Medical Emergency Teams Evidence For and Against

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RRT and evidence of effect

- **Cardiac arrest teams**: enter term in PubMed + “clinical trials”: only 1 paper from Brazil (retrospective not comparing team to non-teams just looking at ACLS training as variable)
- **Trauma teams**: enter term in PubMed + “clinical trials”: nothing
- **Medical Emergency Teams**: PubMed + “clinical trials”: 4 papers

Why?

- Team are not all “the same” (like a tablet of amiodarone) – they have different people
- Teams are not “given” to patients – they are established by hospitals
- Patients cannot be ethically “randomized” to either intervention or “neglect”
- Team deal with multiple conditions not a single disease
- Randomizing hospitals is really difficult

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

16 February 2002

BMJ

Emergency hospital teams halve heart deaths

But changing culture is hard p387

Results The incidence of unexpected cardiac arrest was 3.77 per 1000 hospital admissions (73 cases) in 1996 (before intervention) and 2.05 per 1000 admissions (47 cases) in 1999 (after intervention), with mortality being 77% (56 patients) and 55% (26 patients), respectively. After adjustment for case mix the intervention was associated with a 50% reduction in the incidence of unexpected cardiac arrest (odds ratio 0.50, 95% confidence interval 0.35 to 0.73).

Conclusions In clinically unstable inpatients early intervention by a medical emergency team significantly reduces the incidence of and mortality from unexpected cardiac arrest in hospital.

Table 3 Hospital mortality, incidence of cardiac arrest, and mortality from cardiac arrest before (1996) and after (1999) implementation of medical emergency team

	Before intervention	After intervention
Hospital deaths:		
No of deaths	380	393
Rate per 1000 patients	19.67	17.20*
Cardiac arrest:		
No of cardiac arrests	73	47
Rate per 1000 patients	3.77	2.05*
No (%) of deaths	56 (76.7)	26 (55.3)*
Unplanned admissions to intensive care:		
No of admissions	45	78
Rate per 1000 patients	2.3	3.4
No (%) of deaths	15 (33.3)	23 (29.5)

*Significant difference before and after intervention, $P<0.001$.

Table 4 Independent predictors of cardiac arrest: multivariate analysis

Risk factor	Unit	Coefficient (SE)	Odds ratio (95% CI)
MET	Yes	–0.66 (0.185)	0.52 (0.36 to 0.74)
Age ⩾65 years	Yes	2.09 (0.212)	8.07 (5.32 to 12.2)
Sex	Males	0.41 (0.183)	1.51 (1.05 to 2.16)
Emergency admission	Yes	1.01 (0.259)	2.73 (1.65 to 4.54)
Same day admission	Yes	–1.02 (0.223)	0.36 (0.23 to 0.56)

MET=medical emergency team.

Weaknesses: retrospective, single centre, long period of observation with Possible confounding effects of improvements in care

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

ABSTRACT

Objective: To determine the effect on cardiac arrests and overall hospital mortality of an intensive care-based medical emergency team.

Design and setting: Prospective before-and-after trial in a tertiary referral hospital.

Patients: Consecutive patients admitted to hospital during a 4-month "before" period (May–August 1999) ($n = 21\,090$) and a 4-month intervention period (November 2000 – February 2001) ($n = 20\,921$).

Main outcome measures: Number of cardiac arrests, number of patients dying after cardiac arrest, number of postcardiac-arrest bed-days and overall number of in-hospital deaths.

Results: There were 63 cardiac arrests in the "before" period and 22 in the intervention period (relative risk reduction, RRR: 65%; $P < 0.001$). Thirty-seven deaths were attributed to cardiac arrests in the "before" period and 16 in the intervention period (RRR: 56%; $P = 0.005$). Survivors of cardiac arrest in the "before" period required 163 ICU bed-days versus 33 in the intervention period (RRR: 80%; $P < 0.001$), and 1353 hospital bed-days versus 159 in the intervention period (RRR: 88%; $P < 0.001$). There were 302 deaths in the "before" period and 222 in the intervention period (RRR: 26%; $P = 0.004$).

Conclusions: The incidence of in-hospital cardiac arrest and death following cardiac arrest, bed occupancy related to cardiac arrest, and overall in-hospital mortality decreased after introducing an intensive care-based medical emergency team.

MJA Rapid Online 18 August 2000

MOST HOSPITALS have cardiac arrest teams that respond to in-hospital cardiac arrests using modern technology and standardised protocols. However, survival to hospital discharge in patients with in-hospital cardiac arrests has remained stable at between 14.7% (United States) and 16.7% (United Kingdom) for 30 years.[1] As several studies of in-hospital cardiac arrests suggest that signs of clinical and physiological instability may precede the arrest,[2-4] introducing an intensive care-based hospital-wide preventive approach (a medical emergency team [MET]) might decrease the incidence of cardiac arrests and, consequently, hospital mortality. We tested this hypothesis by conducting a prospective trial comparing these outcome measures before and after introducing a MET.

METHODS

Hospital

Prospective controlled trial of effect of medical emergency team on postoperative morbidity and mortality rates*

Rinaldo Bellomo, MD; Donna Goldsmith, RN; Shigehiko Uchino, MD; Jonathan Buckmaster, MD; Graeme Hart, MD; Helen Opdam, MD; William Silvester, MD; Laurie Doolan, MD; Geoffrey Gutteridge, MD

Objective: To determine whether the introduction of an intensive care unit-based medical emergency team, responding to hospital-wide preset criteria of physiologic instability, would decrease the rate of predefined adverse outcomes in patients having major surgery.

Design: Prospective, controlled before-and-after trial.

Setting: University-affiliated hospital.

Patients: Consecutive patients admitted to hospital for major surgery during a 4-month control phase and during a 4-month intervention phase.

Interventions: Introduction of a hospital-wide intensive care unit-based medical emergency team to evaluate and treat inpatients deemed at risk of developing an adverse outcome by nursing, paramedical, and/or medical staff.

Measurements and Main Results: We measured incidence of serious adverse events, mortality after major surgery, and mean duration of hospital stay. There were 1,369 operations in 1,116 patients during the control period and 1,313 in 1,067 patients during the medical emergency team intervention period. In the control period, there were 336 adverse outcomes in 190 patients (301 outcomes/1,000 surgical admissions), which decreased to 136 in 105 patients (127 outcomes/1,000 surgical admissions) during the intervention period (relative risk reduction, 57.8%; $p < .0001$). These changes were due to significant decreases in the number of cases of respiratory failure (relative risk reduction, 79.1%; $p < .0001$), stroke (relative risk reduction, 78.2%; $p = .0026$), severe sepsis (relative risk reduction, 74.3%; $p = .0044$), and acute renal failure requiring renal replacement therapy (relative risk reduction, 88.5%; $p < .0001$). Emergency intensive care unit admissions were also reduced (relative risk reduction, 44.4%; $p = .001$). The introduction of the medical emergency team was also associated with a significant decrease in the number of postoperative deaths (relative risk reduction, 36.6%; $p = .0178$). Duration of hospital stay after major surgery decreased from a mean of 23.8 days to 19.8 days ($p = .0092$).

Conclusions: The introduction of an intensive care unit-based medical emergency team in a teaching hospital was associated with a reduced incidence of postoperative adverse outcomes, postoperative mortality rate, and mean duration of hospital stay.
(Crit Care Med 2004; 32:916–921)

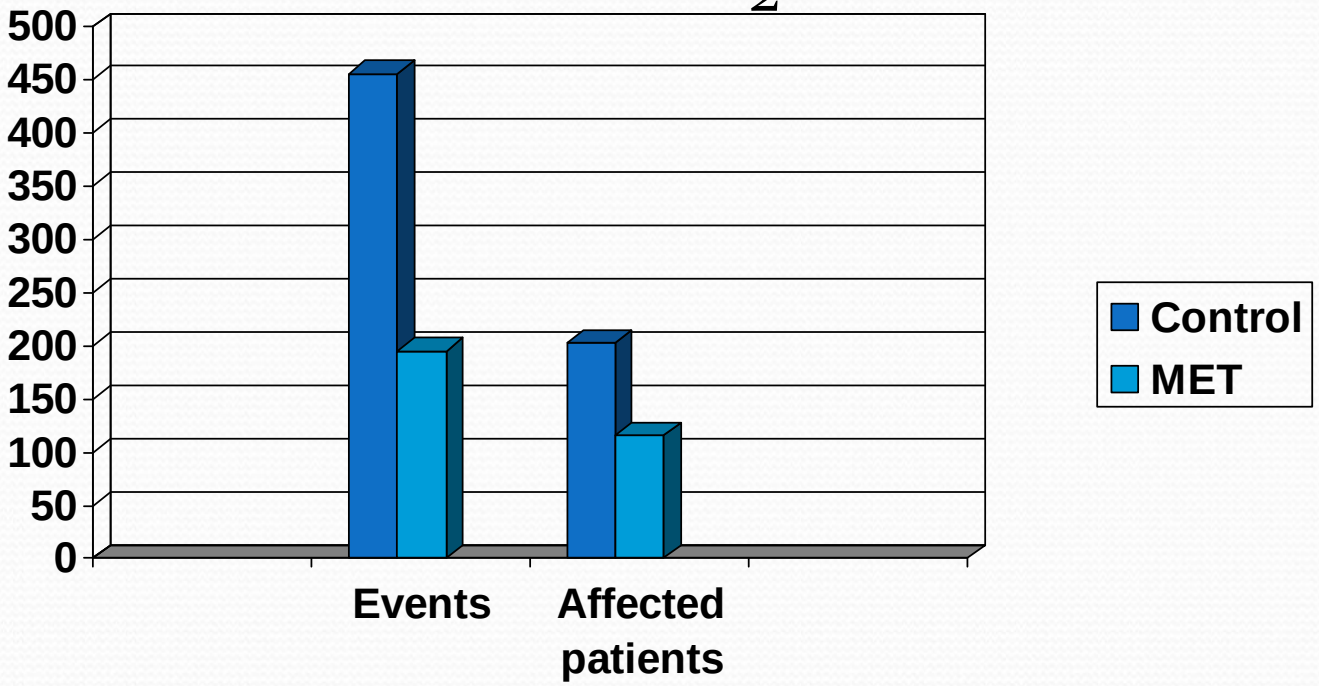
The MET period

- 1067 surgical patients in 4 months
- 99 MET calls
- 52 Surgical MET calls
- Average time to response: 4 minutes
- Average time spent per call: 19 minutes

