Early Response Teams

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OBJECTIVES

- **Provide an overview of an Early Response Team system.**
- **Components of ERT.**
- **Indications for ERT activation.**
- **Role of ERT.**
- **Essential infrastructure for success of ERT.**
- **Data behind implementation and use of ERT.**
- **Concerns related to use of ERT.**

BACKGROUND

- **Studies suggest that adverse events occur in 10% of hospitalized patients with a mortality rate of 5–8%.**
- **Almost all critical inpatient events are preceded by warning signs for an average of 6–8 hours.**
- **Such warning signs include: change in vital signs, acute dyspnea, and change in level of consciousness.**

BACKGROUND

- **ERTs provide at-risk patients early intervention, in the form of better assessment and aggressive resuscitation.**
- **ERTs are independent of the primary physicians who care for the patient.**
- **Institute for Healthcare Improvement's 100 000 Lives Campaign has recommended that hospitals implement RRTs as 1 of 6 strategies to reduce preventable in-hospital deaths.**

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

N Engl J Med 2011; 365:139-146.July 14, 2011

COMPONENTS of ERTs

- **An ERT is typically a multidisciplinary team of medical, nursing, and respiratory therapy staff.**
- **May be a physician- OR an RN- led team and may include the following:**
  - **Critical care physician**
  - **Non-ICU physician**
  - **Critical care RN**
  - **Respiratory Therapist**
  - **Pharmacist**
  - **Charge RN**

ESSENTIALS of an ERT

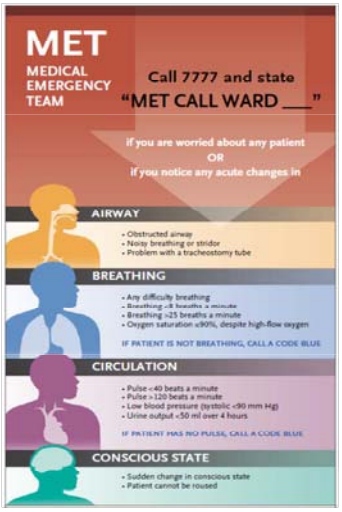
Regardless of the team composition, it should be able to perform the following:

- **Ability to diagnose and intervene.**
- **Advanced airway management skills**
- **Advanced cardiac life support certification.**
- **Capability to establish central venous access.**
- **Ability to provide an ICU level of care at the bedside.**

Common INDICATIONS for ERT

• Acute change in heart rate	<40 or >130 beats per minute
• Acute change in systolic blood pressure	<90 mmHg or >200 mm Hg
• Acute change in respiratory rate	<8 or >30 per minute
• Acute change in saturation	<90% despite O_2
• Acute change in conscious state	e.g., sudden fall in Glascow coma scale of >2 points
• Acute change in urinary output	<50 ml in 4 hours
• Repeated or prolonged seizures	
• MEWS	>5
• Clinical intuition	

