MET - RRT

BERÉNYI TAMÁS DR.

MSOTKE X. KONGRESSZUSA – BUDAPEST, 2011. NOVEMBER 5.

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

The NEW ENGLAND JOURNAL of MEDICINE

N Engl J Med 2011;365:139-46.

REVIEW ARTICLE

CURRENT CONCEPTS

Rapid-Response Teams

Daryl A. Jones, M.D., M.B., B.S., Michael A. DeVita, M.D., and Rinaldo Bellomo, M.D., M.B., B.S.

Table 1. Comparison between a Traditional Code Team and a Rapid-Response Team.*

Feature	Traditional Code Team	Rapid-Response Team
Typical criteria for calling the team	No recordable pulse, no recordable blood pressure, absence of respiratory effort, unresponsive	Low blood pressure, rapid heart rate, respiratory distress, altered consciousness
Typical conditions that the team assesses and treats	Cardiac arrest, respiratory arrest, airway obstruction	Sepsis, pulmonary edema, arrhythmias, respiratory failure
Typical team composition	Anesthesia fellow, ICU fellow, internal-medicine house staff, ICU nurse	ICU fellow, ICU nurse, respiratory therapist, internal-medicine house staff
Typical call rate (no./1000 admissions)	0.5–5	20–40
Typical in-hospital mortality (%)	70–90	0–20

* ICU denotes intensive care unit.

Anesthesiology 2011; 115:421–31

A Review of Current and Emerging Approaches to Address Failure-to-Rescue

Andreas H. Taenzer, M.D., M.S.,* Joshua B. Pyke, B.E.,† Susan P. McGrath, Ph.D.‡

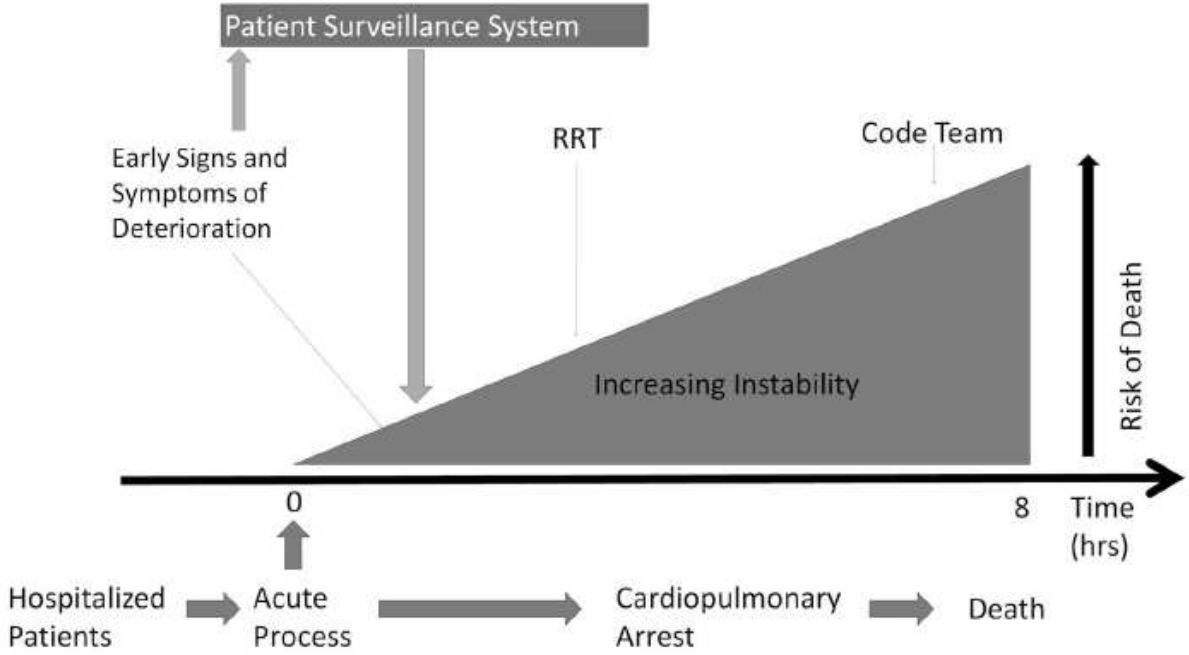

Fig. 1. Representation of physiologic state deterioration and opportunities for intervention. RRT = Rapid Response Team.

Clinical antecedents to in-hospital cardiopulmonary arrest.