Overall adverse events

p=0.000
2

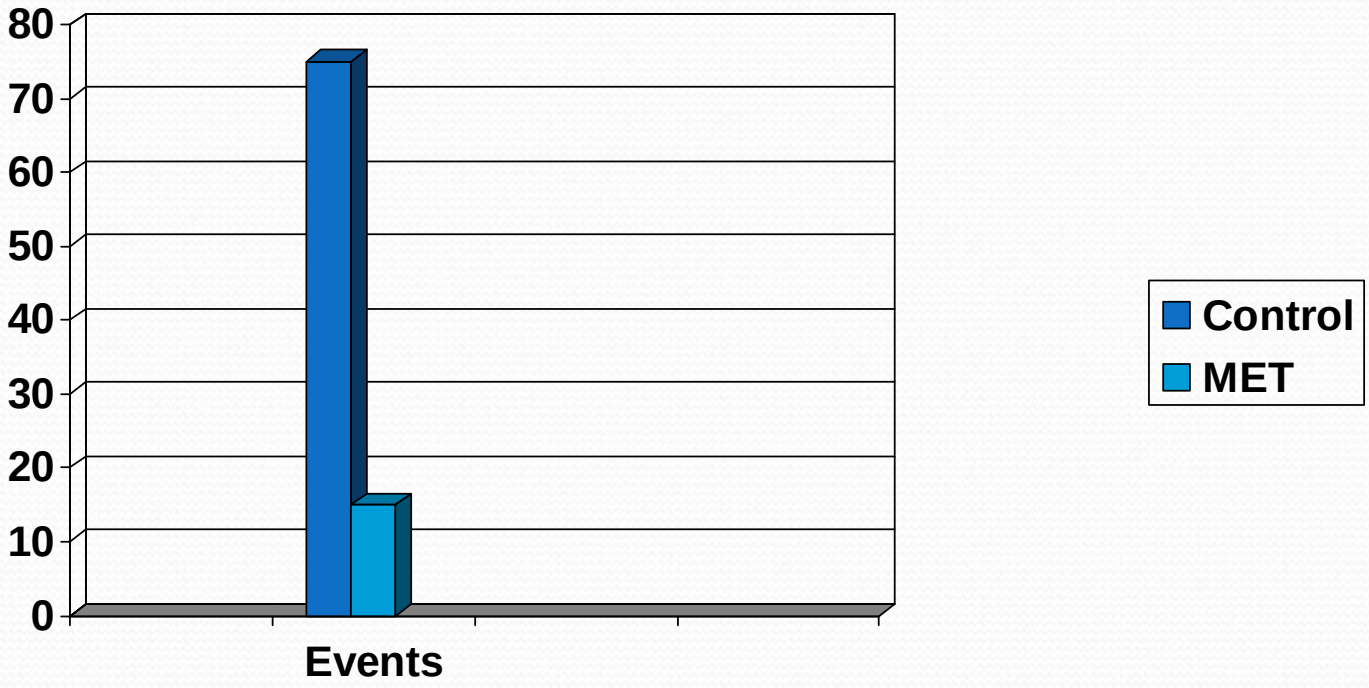
n



Respiratory failure

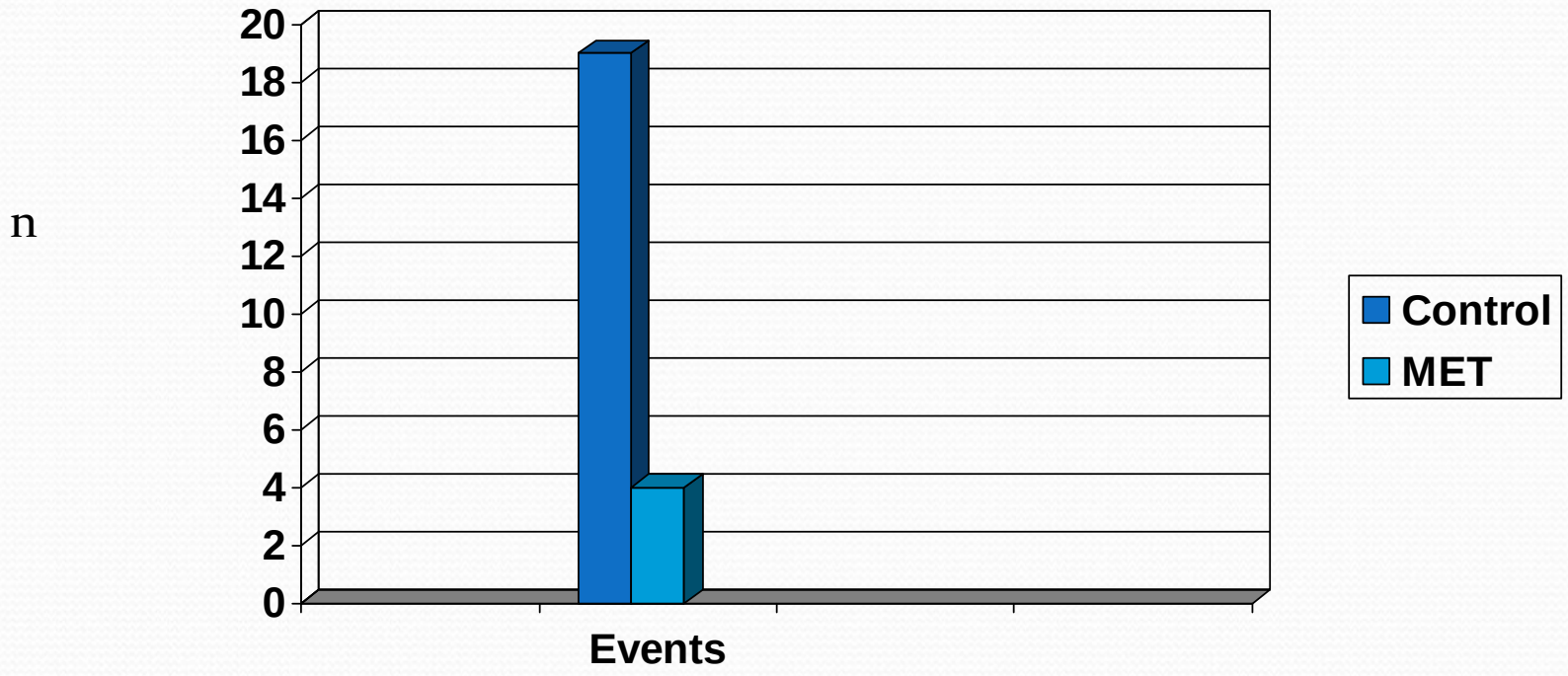
p<0.001

n



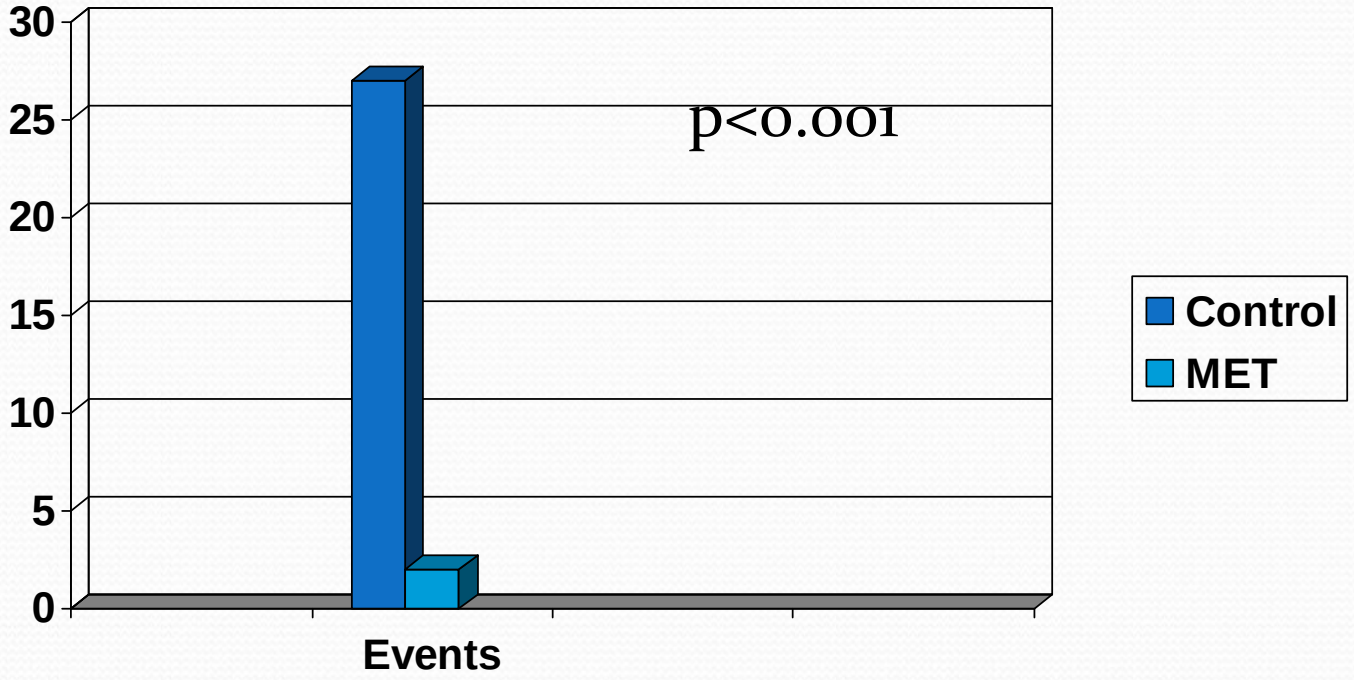
Stroke

p<0.012

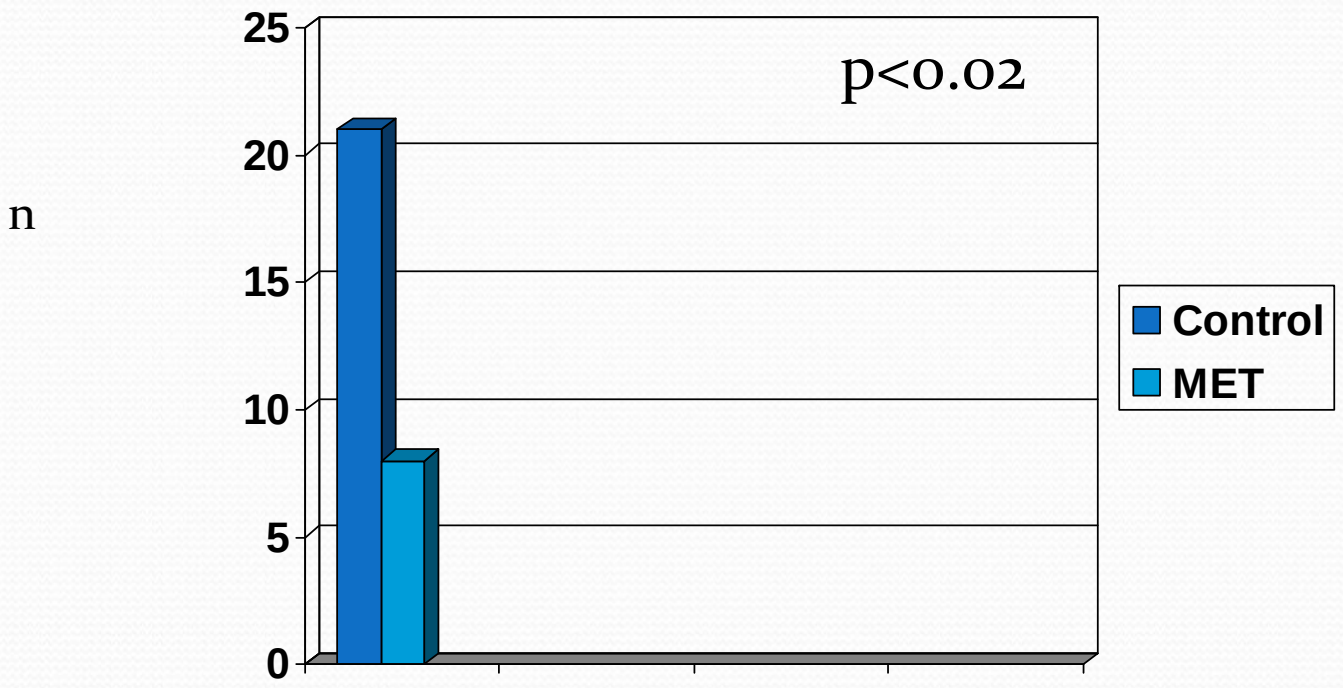


Acute renal failure

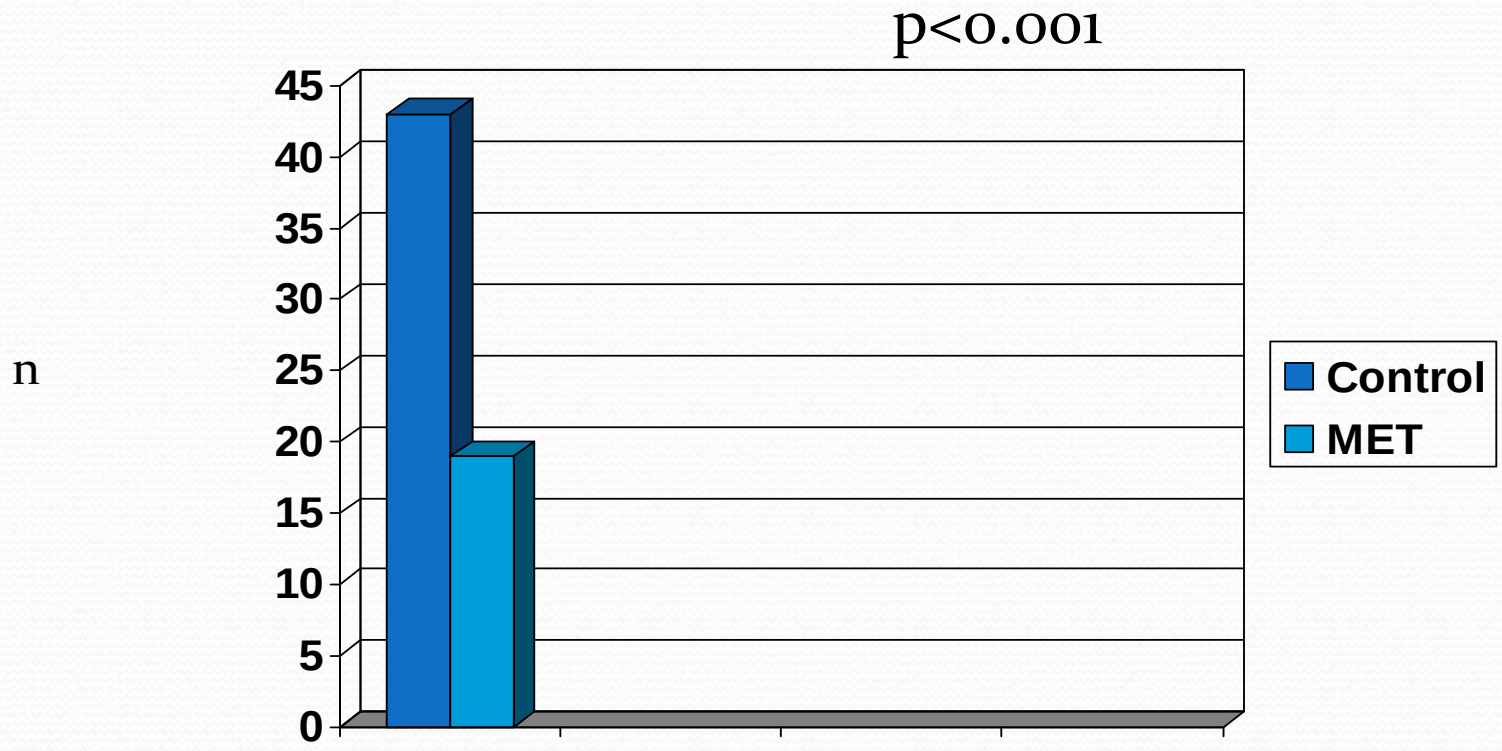
n



Unplanned Tracheostomies

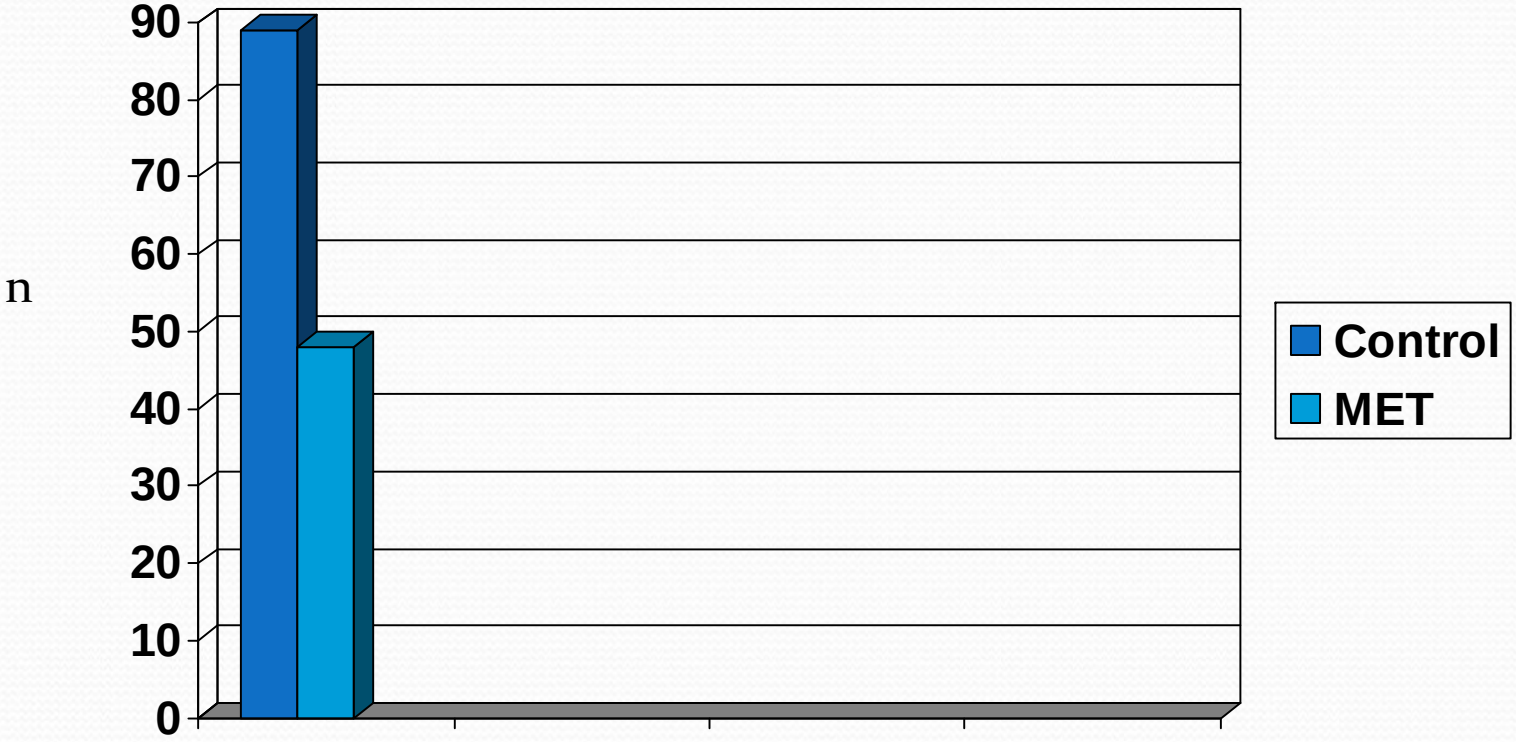


Pulmonary Edema



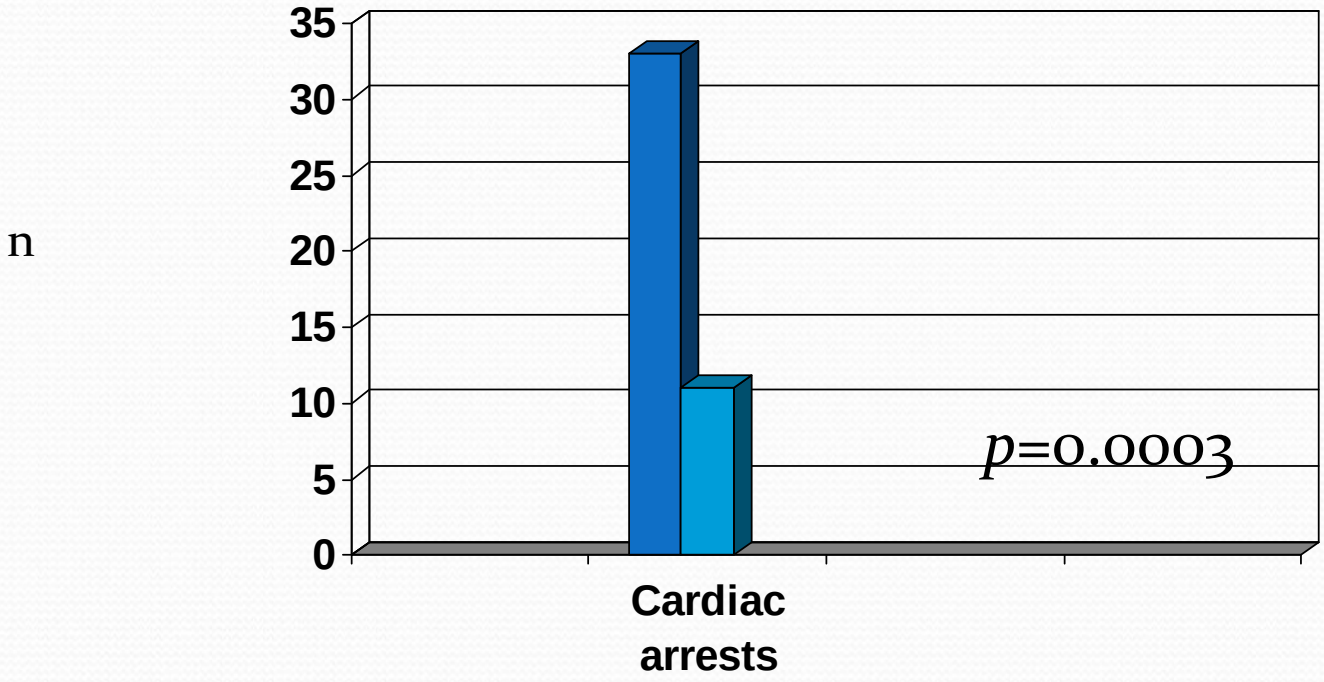
Emergency ICU admissions

p<0.002



Effect of MET on Cardiac Arrests in Surgical Patients

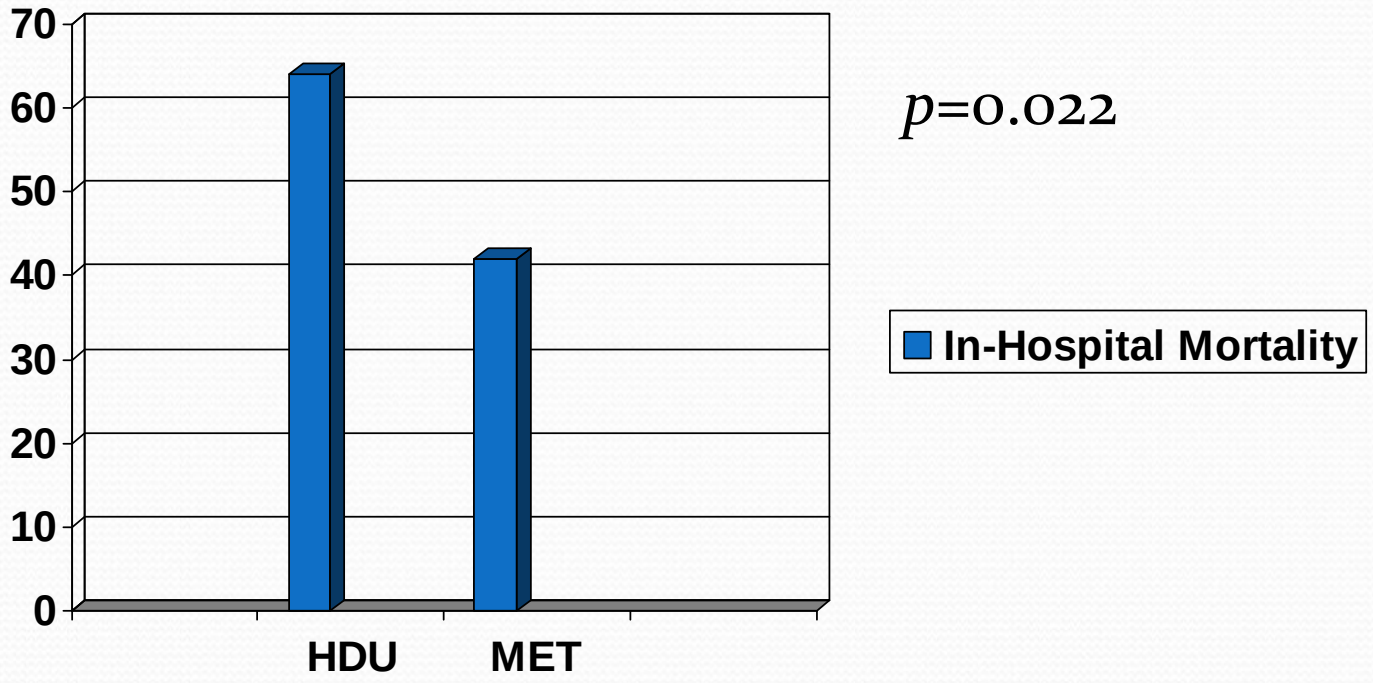
Percentage reduction: 66.6%



Effect of MET on in-hospital Surgical Mortality

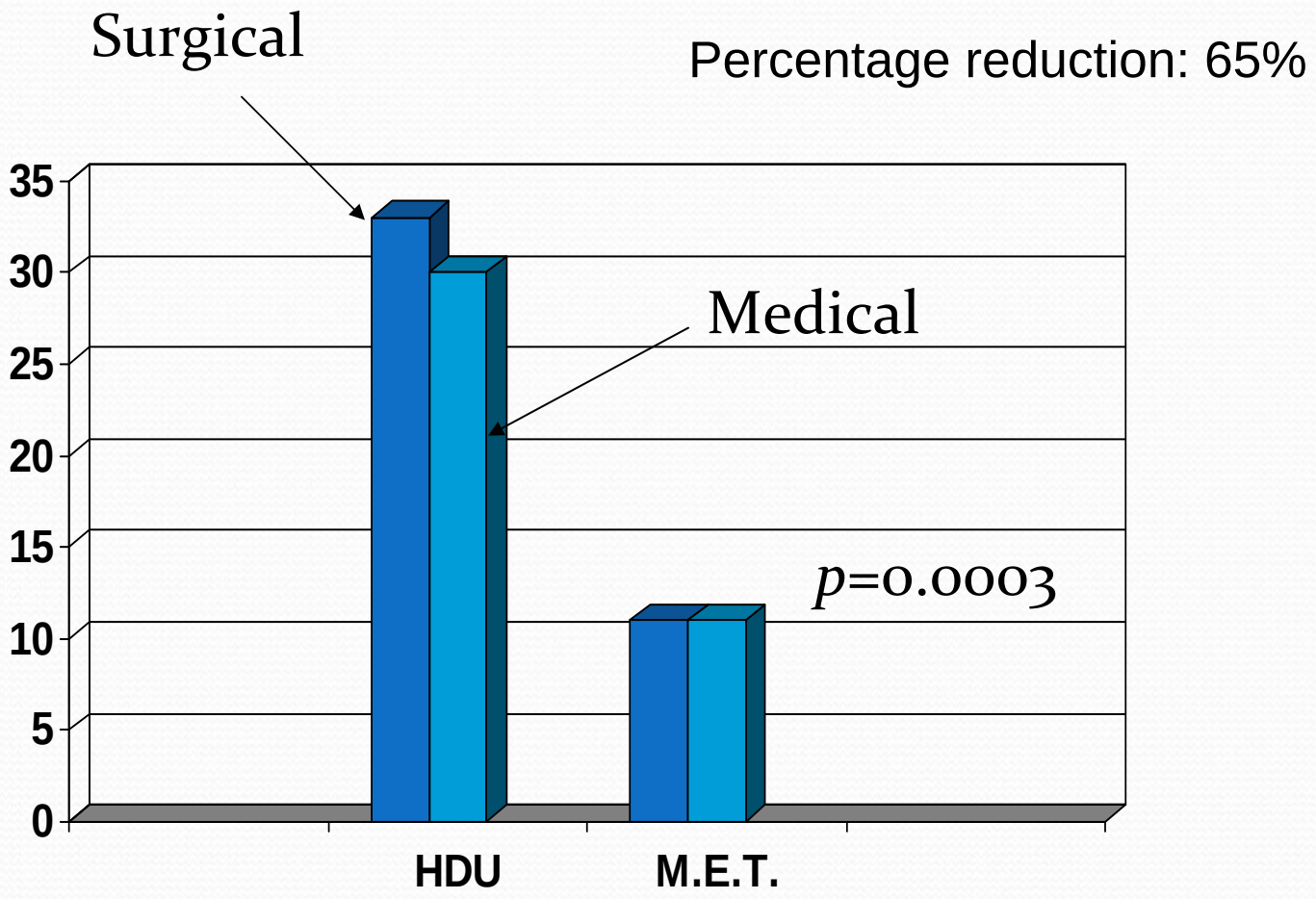
37.5% relative reduction in mortality

n



p=0.022

Effect of MET on All Cardiac Arrests



Prevents 123 arrests/year

Journal of Critical Care, Vol 18, No 2 (June), 2003: pp 87-94