Hospital poster listing criteria for ERT activation



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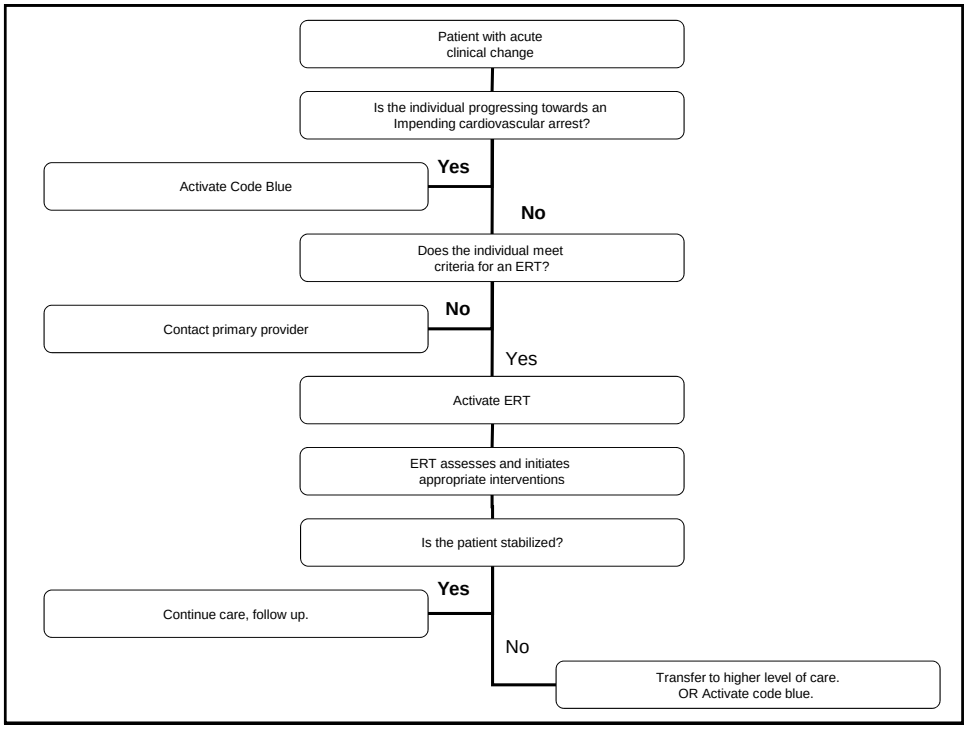
IMPLEMENTATION of ERT

- **Afferent limb (education of healthcare providers of when to call ERT).**
- **Efferent limb with qualified staff.**
- **Administrative support for initial rollout, personnel, equipment, education.**
- **Quality improvement: collecting and analyzing data from events and improving prevention and response.**



The Respiratory Therapist's Role in the Early Response Team

The RN's Role in the Early Response Team

Efferent Limb

- **Form of activation: overhead page or designated pagers.**
- **Average time for response 10-15 minutes.**
- **Carry the required equipment.**
- **Contact the appropriate providers.**
- **Documentation forms.**

Equipment Recommended

- Airway management
- IV access
- Glucometer
- iSTAT
- IVF
- Basic medications (glucagon, lorazepam)
- Access to crash cart

DATA for ERTs

- The only multicenter, cluster-randomized, controlled trial of medical emergency teams is the MERIT study.
- Underpowered study for an intention to treat model.
- A post hoc analysis of the MERIT study showed a significant improvement in outcomes (fewer deaths and cardiac arrests) when the data were analyzed in an as-treated model.
- A few nonrandomized, single-center, before-and-after trials have shown improved outcomes with rapid-response teams.

The JAMA Network

From: Rapid Response Teams: A Systematic Review and Meta-analysis

Arch Intern Med. 2010;170(1):18-26. doi:10.1001/archinternmed.2009.424

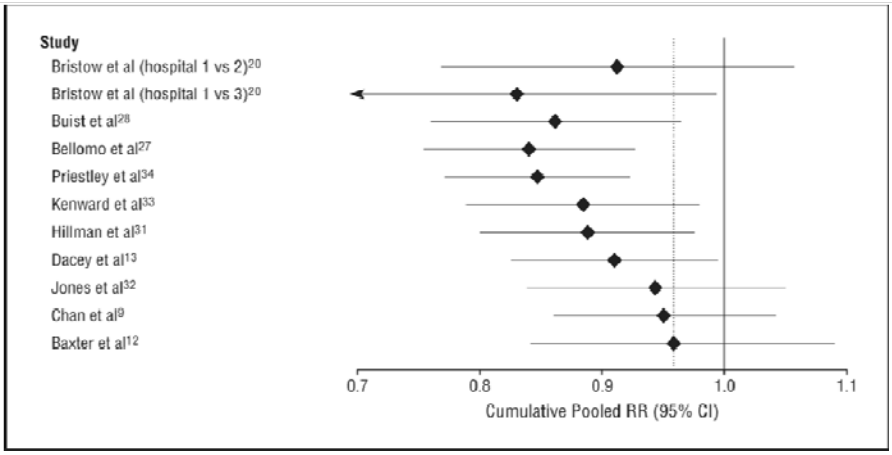


Figure Legend:

Cumulative pooled estimate for hospital mortality after rapid response team (RRT) implementation in adults. The cumulative effect of each additional study on the pooled mortality estimate in adults is depicted..