R M Schein, N Hazday, M Pena, B H Ruben and C L Sprung

Chest 1990;98;1388-1392
DOI 10.1378/chest.98.6.1388

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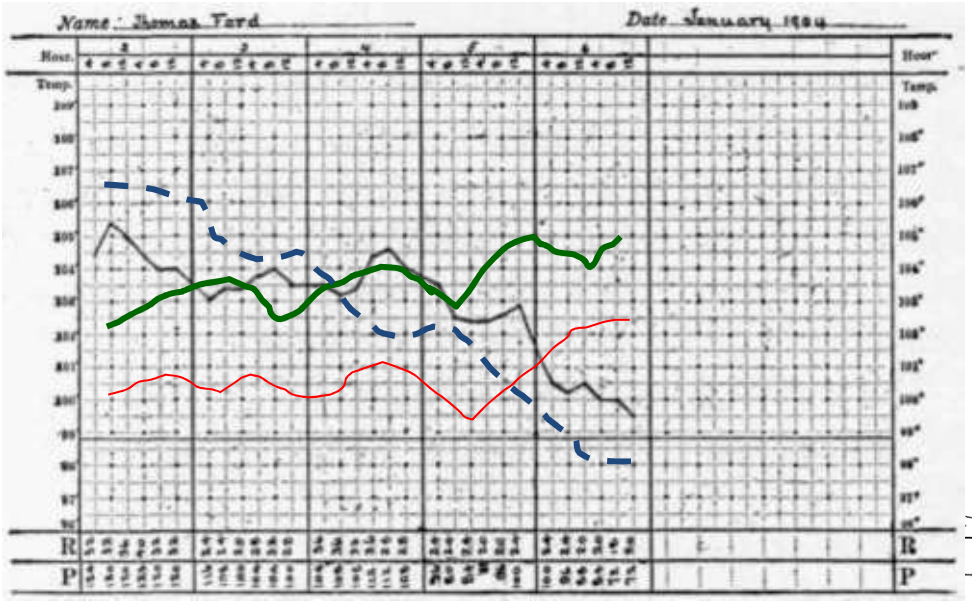

TALANO

SIAMESE | F | SEAL PT. | 11/19 City SAN ANTONIO TX Phone

DATE		OFFICE CALL	INJECTION	DRUGS	DOCTOR SERVICES	RABIES AND L.	D.H.L.	SURGERY DENTAL	X-RAY LAB	BOARD	MISC.	TOTAL CHARGES	PAID	BALANCE
JUL 17 1996	(MAY 1995) 7# T-Kitty PE-													
	Syndrome See records for Hx													
	.2cc Dex Fed KID for flea bite prob. 2-4 wks													
	B12 2cc IM/B comp 1# 3@ 1.50 K/D	18.00	11.50								4.50	34 00	34 00	-0-
JUL 24 1996	Follow up 2cc Dex 5a Hx													
	Rx derma .75 cc b.d	12.00	9.50	9.99								42 70	42 70	-0-
OCT 11 1996	Shot/Fluids B12 5 Dx 3 IM KID SQ													
	Recheck 1# wk 6.9#	18.00	23.50						57.50			105 00	105 00	-0-
FEB 08 1997	FLUIDS? SHOT — was active yesterday PE NAF Mt													
	100cc KID SQ B comp/B 1.5 SQ	18.00	26.50									44 50	44 50	-0-
5-3-97	KID small cans / Fever											25 22	25 22	-0-
AUG 2 1997	Shot (steroid) fluids Cosequin													
	.25 cc b-mod IM for arthritis													
	.5 cc o com/B12 for 7# PE-OK gm													
	100cc KID SQ	KID Cosequin 60cc												
		19.00	23.50 13.50	46.00							9.99	112 99	112 99	-0-
JAN 3 1998	Lover 100 cc KID SQ 7.4#													
	Scab forth Rx .7cc IM	19.00	11.50 15.50								19.99	65 22	65 22	-0-
	small CASE C/D													
JUN 26 1998	bloodwork 6.7# CBC and T4:	19.00	11.50	9.99					10.00			116 00	116 00	-0-

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INTRAARREST

Weisfeldt M.L : 3-phase Time Sensitive Model
JAMA 2002; 288:3035-3038

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INTRAARREST

POSTARREST

2	24	48	72
ACIDOSIS – ENERGIA ZAVAR			
EAA KIÁRAMLÁS			
OXYDATIV STRESS			
HYPOPERFUSIO			
	GÉN EXPRESSIO		
	PROTEIN SYNTHESIS GÁTLÁS		
			APOPTOSIS