Improving the Utilization of Medical Crisis Teams (Condition C) at an Urban Tertiary Care Hospital

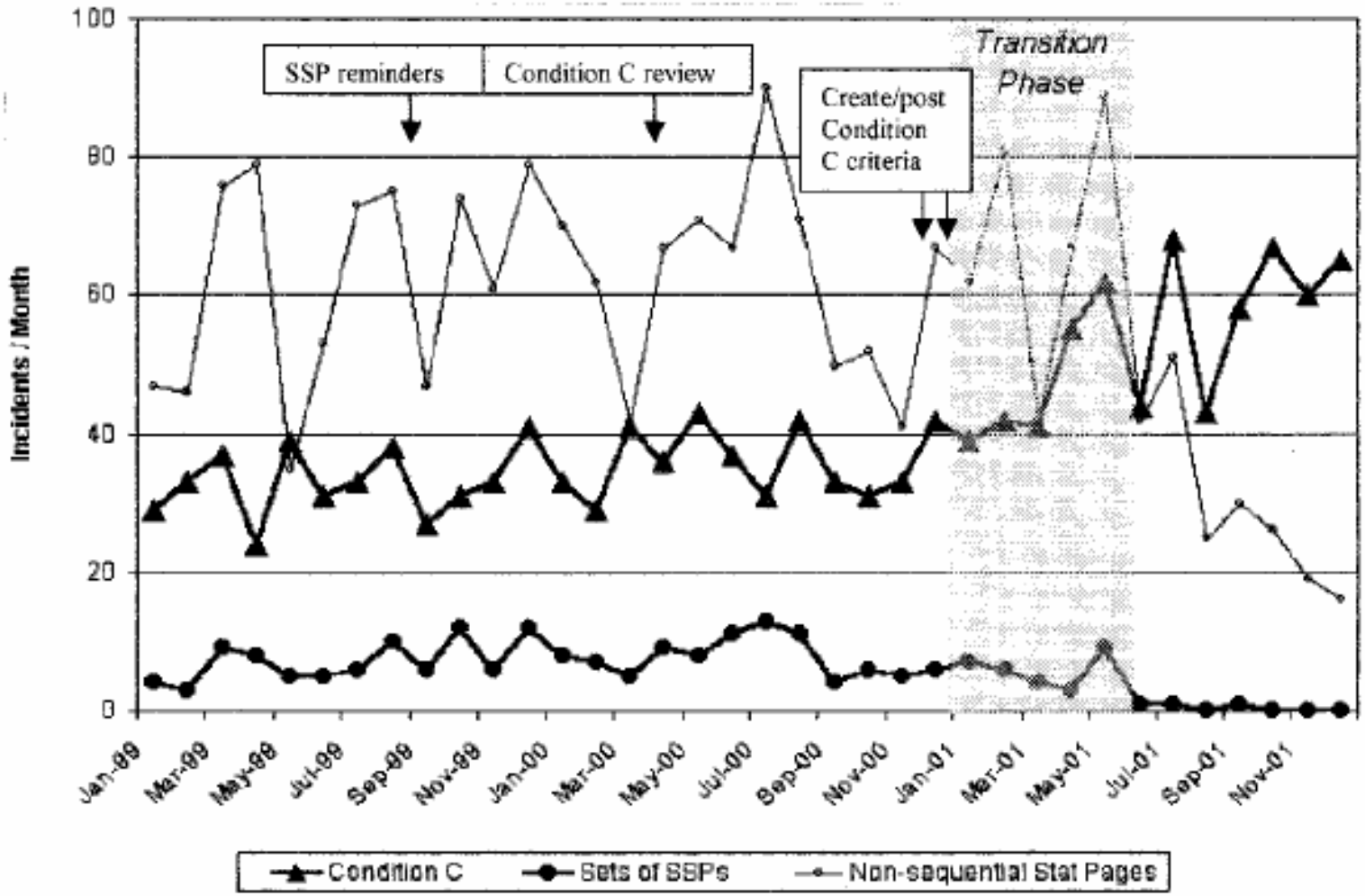
Mohamed I. Foraida, Michael A. DeVita, R. Scott Braithwaite, Susan A. Stuart, Maria Mori Brooks, and Richard L. Simmons

Purpose: Serious clinical deterioration precedes most cardiopulmonary arrests, and there is evidence that organized responses to this deterioration may prevent a substantial proportion of in-hospital deaths. We aimed to increase the utilization of our medical crisis response team (Condition C) to impact this source of mortality.

Methods: We have examined the change in numbers of Condition Cs and the main alternative response strategy (sequential stat pages) after the implementation of 4 strategies to increase Condition C utilization: (1) immediate reviews of all sequential STAT pages, (2) feedback to caregivers responsible for delays in Condition C activation, (3) creation of objective criteria for invoking a crisis response, and (4) dissemination of objective criteria through posting in units, e-mail, and in-service oral presentations.

Results: Over a 3-year period, interventions were followed by increased use of organized responses to medical crises (Condition Cs) and decreased numbers of disorganized responses (sequential STAT pages). The interventions that involved objective definition and dissemination of criteria for initiating the Condition C response were followed by 19.2 more Condition Cs monthly (95% confidence interval [CI], 12.1-26.3; $P < .0001$) and 5.7 fewer sequential STAT pages monthly (95% CI, 3.2-8.2). The interventions that involved giving feedback to medical personnel based on review of their care were not associated with changes in the measures.

Conclusion: Utilization of an important patient safety measure may be increased by focused interventions at an urban tertiary care hospital.