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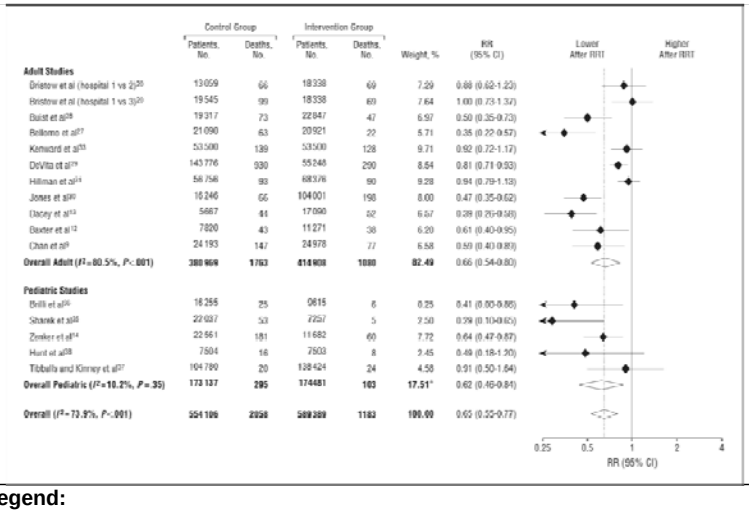

Figure Legend:

Pooled relative risks (RRs) of cardiopulmonary arrest outside the intensive care unit for adults and children after rapid response team (RRT) implementation. CI indicates confidence interval. *Number owing to rounding error for each of the individual pediatric studies.

Establishing a Rapid Response Team (RRT) in an Academic Hospital: One Year's Experience

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BACKGROUND: Rapid response teams and medical emergency teams have been utilized to rapidly manage seriously ill patients at risk of cardiopulmonary arrest and other high risk conditions but have not been extensively described in the American medical literature.

OBJECTIVES: To describe a full year's experience of implementing a rapid response team (RRT) in an academic medical center.

DESIGN: Retrospective analysis of our hospital's RRT database and description of the implementation process from July 2004 to July 2005.

SETTING: Urban, academic medical center.

RESULTS: The RRT system was activated for 307 potentially unstable patients. The most common reasons for an RRT activation were cardiac, respiratory, and neurological conditions. At least 57% of RRT calls were for off-unit inpatients and in outpatient/common areas frequented by outpatients and visitors, whereas at least 42% occurred in inpatient units. Most RRT calls, 82.9%, occurred during daytime hours. In the opinion of RRT leaders 98% of the evaluated calls were appropriate and 85% of the RRT responses resulted in the prevention of further clinical deterioration.

J Hosp Med. 2006 Sep;1(5):296-305.

Criteria for calling early response team

<u>Pulmonary</u>
Respiratory Rate <8 or >30
New onset of dyspnea
New, prolonged (>5min) SaO2 <90%
New requirement for >50% oxygen to keep SaO2 <85%

<u>Cardiovascular</u>
Chest pain unresponsive to nitroglycerin or physician unavailable
Symptomatic systolic blood pressure <80 or >200; diastolic blood pressure >110
(neurological change, chest pain, dyspnea)
Sudden color change of paitent or extremity (pale, dusky, gray, blue, cyanotic)

J Hosp Med. 2006 Sep;1(5):296-305.

Criteria for calling early response team

Neurological/Psychiatric

Acute loss of consciousness or sudden collapse
Naloxone (Narcan) administration for suspected overdose without immediate response
New onset lethargy, difficulty walking
Seizure (outside) of seizure monitoring unit)
Sudden loss of movement (or weakness) in face , arm or leg
Unexplained agitation >10 minutes
Suicide attempt

In-house Trauma, Chest pain, or Stroke

Outside of Emergency Department, Operating Room, or Intensive Care Unit

J Hosp Med. 2006 Sep;1(5):296-305.