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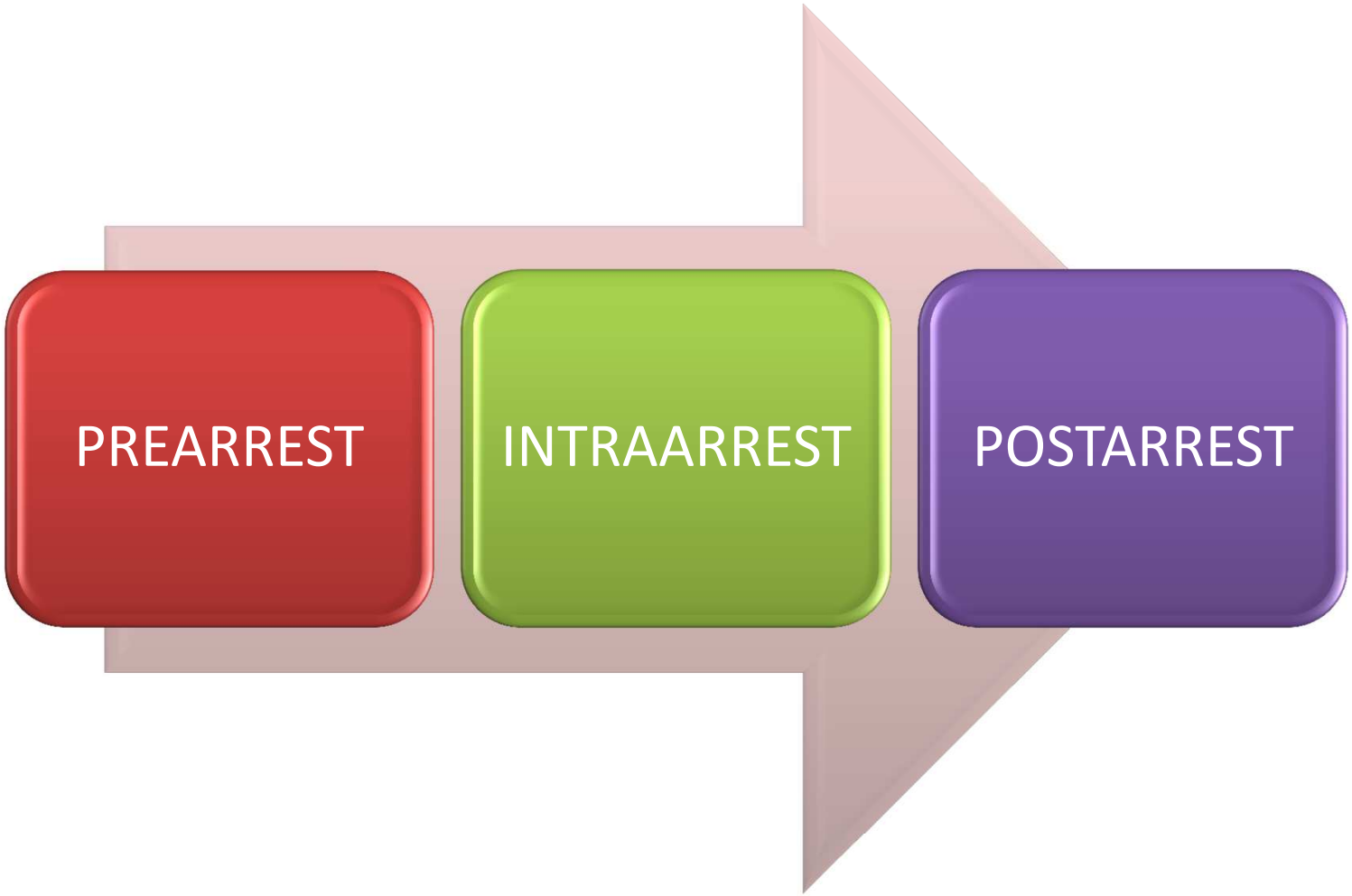

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Clinician blood pressure documentation of stable intensive care patients: An intelligent archiving agent has a higher association with future hypotension

Caleb W. Hug, PhD; Gari D. Clifford, PhD; Andrew T. Reisner, MD

(Crit Care Med 2011; 39:1006–1014)

A VÉRNYOMÁS SZOROS – IT SZINTEN TÁMOGATOTT – MONITORIZÁLÁSA, ATERND MEGFELELŐ ÉRTÉKELÉSE JÓ HAQTÁSFOKKAL JELZI ELŐRE A STABIL KRITIKUS ÁLLAPOTÚ BETEG ELKÖVETKEZŐ DECOM PENSATIOJÁT.

Respiratory rate: the neglected vital sign

Michelle A Cretikos, Rinaldo Bellomo, Ken Hillman, Jack Chen, Simon Finfer and Arthas Flabouris

MJA 2008; 188: 657–659

Respiratory rate as an indicator of serious illness

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CRITICAL CARE IS NOT LOCATION, IT IS A PROCESS.

