Debate:
Do Rapid Response Systems “Dumb Down” Floor Staff?
YES (or at least a qualified yes)…

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Goal of this presentation

• Question:
  – Do Rapid Response Teams “Dumb Down” floor staff?

• Poetic license...
  – Can Rapid Response Teams “Dumb Down” floor staff?
# Types of RRS patients

<table>
<thead>
<tr>
<th>Dead</th>
<th>Almost dead</th>
<th>Probably will not die today</th>
</tr>
</thead>
<tbody>
<tr>
<td>–Chest compressions</td>
<td>–Oxygen</td>
<td>–Physiotherapy</td>
</tr>
<tr>
<td>–Bag-mask ventilation</td>
<td>–Non-invasive ventilation</td>
<td>–Cultures</td>
</tr>
<tr>
<td>–Defibrillation</td>
<td>–IV fluids</td>
<td>–Other lab work</td>
</tr>
<tr>
<td>–IV access</td>
<td>–Vasoactive agents</td>
<td>–CXR</td>
</tr>
<tr>
<td>–ACLS drugs</td>
<td>–Central venous and arterial lines</td>
<td>–Adjust medications</td>
</tr>
<tr>
<td>–Intubation</td>
<td>–Monitoring</td>
<td>–Replace electrolytes</td>
</tr>
<tr>
<td>–Chest tubes</td>
<td>–Antibiotics</td>
<td></td>
</tr>
<tr>
<td>&lt; 3 minutes</td>
<td>???</td>
<td>Lots of time</td>
</tr>
</tbody>
</table>
Types of intervention performed by a physician-led team

- Nasopharyngeal/oropharyngeal suctioning and additional oxygen
- Administration of IV fluid bolus
- Administration of IV furosemide bolus
- Initiation of noninvasive positive pressure ventilation by mask
- Nebulized salbutamol
- Temporary ventilation by bag and mask
- Suctioning of tracheostomy tube
- Initiation of IV glycercyltrinitrate infusion
- Administration of anticonvulsants
- Administration of IV vasopressors

Types of intervention performed by a nurse-led team responsible for follow-up after discharge from the ICU

- Guiding tracheostomy management
- Performing tracheal suction and chest physiotherapy
- Guiding management of continuous positive airway pressure
- Optimizing patient positioning
- Requesting prescription or administration of nebulizer therapy
- Requesting blood testing (CBC, urea, electrolytes)
- Increasing the frequency of cardiac/respiratory observations
- Starting hourly fluid balance recording
- Requesting samples to be sent for microculture and sensitivity

Reynolds S, Cardinal P, Baxter A. Critical Care Rounds (2005), 6(3)
Rapid Response System Structure

Data Acquisition Points

Afferent Limb

Event detection

Trigger

Urgent Unmet Patient Need

Administration oversees all functions

Data collection and analysis for Process Improvement

Data acquisition point

Efferent Limb

MET/RRT/CCOT

Specialized resources

Cardiac Arrest Team

Trauma Team

Stroke Team

Shock Team

Crisis Resolved
Do RRSs help?

• MERIT Study
  – Qualified “No” but inadequate RRT “dosing” due to failure of the “afferent limb”

• Variable benefit in code blue reduction
  – Dose response curve associates increased RRT calls with reduced cardiac arrest rates
  – Failure to show benefit in cardiac arrest rates due to failure to activate team
"Dose Response Curve"

Cardiac arrests / 1000 admissions

MET calls / 1000 admissions

$r^2 = 0.84$

$p = 0.01$
The Blame Game/Name

Why do RRSs fail?
• Afferent Limb Failure = ALF

Who really failed?
• Inadequate education
• Culture change management
Potential adverse events include

- “desensitization to emergencies”
- “decreased sense of responsibility for patients on the part of the hospital-ward team”
- “implementation of a rapid response team may theoretically de-skill hospital-ward staff”
• Single centre studies
• Do these data ensure that RRS implementation does not deskill floor staff?
  • Perception versus reality?
  • Generalizable?
Floor nurse

Primary service physician

CCRT Responder

Primary service physician

CCRT Physıcian

• Assist triage determination

• Provide orders for investigation and therapy
Floor nurse

CCRT Responder

Primary service physician

CCRT Physician

• Assist triage determination
• Provide orders for investigation and therapy

I’ve got 8 other patients needing medication, so glad RRT is here...do you think they will notice I am gone?
Can’t believe I got woken up from that dream…good thing I can fall back asleep again in comfort knowing the RRT is there!!!

• Assist triage determination
• Provide orders for investigation and therapy
Set up for trouble???

