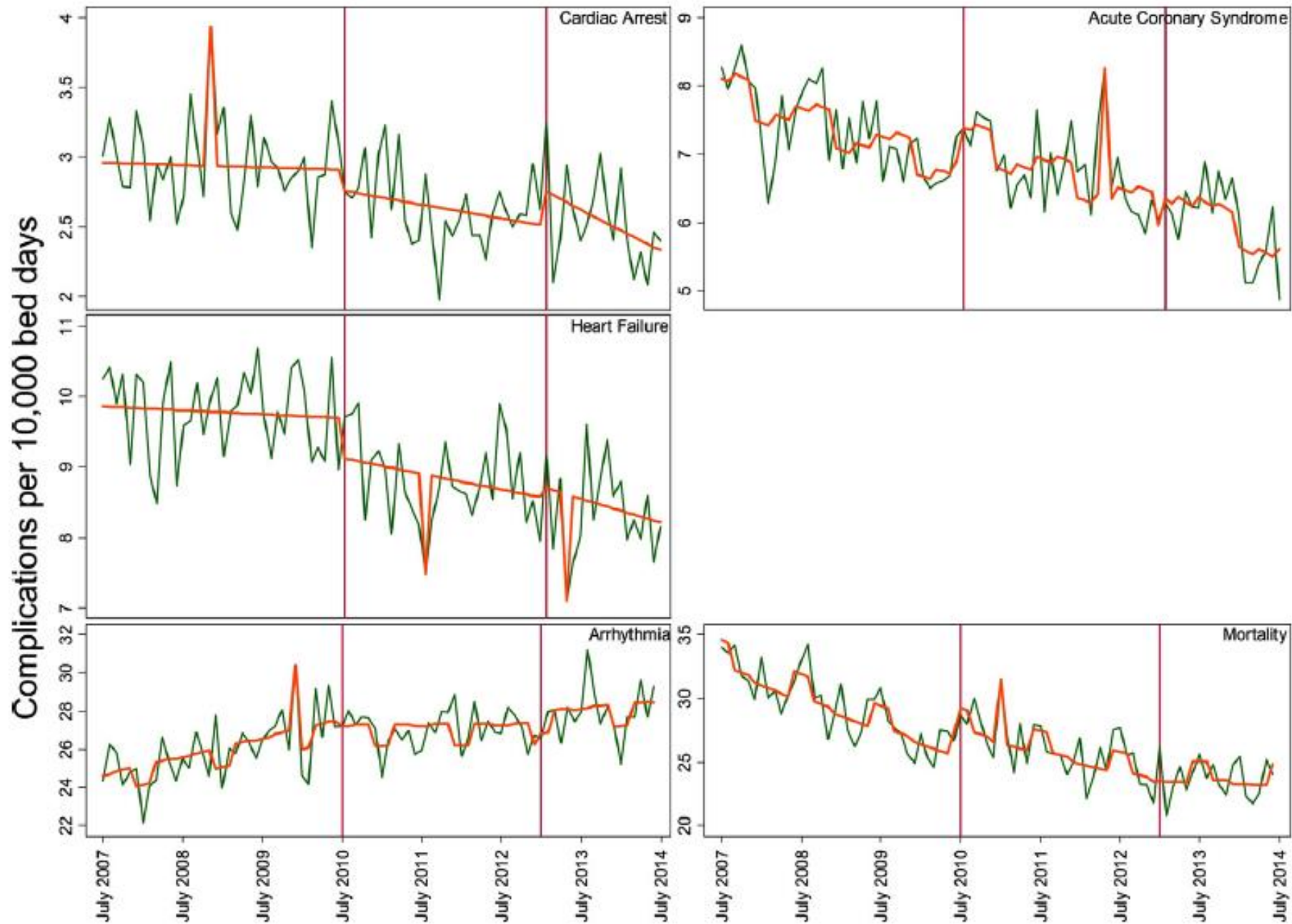
- Two separate studies
  - Different data sets
  - Different statisticians
- Interrupted time series analysis
  - Takes into account changes in time
- Three pre-defined data periods
  - Baseline : before 30/6/2010 (Consensus statement)
  - Roll-out: 1/7/2010 to 31/12/2012.
  - Intervention : after 1/1/2013 (linked to accreditation)

# Cardiac events after hospital admission

- Acute hospital admissions in Victoria
- Used VAED = min dataset (4.7 million / 218 hospitals)
- Pre-defined cardiac complications (ICD-10)
  - Cardiac arrest
  - Acute coronary syndrome
  - Cardiac failure
  - Arrhythmia
  - Death at discharge