IT CAN TAKE PLACE NOT ONLY IN THE ICU, EVERYWHERE

Critical care without walls

Ken Hillman, MBBS, FRCA(Eng), FANZCA, FJFICM

Curr Opin Crit Care 2002,

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Detecting critical illness outside the ICU: the role of track and trigger systems

Jan O. Jansen and Brian H. Cuthbertson

Current Opinion in Critical Care 2010, 16:184–190

Table 2 MERIT study medical emergency team calling criteria

Airway	
If threatened	
Breathing	
All respiratory arrests	
Respiratory rate per minute	<5 or >36
Circulation	
All cardiac arrests	
Pulse rate per minute	<40 or >140
Systolic blood pressure (mmHg)	<90
Neurology	
Fall in Glasgow coma scale >2 points	
Repeated or extended seizures	
Other	
Any patient you are seriously worried about who does not fit the above criteria	

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MET

MEDICAL EMERGENCY TEAM

Call 7777 and state

"MET CALL WARD ___"

if you are worried about any patient
OR
if you notice any acute changes in

AIRWAY

- Obstructed airway
- Noisy breathing or stridor
- Problem with a tracheostomy tube

BREATHING

- Any difficulty breathing
- Breathing <8 breaths a minute
- Breathing >25 breaths a minute
- Oxygen saturation ≤90%, despite high-flow oxygen

IF PATIENT IS NOT BREATHING, CALL A CODE BLUE

CIRCULATION

- Pulse <40 beats a minute
- Pulse >120 beats a minute
- Low blood pressure (systolic <90 mm Hg)
- Urine output <50 ml over 4 hours

IF PATIENT HAS NO PULSE, CALL A CODE BLUE

CONSCIOUS STATE

- Sudden change in conscious state
- Patient cannot be roused

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AFFERENT

EFFERENT

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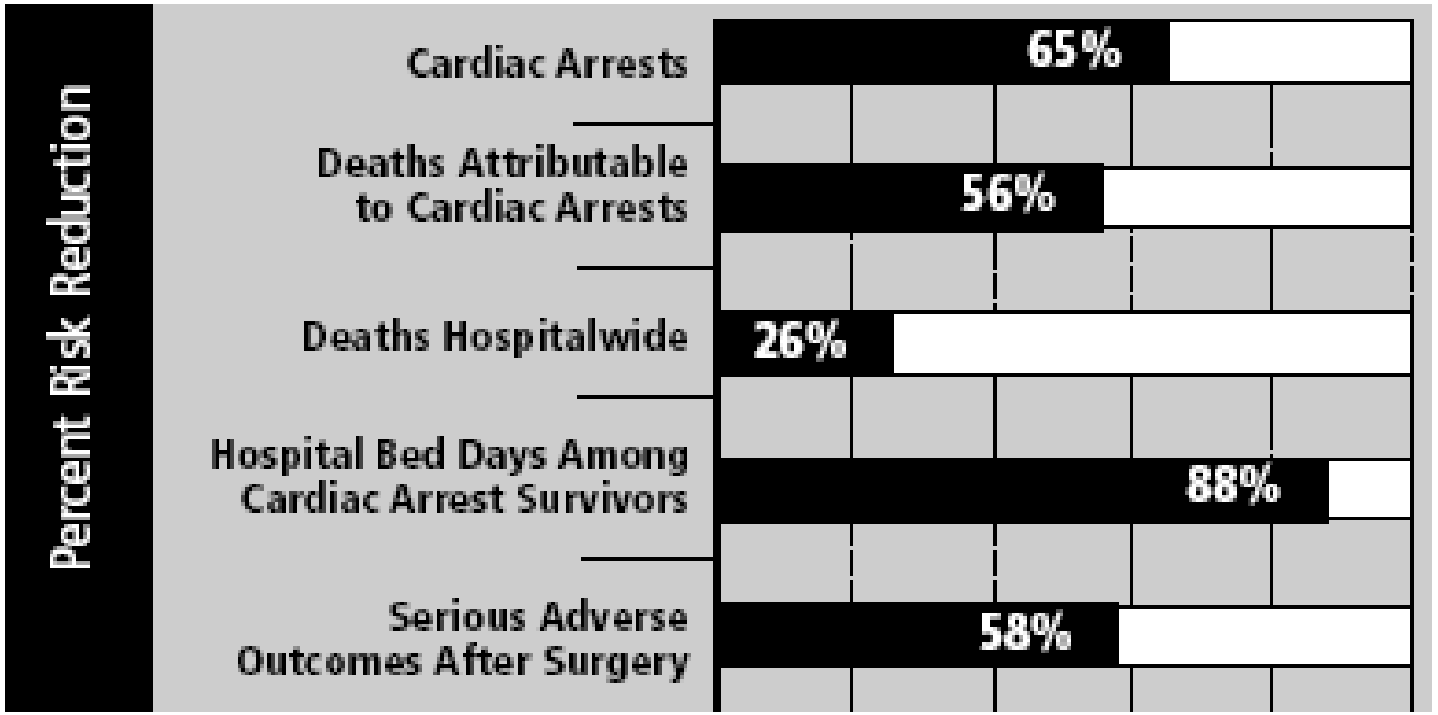
Critical Care Medicine
OFFICIAL JOURNAL OF THE SOCIETY OF CRITICAL CARE MEDICINE