- Floor staff pushed out of the way/leave when very sick patients get treated
- Afraid to activate RRS if not supported during “false alarm” events
- Spend less time at the bedside of sick patients
- Ward MDs perform fewer assessments and interventions
### Calling Criteria Cards

#### Critical Care Outreach Team

**Calling Criteria**

- **Consider calling CCOT whenever you notice**

<table>
<thead>
<tr>
<th>Acute change in:</th>
<th>Signs / Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Airway</strong></td>
<td>• Threatened</td>
</tr>
<tr>
<td></td>
<td>• Stridor</td>
</tr>
<tr>
<td></td>
<td>• Excessive secretions</td>
</tr>
<tr>
<td><strong>Breathing</strong></td>
<td>• Respiratory rate ≤ 8 or ≥ 30</td>
</tr>
<tr>
<td></td>
<td>• Distressed breathing</td>
</tr>
<tr>
<td></td>
<td>• Saturations &lt; 90% on 50% O₂ or 6 litres/min</td>
</tr>
<tr>
<td><strong>Circulation</strong></td>
<td>• Systolic blood pressure ≤ 90mmHg or ≥ 200mmHg</td>
</tr>
<tr>
<td></td>
<td>• or decrease &gt; 40 mmHg</td>
</tr>
<tr>
<td></td>
<td>• Heart rate ≤ 40 or ≥ 130</td>
</tr>
<tr>
<td><strong>Disability</strong></td>
<td>• Decreased level of consciousness</td>
</tr>
<tr>
<td></td>
<td>(GCS decrease ≥ 2 points)</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>• Urine output ≤ 100ml over 4hrs (except dialysis patients)</td>
</tr>
<tr>
<td></td>
<td>• Serious concern about the patient</td>
</tr>
<tr>
<td></td>
<td>• Need medical assistance</td>
</tr>
</tbody>
</table>

**For immediate CCOT assistance**

JUST PAGE!

416-790-9969

*If the patient is in critical condition, call “Code Blue” as per UHN policy.*
SHOCK TEAM and RAPID RESPONSE TEAM

From Shock to STaRRRT: A Multidisciplinary Approach to Implementing a Rapid Response System for Patients in Shock

Frank Sebat, MS, MD, FCCP, FCCM
SCCM: Rapid Response System Training
Chicago, Illinois  ♦ August 6, 2007
Cycle of Shock

1. Hypoxic
2. Hypovolemic
3. Septic
4. Cardiogenic
5. Anaphylactic

Blood Flow (C.O.) or Blood Pressure or Oxygen delivery

Death

UNTREATED SHOCK IS 100% FATAL

Too Late

Multiorgan Failure

↓↓ Blood Flow or Pressure

↓ Organ Perfusion

↓ Neurologic, Resp, and CV Function

EARLIER RECOGNITION AND EARLY GOAL DIRECTED THERAPY WILL INTERRUPT THIS CYCLE

Respiratory Failure

Acute Change in Neurologic Status

EARLIER RECOGNITION AND EARLY GOAL DIRECTED THERAPY WILL INTERRUPT THIS CYCLE

RRT
RRT
RRT
How Do We Recognize Shock Sooner?

- Learn the early signs of shock
- Have a high index of suspicion
- Once the question of shock is raised, go through the drill, i.e., Hx, assessment using 10 SOV, lab, repeat assessment

Burden of proof on the caregiver i.e.,
Prove to yourself the patient is NOT in shock!
Skin Manifestations of Shock: Livedo Reticularis
STaRRT Activation Card Worn by Staff

**FRONT**

**STaRRT ALERT / ACTIVATION CRITERIA**

10 Signs of Vitality

- Temp ≤ 36°C
- Pulse < 50 or > 100/min
- Pain New or sig. increase
- RR < 6 or > 20/min
- SaO₂ < 90% & ↑FiO₂
- BP SBP < 90 MAP < 60
- LOC Anxiety / Lethargy
- CAP > 3 seconds
- UO < 30 cc/hr x 2 hr.*
- ScvO₂ < 65 or B Deficit ≥ 5

Any patient you are seriously concerned about but does not meet criteria

Call STaRRT Alert ext. 7500 Give Room #

**SBAR COMMUNICATION**

- **S** = Situation: Reason for call, acute problem
- **B** = Background: Reason for adm, current Dx, PmHx, I/O, meds, chart available
- **A** = Assessment: 10 SOV, PEx

**BACK**

**AOV / VIPPS / RESUSCITATION**

Airway → Oxygen → Ventilation

- Ventilate, assure adequate airway, oxygenate SaO₂ > 90%
- Rapidly infused crystalloid or colloid, except pulmonary edema
- Pressors MAP > 60 & assess the pump.
- JVD/CVP, stethoscope, EKG, cardiac echo?
- Pharmacology, i.e., bronchodilators, steroids, antibiotics, anticoagulants, NTG, APC, etc.
- Specific interventions, endoscopy, surgical consult, etc.