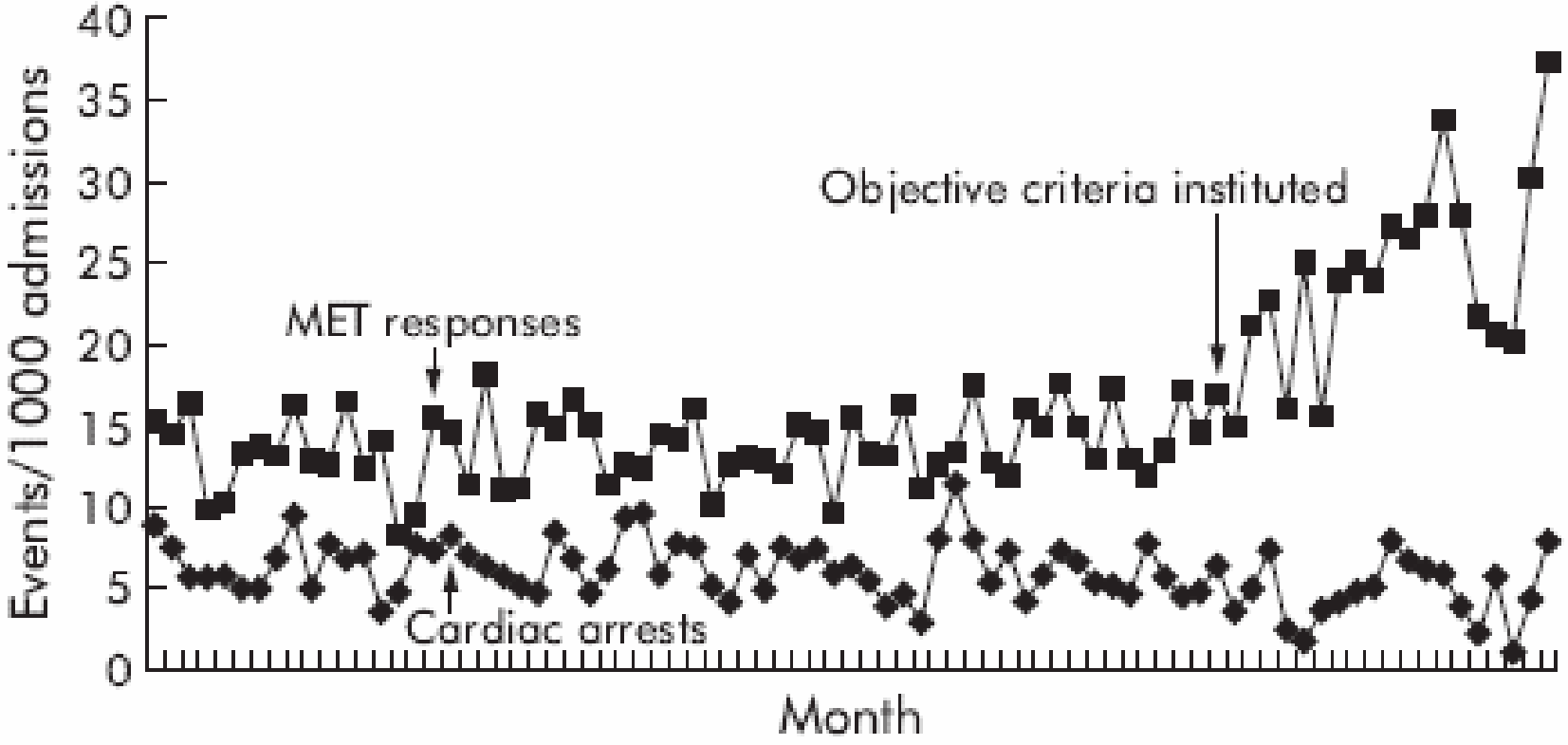

SSP reminders
Condition C review
Create/post Condition C criteria
Transition Phase
Incidents / Month
100
80
60
40
20
0
Jan-99
Mar-99
May-99
Jul-99
Sep-99
Nov-99
Jan-00
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Mar-01
May-01
Jul-01
Sep-01
Nov-01
Condition C
Sets of SSPs
Non-sequential Stat Pages

Use of medical emergency team responses to reduce hospital cardiopulmonary arrests

M A DeVita, R S Braithwaite, R Mahidhara, S Stuart, M Foraida and R L Simmons

Qual. Saf. Health Care 2004;13;251-254
doi:10.1136/qshc.2003.006585

Results: A retrospective analysis of 3269 MET responses and 1220 cardiopulmonary arrests over 6.8 years showed an increase in MET responses from 13.7 to 25.8 per 1000 admissions ($p<0.0001$) after instituting objective activation criteria. There was a coincident 17% decrease in the incidence of cardiopulmonary arrests from 6.5 to 5.4 per 1000 admissions ($p=0.016$). The proportion of fatal arrests was similar before and after the increase in use of MET.
Conclusions: Increased use of MET may be associated with fewer cardiopulmonary arrests.


Events/1000 admissions
40
35
30
25
20
15
10
5
0
MET responses
Objective criteria instituted
Cardiac arrests
Month

Research

Open Access

Long term effect of a medical emergency team on cardiac arrests in a teaching hospital

Daryl Jones[1], Rinaldo Bellomo[2], Samantha Bates[3], Stephen Warrillow[4], Donna Goldsmith[5], Graeme Hart[6], Helen Opdam[7] and Geoffrey Gutteridge[8]

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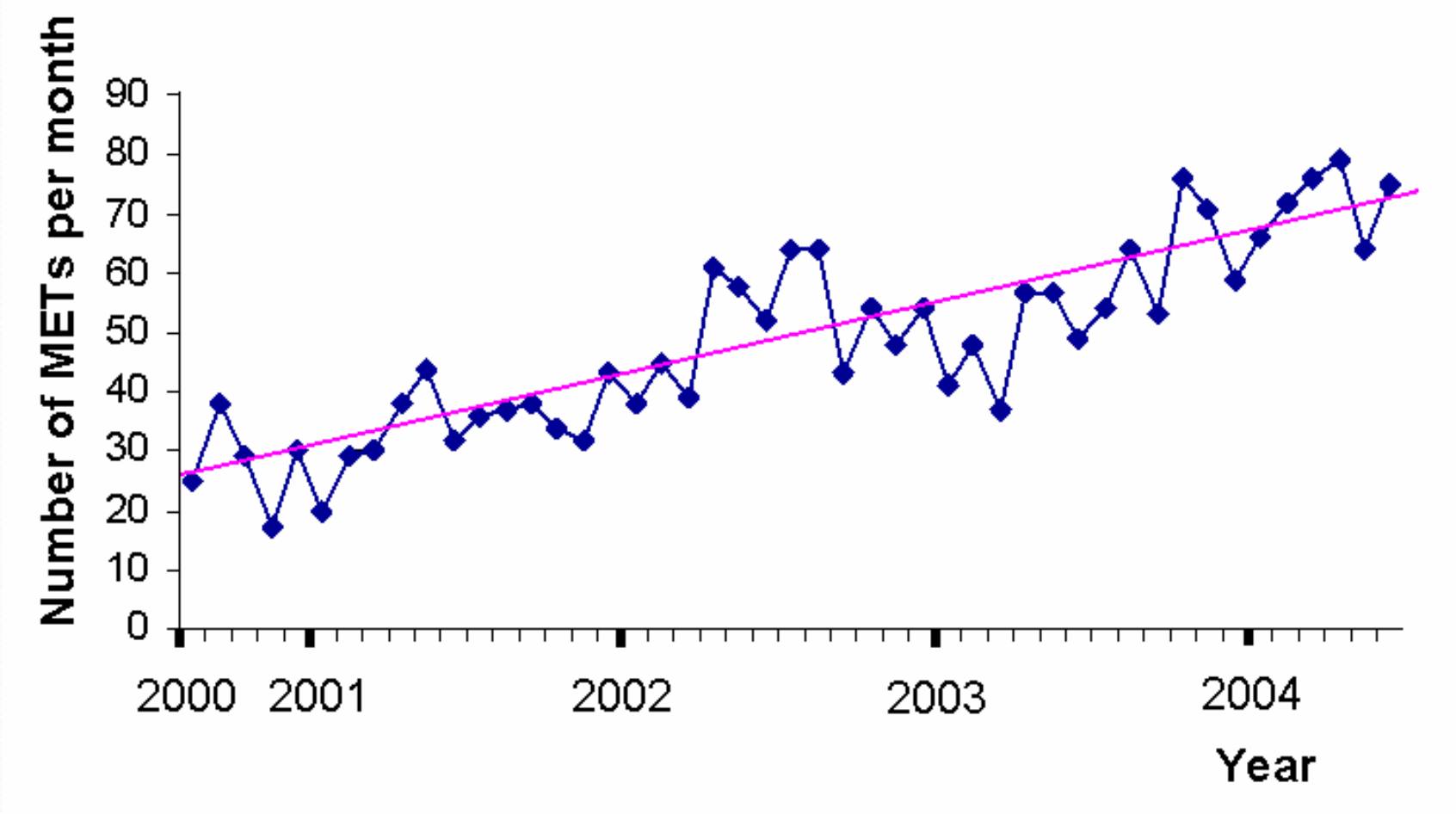
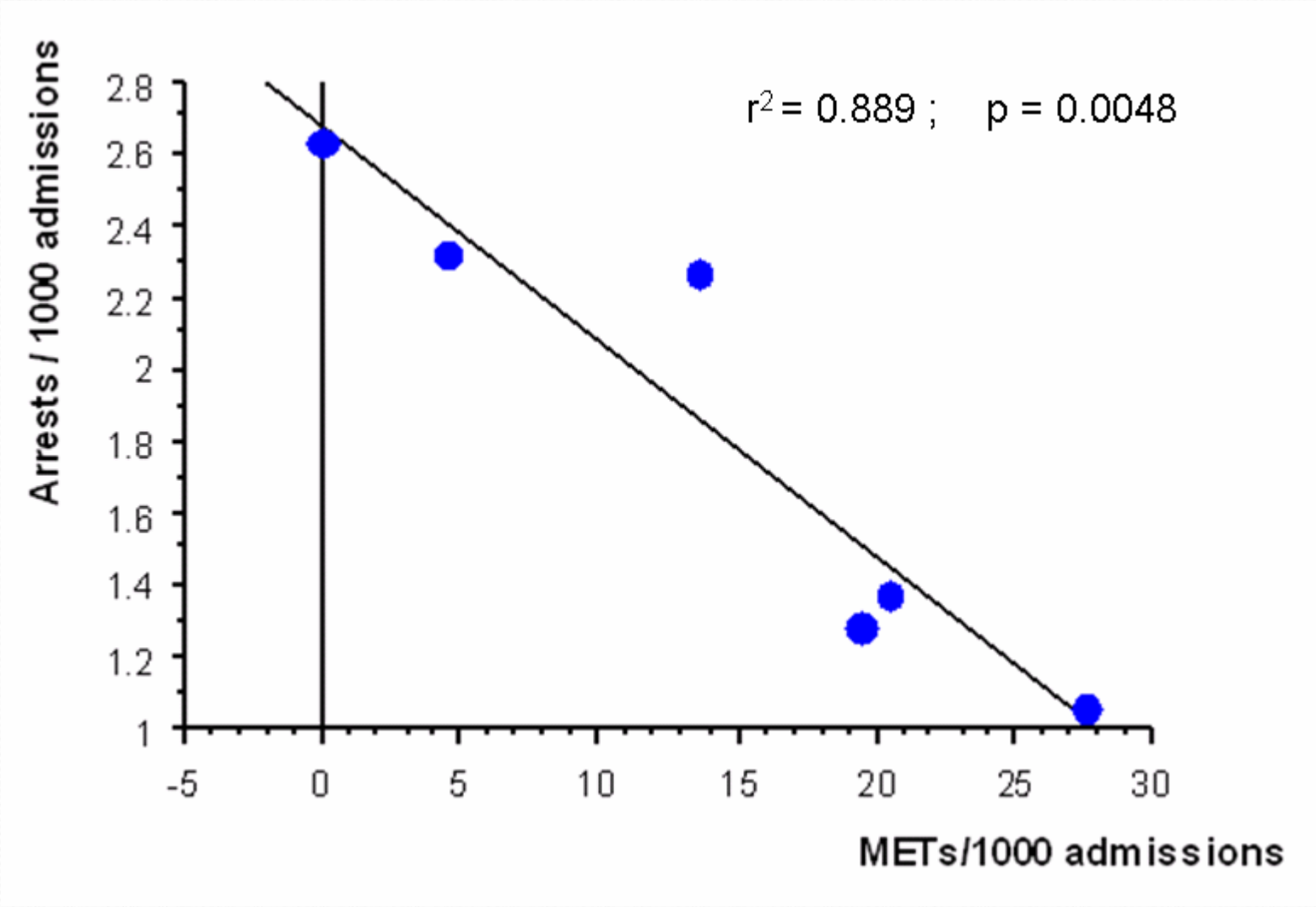
Critical Care 2005, **9**:R808-R815 (DOI 10.1186/cc3906)