2004; 32: 916-

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



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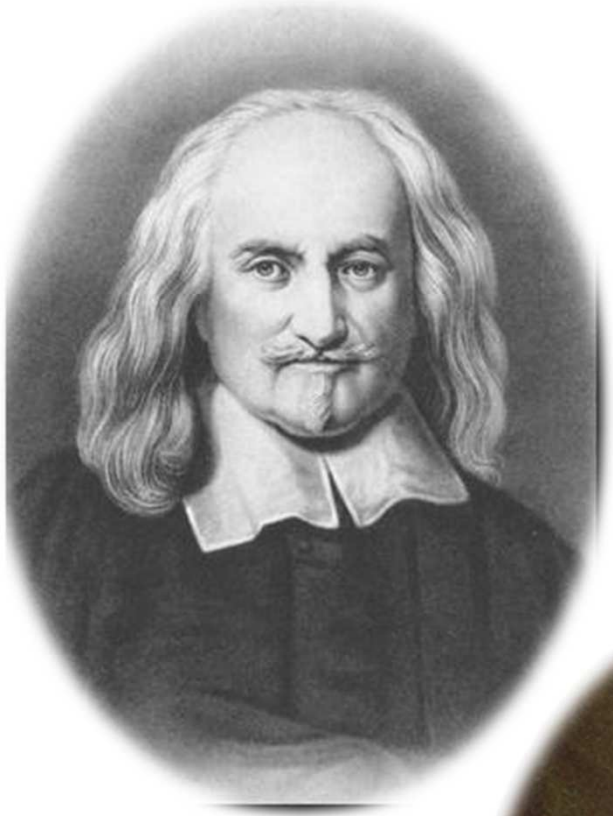

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VIEWPOINT

The medical emergency team, evidence-based medicine and ethics

Ross K Kerridge and W Peter Saul

Nem kétséges, a "legjobb rendelkezésre álló bizonyíték" egy fontos eleme az orvos döntési folyamatának. EBM-re úgy kell tekinteni, mint egy hatékony módszerre. Az EBM-hez vezető folyamat célja hogy jelölje a legjobb rendelkezésre álló bizonyítékot és ezzel is segítse a döntéshozatalt. Azonban, az EBM nem pártatlan vagy érték-semleges, egy kétélű fegyver!

Nem megengedhető, hogy az EBM akadálya legyen olyan változásoknak, mely a betegek érdekét, biztonságát, komfortját szolgálják!

A gyógyítás számos területén végre kell hajtani a racionális , egyszerű változtatásokat akkor is, ha nincs rájuk magas evidencia szintű bizonyíték. Az is lehet, hogy etikátlan késleltetni egy változást nem megfelelő szintű bizonyíték hiányára hivatkozva. Hány embernek kell szenvednie, vagy meghalnia I-A ajánlás hiányában, annak ellenére, hogy az elvárható gondosság és a racionalitás megoldási lehetőséget kínálna?

(MJA 2003; 179: 313-315)

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FIGYELEM, FIGYELEM!
FOKOZOTT RENDŐRSÉGI ELLENŐRZÉS.
☺ TRAFFIPAX ☺

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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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Critical Care, Liverpool Hospit
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Australia
K.Hillman@unsw.edu.au

*Investigators listed at end of report

Research

Open Access

Using Medical Emergency Teams to detect preventable adverse events

Akshai Iyengar[1], Alan Baxter[2] and Alan J Forster[1,3]

Critical Care 2009, **13**:R126 (doi:10.1186/cc7983)