Criteria for calling early response team

Hematological

Large acute blood loss
Uncontrolled bleeding
Bleeding into airway

Other

Inability to reach the patient's primary team of treating physician for any of the above
Any potentially serious medical errors or adverse events

J Hosp Med. 2006 Sep;1(5):296-305.

TABLE 1
Diagnoses in Rapid Response Team (RRT) Activation

Pulmonary	32%
Hypoxia/Respiratory Distress (32%)	
Neurological	14%
Change of mental status (7%)	
Syncope (7%)	
Cardiac	11%
Hypotension (8%)	
Arrhythmia (2%)	
Hypertension (1%)	
Hematologic	2%
Bleeding (2%)	
Endocrine	1%
Hypoglycemia (1%)	
Other reason not listed	32%
No reason given	9%

J Hosp Med. 2006 Sep;1(5):296-305.

Results

- **12-month period, the RRT was activated 307 times.**
- **Most RRT activations occurred between 8 am and 4 pm.**
- **In the judgment of evaluators, the system was utilized appropriately in 98% of the evaluated events.**
- **It was believed that 88% of the patients were stabilized after ERT.**

Concerns

- **Successful rapid-response systems consistently deliver a high response "dose" (>25 calls per 1000 admissions).**
- **Evidence supporting the effectiveness of rapid-response systems comes from unblinded, nonrandomized, short-term studies at single centers.**
- **Implementation of a rapid-response system may theoretically "de-skill" hospital-ward staff.**
- **Conflict with the primary team may occur.**

Concerns

- **The optimal composition of the team remains unknown, although before-and-after studies that showed a benefit involved teams led by a physician.**
- **Implementation of a rapid-response system could divert critical care staff from other duties and jeopardize the safety of their ICU patients, although no data exist to support this concern.**
- **Implementation of a rapid-response system is potentially expensive if ad-hoc teams are required.**

Summary

- **Role of the rapid-response team is to provide a quick second opinion, and to stabilize a patient prior to clinical deterioration.**
- **A rapid-response system requires support from hospital leaders to succeed.**
- **Adequate resources, in terms of both personnel and equipment, to manage any critical care event are required.**
- **System's afferent limb requires sustained education of hospital-ward staff. Without this effort, the system is likely to fail.**

Summary

- **Regular audits are needed to assess factors that contribute to activations and failures of the rapid-response system and to guide quality-improvement activities.**
- **Although rapid-response systems are assumed to be models for advancing patient safety, they should always be part of a much wider strategy aimed at making modern hospitals safer.**

MEWS webcast

https://ccme.osu.edu/EnduringMaterialDetail.aspx?ID=201

MEWS

- Simple physiological scoring system.
- Validated in the surgical and medical units as a tool for identifying patients at risk of deterioration.
- Based on 5 bedside parameters: SBP, HR, RR, temperature, and level of consciousness (assessed by the AVPU or RASS score).

MEWS

	3	2	1	0	1	2	3
Systolic BP (mmHg)	**<70**	**71-80**	**81-100**	**101-199**		**>200**	
Heart rate (bpm)		**<40**	**41-50**	**51-100**	**101-110**	**111-129**	**>130**
Respiratory rate		**<9**		**9-14**	**15-20**	**21-29**	**>30**
Temperature (℃)		**<35**		**35-38.4**		**>38.5**	
AVPU score/ RASS score				**Alert +3 to 0**	**Reacting to Voice -1 to -3**	**Reacting to Pain -4**	**Unresponsive -5**

MEWS Implementation

- **The score is not meant to replace Nursing judgment, but if there is clinical concern we recommend:**
  - **MEWS= 4, call covering clinician, consider increase clinical monitoring (VS)**
  - **MEWS >4, call covering clinician, consider increase clinical monitoring (VS), consider ERT as needed.**