Change in MET use over time at Austin



MET calls in 2007: 147/month

Correlation between MET calls and cardiac arrests



Dose and cardiac arrests at Austin

Effect of the medical emergency team on long-term mortality following major surgery

Critical Care 2007, **11**:R12 doi:10.1186/cc5673

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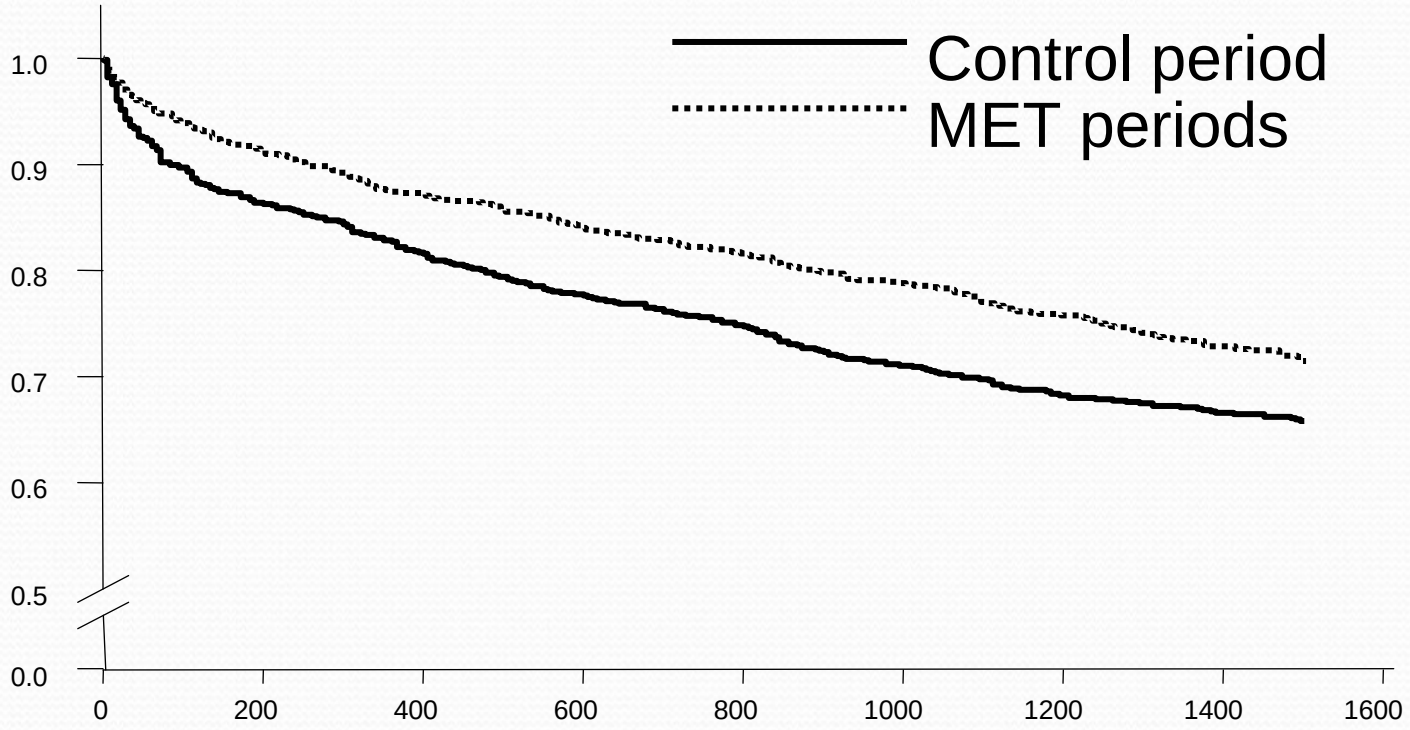
Survival

Survival Analysis



Time

The survival benefits continue for up to 5 years!

Introduction of the medical emergency team (MET) system: a cluster-randomised controlled trial

*MERIT study investigators**

Summary

Background Patients with cardiac arrests or who die in general wards have often received delayed or inadequate care. We investigated whether the medical emergency team (MET) system could reduce the incidence of cardiac arrests, unplanned admissions to intensive care units (ICU), and deaths.

Methods We randomised 23 hospitals in Australia to continue functioning as usual (n=11) or to introduce a MET system (n=12). The primary outcome was the composite of cardiac arrest, unexpected death, or unplanned ICU admission during the 6-month study period after MET activation. Analysis was by intention to treat.

Findings Introduction of the MET increased the overall calling incidence for an emergency team (3·1 *vs* 8·7 per 1000 admissions, p=0·0001). The MET was called to 30% of patients who fulfilled the calling criteria and who were subsequently admitted to the ICU. During the study, we recorded similar incidence of the composite primary outcome in the control and MET hospitals (5·86 *vs* 5·31 per 1000 admissions, p=0·640), as well as of the individual secondary outcomes (cardiac arrests, 1·64 *vs* 1·31, p=0·736; unplanned ICU admissions, 4·68 *vs* 4·19, p=0·599; and unexpected deaths, 1·18 *vs* 1·06, p=0·752). A reduction in the rate of cardiac arrests (p=0·003) and unexpected deaths (p=0·01) was seen from baseline to the study period for both groups combined.

Interpretation The MET system greatly increases emergency team calling, but does not substantially affect the incidence of cardiac arrest, unplanned ICU admissions, or unexpected death.

Lancet 2005; 365: 2091–97

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*Investigators listed at end of report

MERIT had only a 25% power to detect a 30% difference in primary outcome and > 100 hospitals would have been needed to give it sufficient power.

The relationship between early emergency team calls and serious adverse events*

Jack Chen, MBBS, PhD, MBA (Exec); Rinaldo Bellomo, FRACP, FJFICM, MD;
Arthas Flabouris, MBBS, FJFICM, FANZCA, PostGrad Dip Aviation Med;
Ken Hillman, MBBS, FRCA, FACA, FJFICM, MD; Simon Finfer, MBBS, FRCA, FRCP, FJFICM;
the MERIT Study Investigators for the Simpson Centre and the ANZICS Clinical Trials Group

Objective: To examine the relationship between early emergency team calls and the incidence of serious adverse events—cardiac arrests, deaths, and unplanned admissions to an intensive care unit—in a cluster randomized controlled trial of medical emergency team implementation (the MERIT study).

Design: Post hoc analysis of data from cluster randomized controlled trial.

Setting and Participants: Twenty-three public hospitals in Australia and 741,744 patients admitted during the conduct of the study.

Interventions: Attendance by a rapid response system team or cardiac arrest team.

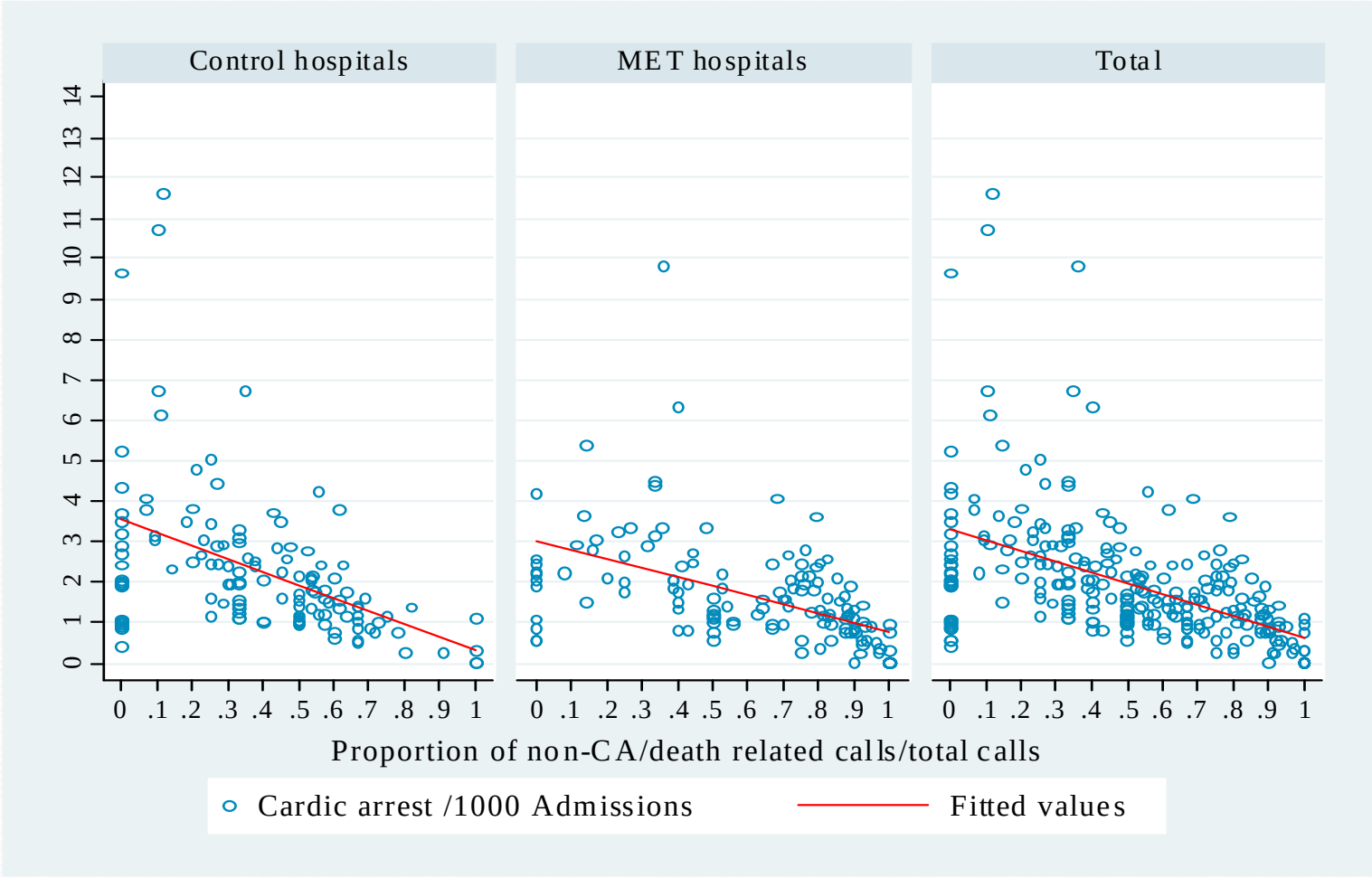
Main Outcome Measures: The relationship between the proportion of rapid response system team calls that were early emergency team calls (defined as calls not associated with cardiac arrest or death) and the rate (events/1000 admissions) of the adverse events.

Results: We analyzed 11,242 serious adverse events and 3700 emergency team calls. For every 10% of increase in the proportion of early emergency team calls there was a 2.0 reduction per 10,000 admissions in unexpected cardiac arrests (95% confidence interval [CI] −2.6 to −1.4), a 2.2 reduction in overall cardiac arrests (95% CI −2.9 to −1.6), and a 0.94 reduction in unexpected deaths (95% CI −1.4 to −0.5). We found no such relationship for unplanned intensive care unit admissions or for the aggregate of unexpected cardiac arrests, unplanned intensive care unit admissions, and unexpected deaths.