- A VILÁG SZÁMOS KÓRHÁZÁBAN MŰKÖDIK MET RENDSZER
- A MET RIASZTÁSOK INDIKÁTORKÉNT IS MŰKÖDNEK – EBBEN A RELÁCIÓBAN AZ OKTATÁS, FEJLESZTÉS MEGHATÁROZÓ ELEMEI
- A METHEZ KAPCSOLÓDÓ ADATGYŰJTÉS, AZ ADATOK ÉRTÉKELÉSE AZ ALAPJA A FEJLESZTÉSNEK , A NEM KÍVÁNATOS ESEMÉNYEK ELKERÜLHETŐSÉGÉNEK
- A BETEG BIZTONSÁGI RENDSZER MEGHATÁROZÓ ELEME

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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

(Crit Care Med 2009; 37:148–153)

POST HOC ANALYSIS ALAPJÁN A „MET-RIASZTÁS" ÉS A NEM KÍVÁNATOS SÚLYOS ESEMÉNYEK KÖZÖTTI ÖSSZEFÜGGÉS FORDÍTOTT .

Resident and RN perceptions of the impact of a medical emergency team on education and patient safety in an academic medical center*

Babak Sarani, MD; Seema Sonnad, PhD; Meredith R. Bergey, MSc, MPH; Joanne Phillips, RN, MSN;
Mary Kate Fitzpatrick, RN, MSN, CRNP; Ara A. Chalian, MD; Jennifer S. Myers, MD

(Crit Care Med 2009; 37: 3091–3096)

Table 1. Criteria for medical emergency team activation

- Respiratory
  - Respiratory rate <8 breaths/min or >32 breaths/min
  - Oxygen saturation <85% for >5 min
  - Acute increase in F_{IO_2} need to >50% by face mask
  - Acute dyspnea
- Cardiac
  - Pulse <40 or >140 beats/min
  - Systolic blood pressure <80 or >200 mm Hg
  - Diastolic blood pressure >110 mm Hg
  - New-onset chest pain
- Neurologic
  - Seizure
  - Acute change in mental status
- Other
  - Uncontrolled bleeding
  - Inability to contact house staff
  - Nurse concern/discretion
  - Physician discretion

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Hillman *Critical Care* 2011, **15**:1001
http://ccforum.com/content/15/5/1001

CRITICAL CARE

COMMENTARY

Rapid response systems: you won't know there is a problem until you measure it

Immediate and long-term impact of medical emergency teams on cardiac arrest prevalence and mortality: A plea for periodic basic life-support training programs*

Glória Campello, MD; Cristina Granja, MD, PhD; Flávia Carvalho, RN; Cláudia Dias, Bsc; Luís-Filipe Azevedo, MD; Altamiro Costa-Pereira, MD, PhD

Conclusions: **Widening criteria for hospital emergency calls together with an integrated training program may reduce cardiac arrest prevalence and mortality in at-risk patients. Program effectiveness was critically related to the staff education, awareness, and responsiveness to physiologic instability of the patients. Long-term effectiveness of the program may decrease in the absence of periodic and continued implementation of educational interventions. (Crit Care Med 2009; 37:3054–3061)**

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Resuscitation (2007) 75, 412—433

ELSEVIER

RESUSCITATION

www.elsevier.com/locate/resuscitation

STATEMENT PAPER

Recommended guidelines for monitoring, reporting, and conducting research on medical emergency team, outreach, and rapid response systems: An Utstein-style scientific statement A Scientific Statement from the International Liaison Committee on Resuscitation; the American Heart Association Emergency Cardiovascular Care Committee; the Council on Cardiopulmonary, Perioperative, and Critical Care; and the Interdisciplinary Working Group on Quality of Care and Outcomes Research☆

Response Team Data Collection: Case Form (to be filled out for each encounter)

1. CASE IDENTIFICATION AND DEMOGRAPHICS

Patient Category:
- ☐ Medical
- ☐ Surgical
- ☐ Obstetric
- ☐ Pediatric
- ☐ Other: _____

MEDICAL RECORD NUMBER: _____

Patient Name: _____

Date of Birth: ____/____/____ **Age:** _____

Date of Hospital Admission:
____/____/____

Gender:
☐ Male ☐ Female

Location:
- ☐ Emergency Department
- ☐ Operating Room/Post-Operative Anesthetic Care Unit
- ☐ Critical Care Area
- ☐ Intermediate Care/ Step-down Area
- ☐ General Inpatient Unit or Ward Area
- ☐ Outpatient Area
- ☐ Procedure or Intervention Area
- ☐ Other: _____

TEAM ACTIVATION

Date ____/____/____ (dd/mm/yyyy) Time _____:_____ (hh:mm)

TEAM COMPLETION

Date ____/____/____ (dd/mm/yyyy) Time _____:_____ (hh:mm)

