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.
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**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute change in heart rate</td>
<td>&lt;40 or &gt;130 beats per minute</td>
</tr>
<tr>
<td>Acute change in systolic blood pressure</td>
<td>&lt;90 mmHg or &gt;200 mm Hg</td>
</tr>
<tr>
<td>Acute change in respiratory rate</td>
<td>&lt;8 or &gt;30 per minute</td>
</tr>
<tr>
<td>Acute change in saturation</td>
<td>&lt;90% despite O₂</td>
</tr>
<tr>
<td>Acute change in conscious state</td>
<td>e.g., sudden fall in Glasgow coma scale of &gt;2 points</td>
</tr>
<tr>
<td>Acute change in urinary output</td>
<td>&lt;50 ml in 4 hours</td>
</tr>
<tr>
<td>Repeated or prolonged seizures</td>
<td></td>
</tr>
<tr>
<td>MEWS</td>
<td>&gt;5</td>
</tr>
<tr>
<td>Clinical intuition</td>
<td></td>
</tr>
</tbody>
</table>
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.
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.

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.

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


Criteria for calling early response team

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

**Cardiovascular**
- 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 patient or extremity (pale, dusky, gray, blue, cyanotic)

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

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**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

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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.

### Results

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Diagnoses In Rapid Response Team (RRT) Activation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulmonary</td>
<td>32%</td>
</tr>
<tr>
<td>Hypoxia/Respiratory Distress (32%)</td>
<td></td>
</tr>
<tr>
<td>Neurological</td>
<td>14%</td>
</tr>
<tr>
<td>Change of mental status (7%)</td>
<td></td>
</tr>
<tr>
<td>Syncope (7%)</td>
<td></td>
</tr>
<tr>
<td>Cardiac</td>
<td>11%</td>
</tr>
<tr>
<td>Hypotension (8%)</td>
<td></td>
</tr>
<tr>
<td>Arrhythmia (2%)</td>
<td></td>
</tr>
<tr>
<td>Hypertension (1%)</td>
<td></td>
</tr>
<tr>
<td>Hematologic</td>
<td>2%</td>
</tr>
<tr>
<td>Bleeding (2%)</td>
<td></td>
</tr>
<tr>
<td>Endocrine</td>
<td>1%</td>
</tr>
<tr>
<td>Hypoglycemia (1%)</td>
<td></td>
</tr>
<tr>
<td>Other reason not listed</td>
<td>32%</td>
</tr>
<tr>
<td>No reason given</td>
<td>9%</td>
</tr>
</tbody>
</table>

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

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

### 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.