Conclusions: As the proportion of early emergency team calls increases, the rate of cardiac arrests and unexpected deaths decreases. This inverse relationship provides support for the notion that early review of acutely ill ward patients by an emergency team is desirable. (Crit Care Med 2009; 37:148–153)

KEY WORDS: medical emergency team; rapid response team; health services research; cluster randomized controlled trial; dose–response

Dose of MET-like activity in cardiac arrests in MERIT



QUALITY IMPROVEMENT REPORT

Six year audit of cardiac arrests and medical emergency team calls in an Australian outer metropolitan teaching hospital

Michael Buist, Julia Harrison, Ellie Abaloz, Susan Van Dyke

EDITORIAL by Rowan and Harrison

Intensive Care Unit, Dandenong Hospital, PO Box 478, Dandenong, VIC 3175, Australia

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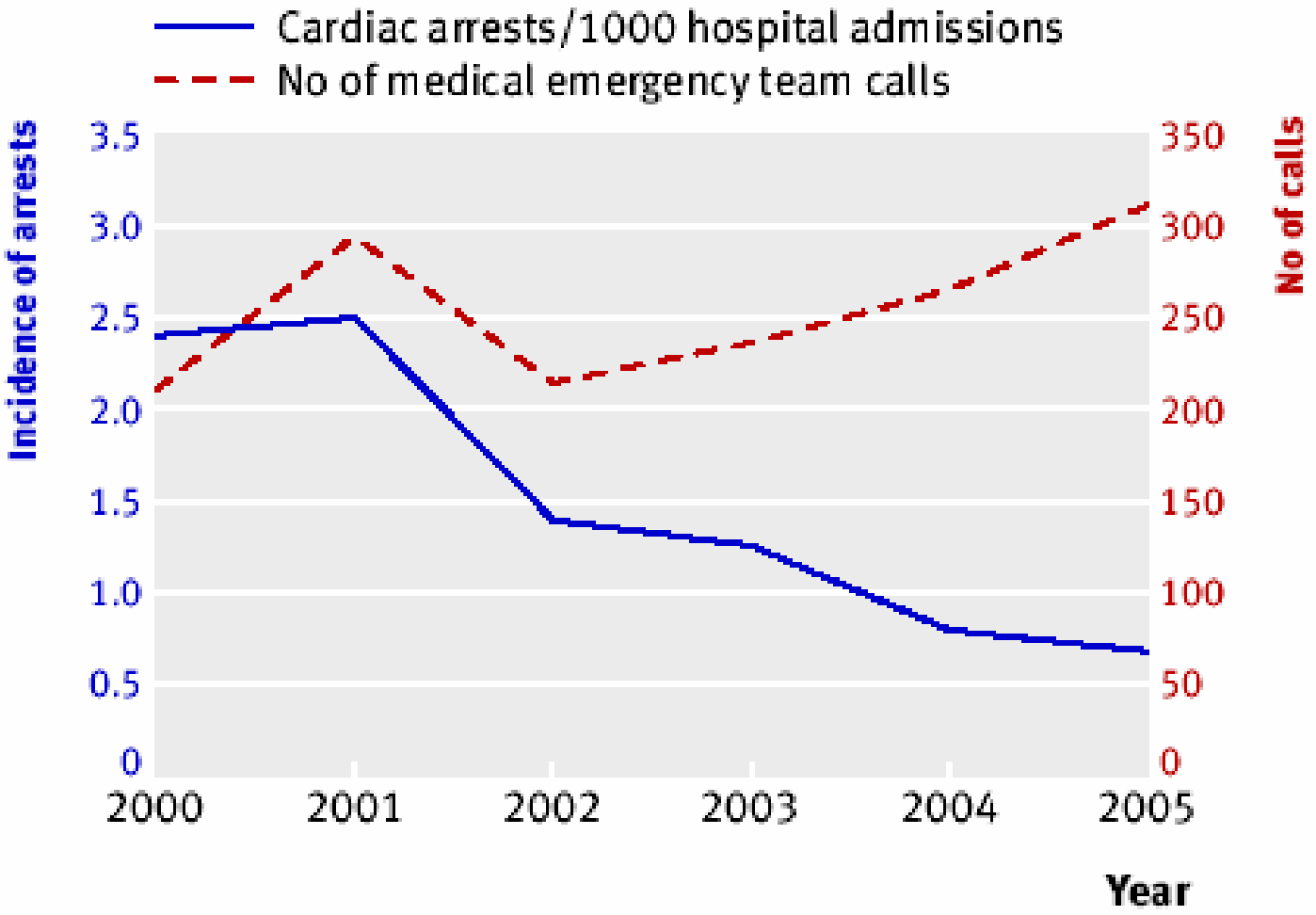
BMJ 2007;335:1210-2
doi:10.1136/bmj.39385.534236.47

Problem

In our hospital, the occurrence of cardiac arrest often indicates delayed or suboptimal clinical management of the patient.[1] The outcome from in-hospital cardiac arrest is universally poor.[2-6] Our hospital implemented a medical emergency team in 1996, and within three years the incidence of cardiac arrests dropped by 50%.[7] Three other studies have since reported similar findings,[8-10] but they have been criticised because they used a historical control, before-after conference on medical emergency teams found that hospitals should implement such systems.[14]

Inspections of data from the MERIT study and single centre studies using historical controls[7-10] show that in a large number of instances where the composite outcome occurred, although the patient had had the criteria for calling the medical emergency team, the staff had not called the team. Thus, the MERIT study could not measure the effectiveness of the medical emergency team because the randomised intervention



Incidence of medical emergency team and cardiac arrest calls, 2000-5

Reduction of paediatric in-patient cardiac arrest and death with a medical emergency team: preliminary results

J Tibballs, S Kinney, T Duke, E Oakley, M Hennessy

Arch Dis Child 2005;**90**:1148–1152. doi: 10.1136/adc.2004.069401

See end of article for authors' affiliations

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Accepted 23 March 2005

Aims: To determine the impact of a paediatric medical emergency team (MET) on cardiac arrest, mortality, and unplanned admission to intensive care in a paediatric tertiary care hospital.

Methods: Comparison of the retrospective incidence of cardiac arrest and death during 41 months before introduction of a MET service with the prospective incidence of these events during 12 months after its introduction. Comparison of transgression of MET call criteria in patients who arrested and died before and after introduction of MET.

Results: Cardiac arrest decreased from 20 among 104 780 admissions (0.19/1000) to 4 among 35 892 admissions (0.11/1000) (risk ratio 1.71, 95% CI 0.59 to 5.01), while death decreased from 13 (0.12/1000) to 2 (0.06/1000) during these periods (risk ratio 2.22, 95% CI 0.50 to 9.87). Unplanned admissions to intensive care increased from 20 (SD 6) to 24 (SD 9) per month. The incidence of transgression of MET call criteria in patients who arrested decreased from 17 to 0 (risk difference 0.16/1000, 95% CI 0.09 to 0.24), and in those who died, decreased from 12 to 0 (risk difference 0.11/1000, 95% CI 0.05 to 0.18) after introduction of MET.

Conclusions: Introduction of a medical emergency team service was coincident with a reduction of cardiac arrest and mortality and a slight increase in admissions to intensive care.

Effect of a Rapid Response Team on Hospital-wide Mortality and Code Rates Outside the ICU in a Children's Hospital

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Context Introduction of a rapid response team (RRT) has been shown to decrease mortality and cardiopulmonary arrests outside of the intensive care unit (ICU) in adult inpatients. No published studies to date show significant reductions in mortality or cardiopulmonary arrests in pediatric inpatients.

Objective To determine the effect on hospital-wide mortality rates and code rates outside of the ICU setting after RRT implementation at an academic children's hospital.

Design, Setting, and Participants A cohort study design with historical controls at a 264-bed, free-standing, quaternary care academic children's hospital. Pediatric inpatients who spent at least 1 day on a medical or surgical ward between January 1, 2001, and March 31, 2007, were included. A total of 22 037 patient admissions and 102 537 patient-days were evaluated preintervention (before September 1, 2005), and 7257 patient admissions and 34 420 patient-days were evaluated postintervention (on or after September 1, 2005).

IN THE REPORT *TO ERR IS HUMAN*,[1] the Institute of Medicine concluded that between 44 000 and 98 000 deaths per year occur in

Intervention The RRT included a pediatric ICU–trained fellow or attending physician, ICU nurse, ICU respiratory therapist, and nursing supervisor. This team was activated using standard criteria and was available at all times to assess, treat, and triage decompensating pediatric inpatients.

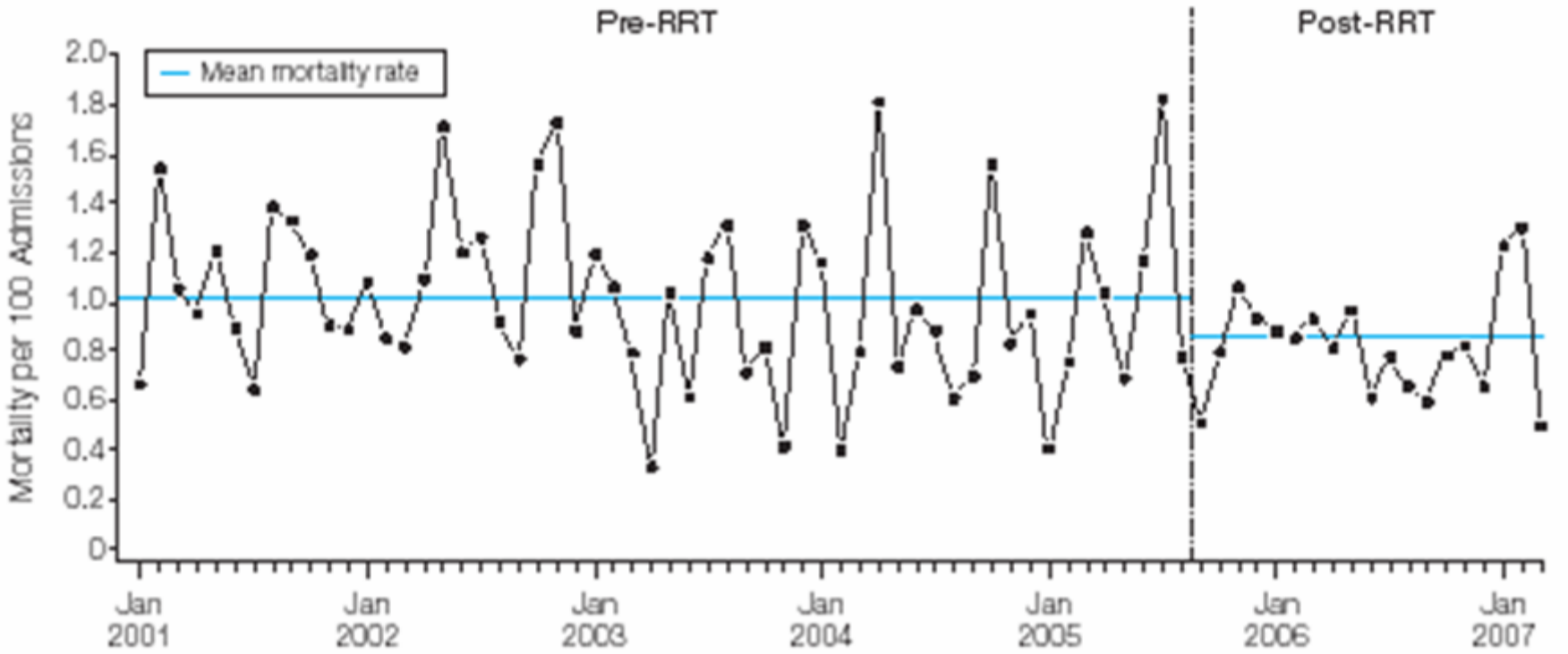
Main Outcome Measures Hospital-wide mortality rates and code (respiratory and cardiopulmonary arrests) rates outside of the ICU setting. All outcomes were adjusted for case mix index values.

