The Rapid Response System

The afferent limb: an overview

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Rapid response systems: the afferent arm

A 24 hour service that:

- **Monitors the patient**
- **Detects any patient deterioration**
- **Triggers the efferent arm of the rapid response system**

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The afferent limb of the rapid response system

Regular monitoring & assessment

- accurate measurement
- specify parameters
- specify frequency of measurement
- all relevant parameters
- complete dataset

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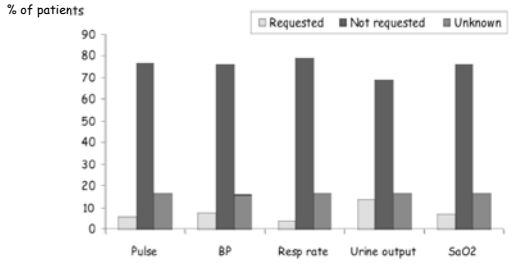
NCEPOD: type and frequency of observations for ward patients

n = 439 acute medical emergencies who died in ICU after admission from general wards



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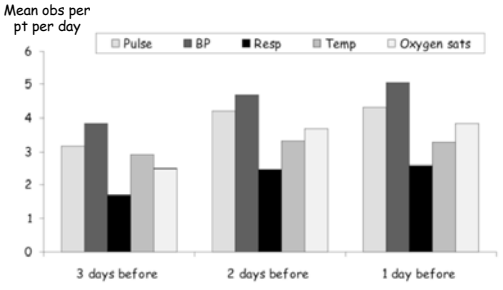
NCEPOD: An Acute Problem, 2005

NCEPOD: mean observations per patient per day prior to ICU admission



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NCEPOD: An Acute Problem, 2005

MERIT study data: completeness of vital signs record

Percentage of patients without a documented DNAR order who had a record of HR, BP and RR in the 15 minute period before an event (n=5899)

	n	%
Complete record	1120	19%
Incomplete record	1122	19%
Record absent	3657	62%

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MERIT study investigators. Lancet 2005; 365: 2091-2097

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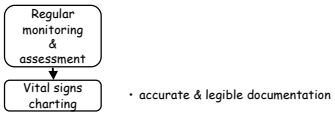

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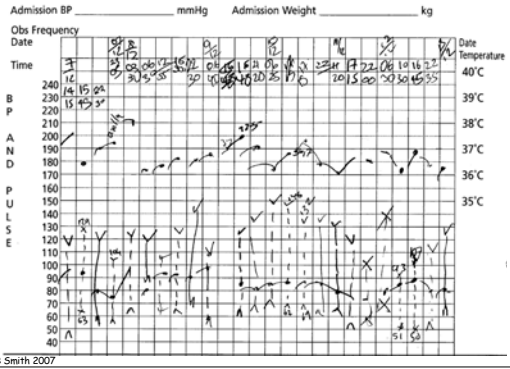
Legibility of charts



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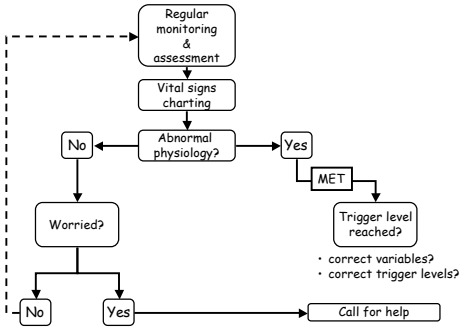

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Variations in calling criteria cut points in MET studies

variable	Hourihan 1995	Buist 2002	Ball 2003	Bellomo 2004	Galhotra 2006	Baxter 2006
Low pulse rate	< 40		< 50	< 40	< 40	≤ 40
High pulse rate	> 140	> 130	> 125	> 130	> 140	≥ 130
Low respiratory rate	< 5	< 6	< 8	< 8	< 8	≤ 8
High respiratory rate	> 36	> 30	> 25	> 30	> 36	≥ 30
Low systolic BP	< 90	< 90	< 90	< 90	< 90	≤ 90
High systolic BP			> 200		> 200	≥ 200

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Effect of altering MET calling criteria cut points