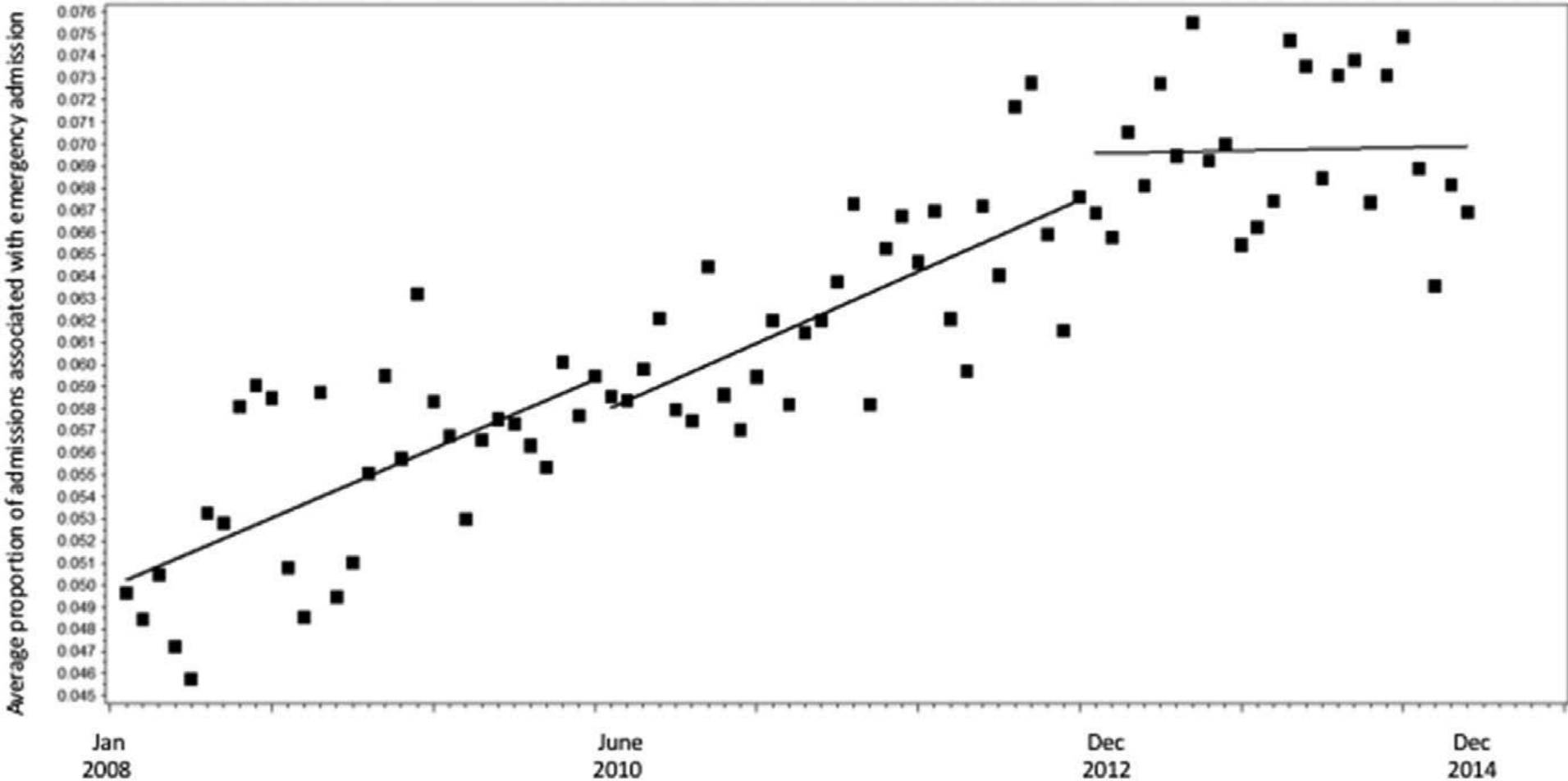


# ICU admissions from ward following IHCA's

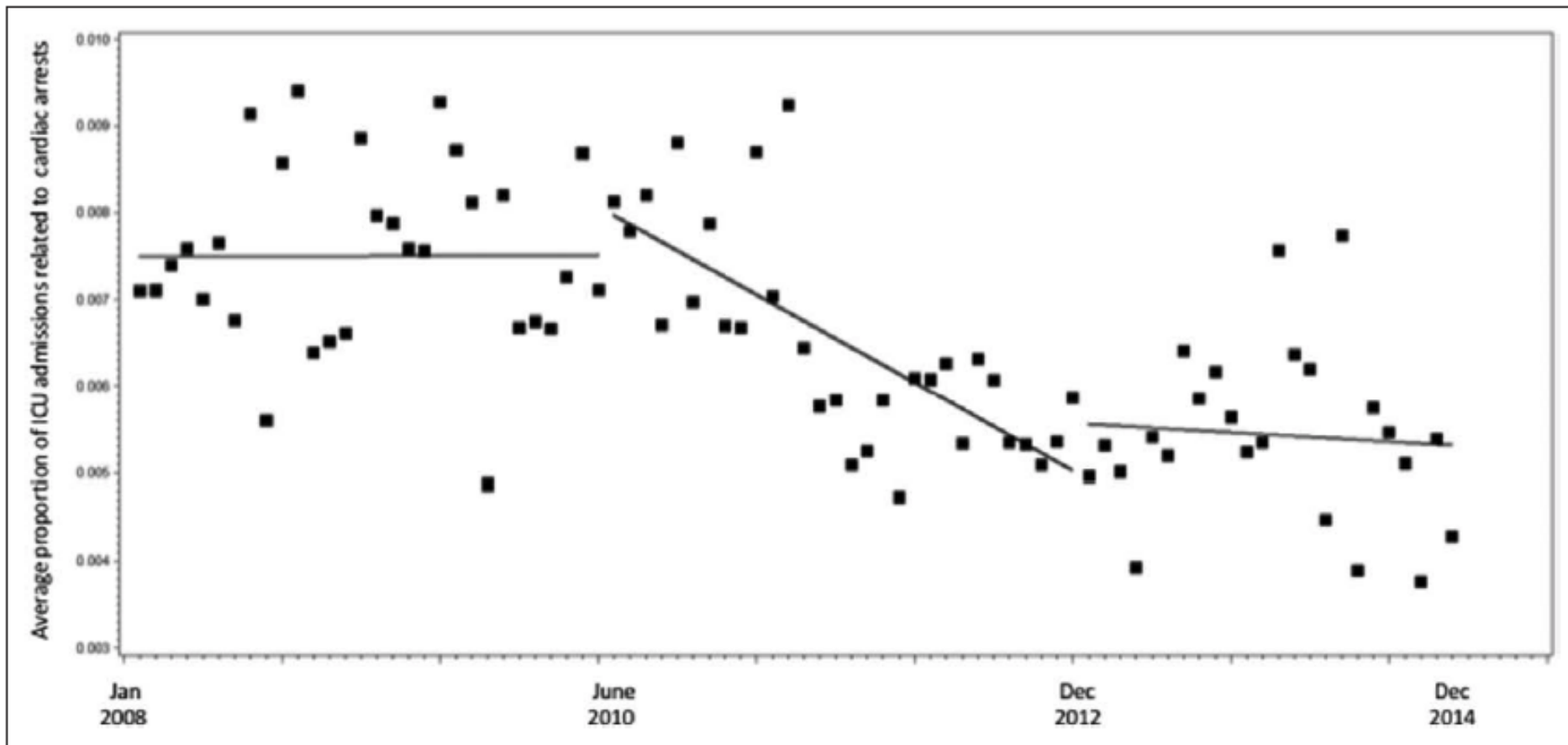
- ANZICS-APD
  - Admissions to Intensive Care unit
  - 689,986 admissions overall
  - At least 115 ICUs in each study period
- Levelling-out of admissions to ICU from ward in association with an emergency call
  - RRT; or
  - Respond Blue / code blue

## Effect of a National Standard for Deteriorating Patients on Intensive Care Admissions Due to Cardiac Arrest in Australia

Daryl Jones, BSc(Hons), MBBS, FRACP, FCICM, MD, PhD<sup>1</sup>; Alice Bhasale, BSc (Psychol), MSc (Med)<sup>2</sup>; Michael Bailey, PhD, MSc(statistics), BSc(Hons)<sup>1</sup>; David Pilcher, MBBS, MRCP(UK), FRACP, FCICM<sup>1,3,4</sup>; Matthew H. Anstey, MBBS, MPH FCICM<sup>2,5</sup>



- Decrease in admissions from ward where patient had suffered a cardiac arrest in prior 24 hours



- Amongst patients admitted with an arrest
  - Less likely to be mechanically ventilated
    - » 71.3% vs 63.4% ( $p < 0.0001$ )
  - Less likely to die in ICU
    - » 46.9% vs 42% ( $p = 0.009$ )
  - Less likely to die in hospital
    - » 57.5% vs 50.5%

# Summary

- Lessons learned from IHCA and SAEs led to the MET
- MET patients
  - are “at-risk” and
  - there are a lot more of them
- Introduction of a national standard was associated with reductions in
  - IHCA and ICU admissions due to IHCA
  - Better outcomes for ICU admissions from IHCA
  - Other cardio-vascular complications in Victoria