Results After RRT implementation, the mean monthly mortality rate decreased by 18% (1.01 to 0.83 deaths per 100 discharges; 95% confidence interval [CI], 5%-30%; $P=.007$), the mean monthly code rate per 1000 admissions decreased by 71.7% (2.45 to 0.69 codes per 1000 admissions), and the mean monthly code rate per 1000 patient-days decreased by 71.2% (0.52 to 0.15 codes per 1000 patient-days). The estimated code rate per 1000 admissions for the postintervention group was 0.29 times that for the preintervention group (95% likelihood ratio CI, 0.10-0.65; $P=.008$), and the estimated code rate per 1000 patient-days for the postintervention group was 0.28 times that for the preintervention group (95% likelihood ratio CI, 0.10-0.64; $P=.007$).

Conclusion Implementation of an RRT was associated with a statistically significant reduction in hospital-wide mortality rate and code rate outside of the pediatric ICU setting.

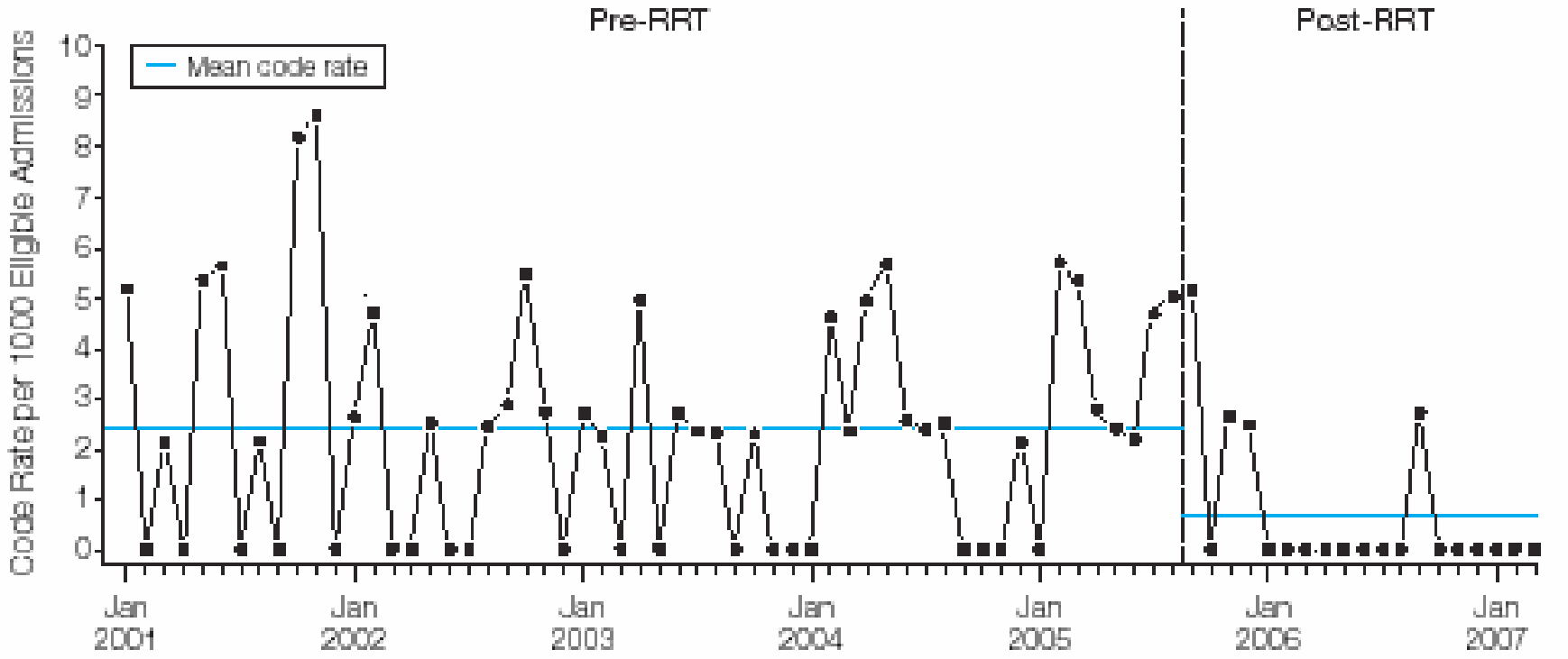
JAMA. 2007;298(19):2267-2274 www.jama.com

Figure 1. Hospital-wide Mortality Rates per 100 Admissions by Month, Excluding Obstetrical Population



RRT indicates rapid response team. The pre-RRT period is between January 1, 2001, and August 30, 2005, and the post-RRT period is between September 1, 2005, and March 31, 2007.

Figure 2. Code Rates (Respiratory and Cardiopulmonary Arrests) Outside the Intensive Care Unit Setting per 1000 Eligible Patient Admissions by Month



RRT indicates rapid response team. The pre-RRT period is between January 1, 2001, and August 30, 2005, and the post-RRT period is between September 1, 2005, and March 31, 2007.

Hospital-wide Code Rates and Mortality Before and After Implementation of a Rapid Response Team

Paul S. Chan; Adnan Khalid; Lance S. Longmore; et al.

JAMA. 2008;300(21):2506-2513 (doi:10.1001/jama.2008.715)

Figure 1. Hospital-Wide Code Rates per 1000 Eligible Adult Patient Admissions by Month

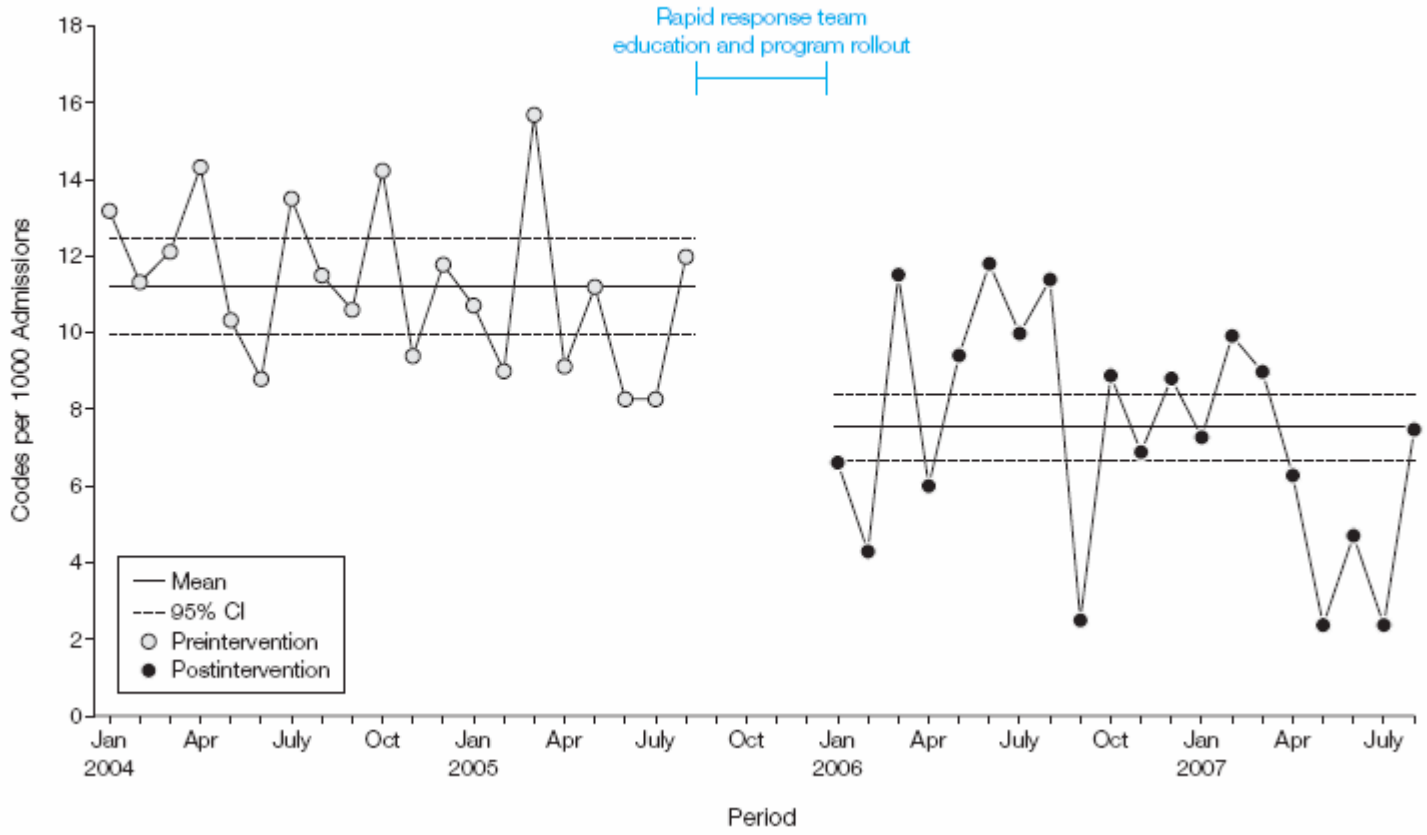


Table 4. Model Estimates of the Association Between Rapid Response Team Intervention and Hospital-Wide Code Rates and Mortality

Outcome	Estimate (SE)	Adjusted OR (95% CI)[a]	*P* Value
Hospital-wide codes per 1000 admissions	–0.27 (0.14)	0.76 (0.57-1.01)	.06
Hospital-wide codes per 1000 admissions by arrest type			
Ventricular fibrillation or pulseless ventricular fibrillation	–0.27 (0.28)	0.77 (0.43-1.36)	.36
Asystole or pulseless electrical activity	–0.19 (0.28)	0.82 (0.58-1.18)	.28
Respiratory	–0.70 (0.40)	0.50 (0.22-1.12)	.09
Hospital-wide codes per 1000 admissions by bed type			
Intensive care unit	–0.05 (0.20)	0.95 (0.64-1.43)	.81
Non–intensive care unit	–0.52 (0.20)	0.59 (0.40-0.89)	.01
Mortality rate per 100 admissions	–0.05 (0.08)	0.95 (0.81-1.11)	.52

Abbreviations: CI, confidence interval; OR, odds ratio.
[a]Adjusted for demographics, case-mix index, and preintervention trends.

Summary of 11 comparisons

- Ward cardiac arrests: decreased in 7 studies, no change in 3, no data in one, increased in none
- ICU admissions: decreased in 2, same in 4, not reported in 5, increased in none
- Hospital mortality: decreased in 4, same in 6, not reported in one, increased in none
- Essentially all positive studies have a doctor in the team
- NB: 1. >90% of hospital deaths in MERIT were NFR; 95% at Austin; 2. Much less data on cardiac arrest teams; 3. No published studies outside ANZ, USA, UK

The data against

- None
- All “negative” studies are all spectacularly underpowered.
- No evidence of harm

Conclusions

- The evidence for RRT comes for adult and pediatric studies..but..no studies are DB MC RCT because they are impossible
- The evidence comes only from 3 countries (we need studies from continental Europe/Canada/Asia)
- The evidence that cardiac arrests decrease is strong
- The evidence for other effects (mortality or ICU admission is less strong – no surprise as most people die with NFR orders and ICU admission can be a good thing)

Conclusions

- The evidence for RRTs will never be “conclusive”
- It is better than for any other team-based interventions
- It is better than the evidence that intensivists are useful
- What the studies show is what “can” happen not what “will” happen
- If there is no institutional commitment RRTs fail
- **In the end you have to make a judgment**