2. PRE-EVENT DATA

Primary reason for team activation:
☐ Physiologic criteria ☐ Staff provider worried/concerned

Patient status at team activation:
- ☐ Transferred within 24 hrs from Critical Care Area
- ☐ Transferred within 24 hrs from Emergency Department
- ☐ Transferred within 24 hrs from another acute care hospital / facility

Level of consciousness (AVPU score OR ACDU – Select one):
- ☐ Alert
- ☐ Respond to verbal stimuli
- ☐ Respond to painful stimuli
- ☐ Unresponsive
- ☐ Alert
- ☐ Confused
- ☐ Drowsy
- ☐ Unresponsive

Glasgow Coma Scale: GCS: ____ E: ____ M: ____ V: ____

Patient clinical status at activation:

Heart rate _____
Blood pressure ____/____
Respiratory rate _____
Temperature _____ °C
☐ Axillary ☐ Oral ☐ Rectal ☐ Tympanic
Pulse oximetry _____ %
☐ Oxygen delivery _____ (l/min)
☐ Nasal prongs ☐ Oxygen mask ☐ High flow-oxygen

Supplemental Data

List specific activation criteria
- ☐ Symptom trigger: mental status change
- ☐ Symptom trigger: respiratory distress
- ☐ Symptom trigger: chest pain
- ☐ Primary medical team not responding
- ☐ Staff provider worried/concerned
- ☐ Blood test result abnormality
- ☐ Respiratory arrest
- ☐ Cardiac arrest
- ☐ Vital sign criteria
  - ☐ Heart rate: Less than _____ or greater than _____
  - ☐ Respiratory rate: Less than _____ or greater than _____
  - ☐ Blood pressure: Less than _____ or greater than _____
  - ☐ Temperature: Less than _____ or greater than _____

Level of consciousness (AVPU score OR ACDU – Select one):
- ☐ Alert
- ☐ Respond to verbal stimuli
- ☐ Respond to painful stimuli
- ☐ Unresponsive
- ☐ Alert
- ☐ Confused
- ☐ Drowsy
- ☐ Unresponsive

Glasgow Coma Scale: GCS: ____ E: ____ M: ____ V: ____

Supplemental Data

Patient Clinical Status 6 hrs before activation (or closest time with assessment, ____ hrs before activation):

Heart rate _____
Blood pressure ____/____
Respiratory rate _____
Temperature _____ °C
☐ Axillary ☐ Oral ☐ Rectal ☐ Tympanic
Pulse oximetry _____ %
☐ Oxygen delivery _____ (l/min)
☐ Nasal prongs ☐ Oxygen mask ☐ High flow-oxygen

Level of consciousness (AVPU Score OR ACDU– Select one):
- ☐ Alert
- ☐ Respond to verbal stimuli
- ☐ Respond to painful stimuli
- ☐ Unresponsive
- ☐ Alert
- ☐ Confused
- ☐ Drowsy
- ☐ Unresponsive

Glasgow Coma Scale: GCS: ____ E: ____ M: ____ V: ____

3. TEAM INTERVENTION DURING EVENT

During Event (check all that apply):
- ☐ Non-medication therapy initiated
- ☐ Medication therapy initiated
- ☐ Treatment limitation initiated
- ☐ Advice or consultation only

Medication therapy:
- ☐ Yes
- ☐ No

Treatment limitation initiated:
- ☐ Institution of a DNAR/NFR order
- ☐ Treatment limitation order documented

Non-Medication Therapy:
- ☐ Supplemental oxygen administration or Increase in oxygen administration
- ☐ Bag-valve-mask ventilation
- ☐ CPAP/ NIPPV administration
- ☐ Intubation/ Airway adjunct
- ☐ External chest compression
- ☐ Defibrillation
- ☐ Cardioversion
- ☐ Bolus fluid administration

Supplemental Data

Patient Clinical Status at time of call completion:

Heart rate _____
Blood pressure ____/____
Respiratory rate _____
Temperature _____ °C
☐ Axillary ☐ Oral ☐ Rectal ☐ Tympanic
Pulse oximetry _____ %
☐ Oxygen delivery _____ (l/min)
☐ Nasal prongs ☐ Oxygen mask ☐ High flow-oxygen

Level of consciousness (AVPU Score OR ACDU– Select one):
- ☐ Alert
- ☐ Respond to verbal stimuli
- ☐ Respond to painful stimuli
- ☐ Unresponsive
- ☐ Alert
- ☐ Confused
- ☐ Drowsy
- ☐ Unresponsive

Glasgow Coma Scale: GCS: ____ E: ____ M: ____ V: ____

Other team interventions (narrative/comments):