	Standard criteria	Restricted criteria	Extended criteria
Low pulse rate	< 40	< 35	< 50
High pulse rate	> 130	> 140	> 120
Low respiratory rate	< 8	≤ 6	≤ 10
High respiratory rate	> 30	≥ 32	≥ 28
Low systolic BP	< 90	< 80	< 100
Percentage of patients with MET criteria	4.5%	2.2%	13.8%
No of deaths detected within 30 days	10	4	18

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Bell et al. Resuscitation 2006; 70: 66-73

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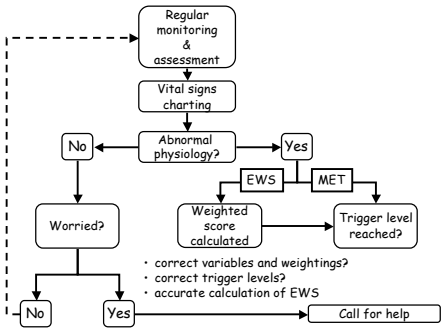

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Track & Trigger systems: aggregate weighted scoring systems

- Allocates points to routine vital signs measurements on the basis of their derangement from an arbitrarily agreed "normal" range.
- Trigger value (e.g., ≥3) set locally, depending upon system used.

Score	3	2	1	0	1	2	3
HR		<40	40–50	51–100	101–110	111–129	≥130
BP	<45% ↓	≤30% ↓	15% ↓	Normal for patient	15% ↑	30% ↑	>45% ↑
RR		≤ 8		9–14	15–20	21–29	≥30
TEMP		<35.0		35.0–38.4		<38.4	
CNS				A	V	P	U
Urine	Nil	<1ml/kg/2h	<1ml/kg/1h		>3ml/kg/2h		

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Stenhouse et al. BJA 2000; 84: 663

Variables used in a range of aggregate early warning systems

variable	scoring system				
	EWS	MEWS	SEWS	ASSIST	WEWS
Pulse rate					
Breathing rate					
Systolic BP					
SaO2					
Temperature					
Urine output					
Conscious level					
Patient age					

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Errors in aggregate "track and trigger" systems

- Incomplete recording of variables with many datasets incomplete
- Errors in the early warning score algorithm used
- ~50% of early warning scores incorrect

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Smith et al. Anaesthesia 2006; 61: 222-228

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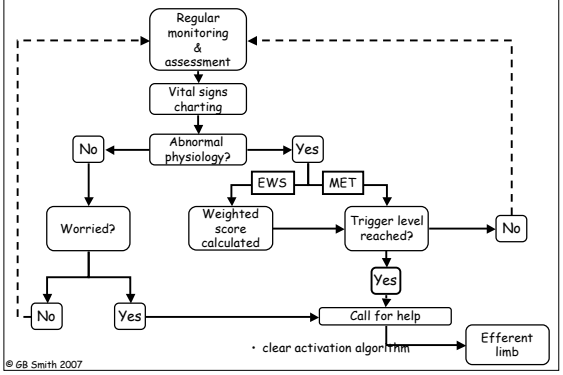

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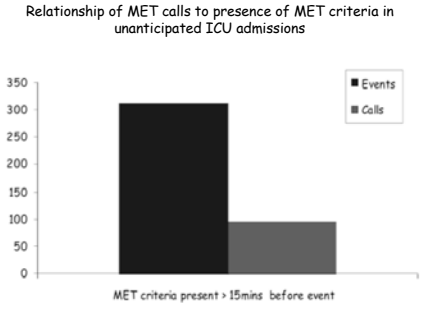
MERIT study data: unanticipated ICU admissions



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MERIT study investigators. Lancet 2005; 365: 2091-2097

Summary

1. Afferent limb of rapid response system is responsible for monitoring of patient, detection of patient deterioration and triggering of a response.
2. Rapid response systems often fail because of failures in afferent limb.
3. Variables must be measured accurately and frequently.
4. There is a need to identify the important variables to measure.
5. Documentation must be accurate, timed, dated and legible.
6. For determining the appropriate trigger levels of trigger systems, all relevant variables must be measured every time a dataset is obtained.
7. Where aggregated trigger systems are used, there should be accurate calculation of early warning scores.
8. There should be an unambiguous, activation protocol for summoning a response.

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