Critical Care Response Teams

A good idea without MERIT

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Disclosures

• Received both unrestricted educational grants and lecturing honoraria from Hospira Healthcare.

• Received unrestricted educational grants from Edwards Lifescience.
Should I be committed?
Objectives

- Background for the introduction of critical care response teams
- Characteristics of rapid response systems
- Evaluating the impact of critical care response teams
- Management issues for the mature CCRT and future direction
Critical care response teams

BACKGROUND
St. Bartholomew’s Hospital c.1860
Historical perspective

• Acute care hospitals were not originally designed to look after sick people.

• Healthcare has changed, expectations have changed, but the hospital system has evolved little since the 19th Century
  – Casualty wards are the same as the ED
  – Attending Staff “consult” on “their” patients and manage them at a distance
  – Day to day activities are supported by trainees
  – Nursing staff record vital signs manually but have varying degrees of empowerment to act
Historical Change

• Increasingly complex care options
• Specialisation of services
• Reduced emphasis on experiential learning
• Silos or vertical structures such as wards, units, divisions, departments
  – Highly developed for managing the specialised component but not the co-morbidities or the complications
• Paucity of horizontal system integration
Patient Safety

- Not surprisingly there are many preventable deaths and adverse events
  
  - 84% of in-hospital arrests are preceded by physiologic instability, especially abnormalities of heart rate and respiratory rate
    
    (Schein 1990, Franklin 1998)
  
  - Admissions to the ICU are often preceded by the same predictable slow deterioration
    
    (Goldhill 1999, Hillman 2002)
  
  - 12.2% of patients require a level of care above that which can be provided in a ward environment
    
    (Chelel 2002)
Logic

1. The mortality rate amongst inpatients that have a cardiac arrest is very high

2. It is easier to treat patients who are at risk and deteriorating before they arrest
Critical care response teams

CHARACTERISTICS
Rapid Response

- Out of hospital response – 911 or 999
Rapid Response

• In-Hospital....
Rapid Response

• In-Hospital....
Rapid Response

- In-Hospital....
The team
Rapid response system

Afferent Limb

- Event detection
- Urgent Un-met Patient Need

Efferent Limb

- Trigger
- MET/RRT/CCO
- Crisis Resolved

- Specialized resources
  - Cardiac Arrest Team
  - Trauma Team
  - Stroke Team

Administration oversees all functions

Data collection and analysis for Process Improvement

Data acquisition point
Calling criteria for CCRT

**Critical Care Response Team**

**CALLING CRITERIA**

Consider calling CCRT anytime your patient shows signs of acute change in

**Airway**
- Excessive secretions
- Obstruction

**Breathing**
- Respiratory rate ≥ 30 or ≤ 8
- Saturation < 90%
- Respiratory Distresses

**Circulation**
- Systolic ≤ 90 mmHg or ≥ 200 mmHg or change > 60 mmHg
- Heart rate ≥ 130 or ≤ 40 /min

**Disability**
- Assess Mental Status
- Seizures

**If you have serious concerns about your patient – JUST CALL**

**416-790-9969**

Activate “Code Blue” for all respiratory and/or cardiac arrests or other medical emergencies as per UHN policy.

**While waiting for CCRT have you...**

1. **Notified the MRP?**
   - Ensure functioning 02 and suction at the bedside

2. **Continue to document vital signs**

3. **Remain available and be part of the team**

4. **416-790-9969**
   - Activate “Code Blue” for all respiratory and/or cardiac arrests or other medical emergencies as per UHN policy.
Critical to success – adoption

Correlation between the number of medical emergency team (MET) calls and the rate of cardiac arrests between 1999 and 2004.

17 MET calls per 1000 inpatient admissions is associated with reduction in cardiac arrest rate of 1 per 1000 admissions.
## Number needed to treat

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Outcome</th>
<th>NNT (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low vs. conventional tidal volume</td>
<td>180 day mortality</td>
<td>12 (7-41)</td>
</tr>
<tr>
<td>Spironolactone vs. placebo</td>
<td>2yr mortality</td>
<td>9 (7-16)</td>
</tr>
<tr>
<td>Omeprazole vs. placebo</td>
<td>Recurrent GI bleeding at 8 weeks</td>
<td>6 (4-14)</td>
</tr>
<tr>
<td>CCRT intervention vs. standard of care</td>
<td>Cardiac arrest rate per 1000 admissions over 60 month period</td>
<td>17</td>
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**NNT = 1/ARR** Where **ARR = CER (Control Event Rate) - EER (Experimental Event Rate).**
Critical care response teams

CONTINUING LIFE-SUSTAINING TREATMENT
Background

• Leadership role in Rapid Response Teams
• Introduced May 2005
• 24/7 coverage:
  – New Consults from all TGH floors except cardiac, vascular, emergency room, medical imaging, day units.
  – Discharge follow up of MSICU patients.

• 342 consults in 1st year – 20.6 per 1000 separations
• 2150 visits

• 2012-13 730 new consults, 4050 visits
Early impact

P=0.0001

Cardiac Arrest

Respiratory Arrest

<table>
<thead>
<tr>
<th>May 2003-04</th>
<th>May 2004-05</th>
<th>May 2005-06</th>
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</thead>
<tbody>
<tr>
<td>2.92</td>
<td>2.64</td>
<td>2.47</td>
</tr>
<tr>
<td>4.68</td>
<td>4.55</td>
<td>3.54</td>
</tr>
</tbody>
</table>
Early impact

Mortality Rate per 1,000 Admissions

- May 2003-04: 35.3
- May 2004-05: 35.9
- May 2005-06: 32.9
- May 2006-07: 34.0

P<0.0005
New consultation rate

Consults per 1000 admissions

Performance indicators

Events per 1000 admissions

Cardiac arrests
Respiratory arrests
Continued success?

Mortality rate per 1000 admissions
Critical care response teams

CLINICAL CASE
Clinical Case

Patient, well until 2 days prior
Admitted from community hospital with abdominal pain and symptoms and radiological signs of large bowel obstruction

Background

Pulmonary Fibrosis
Double lung transplant

Taken to the operating room for Rt. Hemicolecotemy, uncomplicated procedure with minimal EBL.
"When I called for CCRT I was informed that the CCRT was currently engaged in a code on the 6th floor and therefore unable to come. I was encouraged to call my on-call MD. MD on call had ordered a 500 ml NS bolus over 1 hr. Seeing that my patient was in distress 2 neighbouring ICU nurses offered assistance, called the ICU MD and shortly thereafter the CCRT arrived.

Please address this issue with the CCRT team"
Outcome

- Returned to the operating room.
- 4 litres of blood evacuated
- No specific bleeding point identified but abdomen dry when closing
- Transferred to MSICU.
Fundamental issues

Reducing Failure to Rescue
- Higher staffing ratios
- Continuing education
- Seniority and expertise
- Complex triggers or AWSS

CCRT is a good idea however
- Cost ($1.55m at TGH)
- Physician-led and delivered
- Require continuing marketing strategy
- Impact on education of RN and MDs
- Diffusion of responsibility
- Evidence base is not robust

Chan, Jain, Nallmothu et al. Arch Intern Med 2010
McNeill and Bryden Resuscitation 2013
Questions
Thank you

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