4. OUTCOME MEASURES

Patient status at end of call:
- ☐ Alive
- ☐ Dead

If Alive:
- ☐ Remained in same location
- ☐ Transferred to critical care area
- ☐ Transferred to intermediate/ Step-down area
- ☐ Transferred to cardiac monitoring area
- ☐ Transferred to another area for procedure/operation/ intervention
- ☐ Transferred to another acute care hospital

Date of acute hospital discharge or of death:
____/____/____ (dd/mm/yyyy)

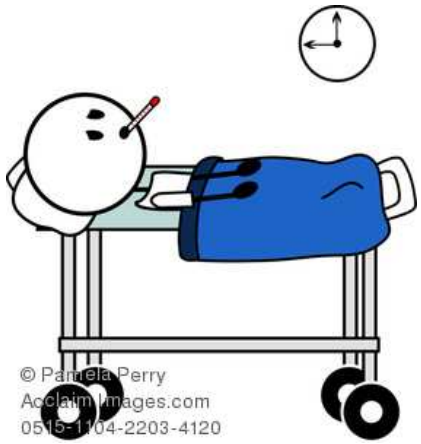
Patient status at acute hospital discharge:
- ☐ Alive
- ☐ Dead

Form Prepared by: _____ (PRINT) _____ (SIGNATURE) **Date:** ____/____/____

Continuum of hospital care: the role of intensive care

Ken Hillman[a], Jack Chen[a] and Anders Aneman[b]

Current Opinion in Critical Care 2010, 16:505–509



MET

ICU

EoLC

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The role of the medical emergency team in end-of-life care: A multicenter, prospective, observational study

Daryl A. Jones, MBBS, MD; Sean M. Bagshaw, MD; Jonathon Barrett, MBBS;
Rinaldo Bellomo, MBBS, MD, PG Dip Echo; Gaurav Bhatia, MD; Tracey K. Bucknall, PhD;

Conclusions: **Issues around end-of-life care and limitations of medical therapy arose in approximately one-third of calls, suggesting a mismatch between patient needs for end-of-life care and resources at participating hospitals. These calls frequently occur in elderly medical patients and out of hours. Many such patients do not return home, and half die in hospital. There is a need for improved advanced care planning in our hospitals, and to confirm our findings in other organizations. (Crit Care Med 2012; 40:000–000)**

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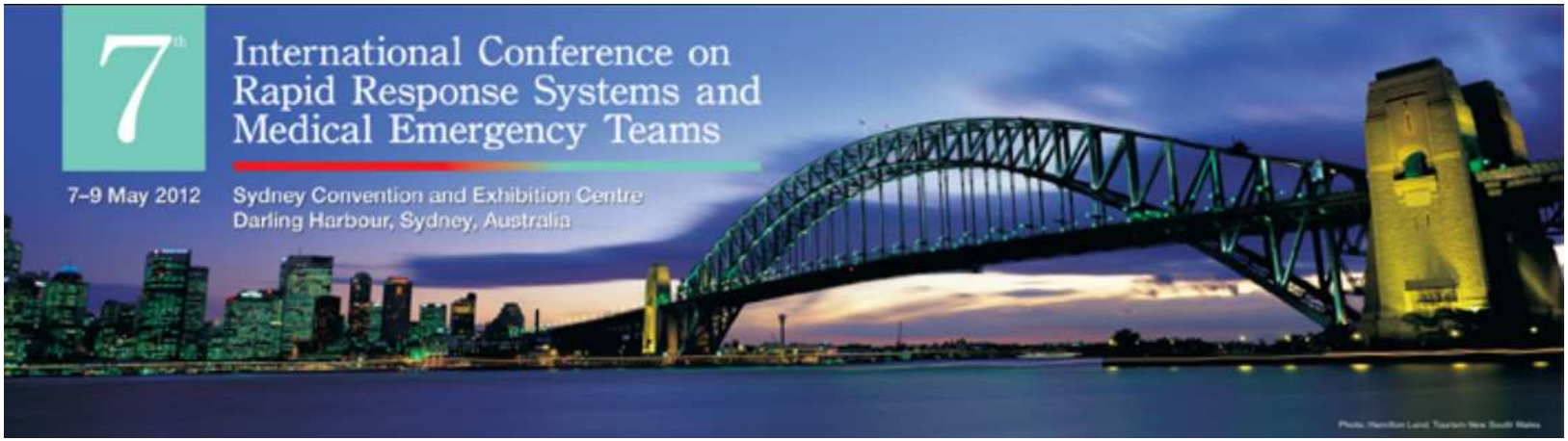
SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

TO BE CONTINUED...



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