- Decreased organ perfusion; resuscitation & lab

- **A** STaRRT PATIENT LAB
- **B**

- • ABG
- • H/H, Lytes STAT
- • 12 lead EKG
- • CXR
- • If sepsis suspected or temp is < 36° or > 38°, or antibiotics to be started: CBC w/diff, 2 blood cultures, sputum GS/CS, UA & urine GS/CS if > 5 WBC/HPF

- • Serum lactate x 2, 4 hrs apart
- • Metabolic & liver panel
- • Type and screen
- • CPK/Troponin
- • D.I.C. screen
- • Amylase / Lipase
- • LDH, PO₄
STaRRT Activation Card Worn by Staff
(Front)

STaRRT ALERT / ACTIVATION CRITERIA
10 Signs of Vitality

- Temp ≤36°C
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- LOC Anxiety / Lethargy
- CAP >3 seconds
- UO <30 cc/hr x 2 hr.*
- ScvO₂ <65 or B Deficit ≥5 or Lactic A >2.0

Any patient you are seriously concerned about but does not meet criteria

Call STaRRT Alert ext. 7500 Give Room #
STaRRT Activation Card Worn by Staff (Front)

**SBAR COMMUNICATION**

- **S** = Situation  
  Reason for call, acute problem
- **B** = Background  
  Reason for adm, current Dx, PmHx, I/O, meds, chart available
- **A** = Assessment  
  10 SOV, PEx
- **R** = Recommendation  
  Your suggested interventions. Order sheet available
STaRRT Activation Card Worn by Staff (Back)

AOV / VIPPS / RESUSCITATION

Airway → Oxygen → Ventilation

Ventilate, assure adequate airway, oxygenate
SaO₂ >90%

Rapidly infused crystalloid or colloid, except pulmonary edema

Pressors MAP >60 & assess the pump. JVD/CVP, stethoscope, EKG, cardiac echo?

Pharmacology, i.e., bronchodilators, steroids, antibiotics, anticoagulants, NTG, APC, etc.

Specific interventions, endoscopy, surgical consult, etc.

Decreased organ perfusion; resuscitation & lab
**STaRRT Activation Card Worn by Staff (Back)**

**A**

- ABG
- H/H, Lytes STAT
- 12 lead EKG
- CXR
- If sepsis suspected or temp is < 36° or > 38°, or antibiotics to be started: CBC w/diff, 2 blood cultures, sputum GS/CS, U/A & urine GS/CS if >5 WBC/HPF

**B**

- Serum lactate x 2, 4 hrs apart
- Metabolic & liver panel
- Type and screen
- CPK/Troponin
- D.I.C. screen
- Amylase / Lipase
- LDH, PO₄
Algorithm for Early Recognition and Treatment of Shock

**PATIENT IN SHOCK**

- **Initiate 500 cc Fluid Increments**
  - (2) 16 gauge IV or central line
  - Up to 2000 cc per protocol
  - Except pulmonary edema

- **Respiratory Support AOV**
  - SaO₂ > 92
  - Decrease work of breathing
  - Early intubation
  - Plus Ambu bag or BIPAP

**Goals**
- SAO₂ > 90
- Decreased work of breathing
- MAP ≥ 70
- UO ≥ 30 cc/hr
- CAP Refill < 3 sec
- Improved mentation

**Goals not met continue VIPPS resuscitation**
- Fluid Challenge Protocol
- Start Dopamine or Levophed MAP < 70
- Add Dobutamine if MAP ≥ 70

**Rapid Transfer**
- ICU or OR

- **Goals not met or increase in pressor requirement or deteriorating oxygenation**
  - Intubate
  - Consider PA catheter for cardiogenic shock
  - Additional Goals:
    - SvO₂ ≤ 70 or ScvO₂ ≤ 60:
      - Transfuse to Hb 10
      - Dobutamine

**Hypoxic Shock**
- Primary Respiratory failure or Acute deterioration in neurologic status

**Hypovolemic Shock**
- Transfusion and Coag Factor Protocols

**Septic Shock and Antibiotic Protocols**
- Consider APC*

**Cardiogenic Shock Protocol**

**Anaphylactic Shock Protocol**
Adjusted Hospital Mortality vs. Median Time to 3 Most Rapid Interventions

Mortality Observed/ Expected Mortality APACHE III

Median Time to Most Rapid Interventions $p < 0.001$

Observed (O) / Expected (E) mortality using Apache III predictions.

(O/E = 1 when observed mortality is equal to expected mortality).
Prevention of in-hospital cardiac arrest

Chain of prevention

Smith GR, Resuscitation 81 (2010) 1209-1211
# Edmonton Program

<table>
<thead>
<tr>
<th></th>
<th>MSS 1</th>
<th>MSS 2</th>
<th>MSS 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of initiation</td>
<td>Sep 1, 2004</td>
<td>Nov 1, 2004</td>
<td>Apr 1, 2005</td>
</tr>
<tr>
<td>MET Calls</td>
<td>36</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>Cardiac arrests</td>
<td>4</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Cardiac arrests/100 separations</td>
<td>1.4</td>
<td>2.1</td>
<td>0</td>
</tr>
<tr>
<td>% Change</td>
<td>↓ 48.9%</td>
<td>↑ 285.8%</td>
<td>↓ 100%</td>
</tr>
<tr>
<td>% ICU admissions with MET activation</td>
<td>60%</td>
<td>38.7%</td>
<td>41.7%</td>
</tr>
<tr>
<td>ICU ALOS (days)</td>
<td>6.1</td>
<td>5.9</td>
<td>6.5</td>
</tr>
<tr>
<td>% Change</td>
<td>↓ 39.7%</td>
<td>↑ 2.5%</td>
<td>↑ 27.2%</td>
</tr>
</tbody>
</table>
“The system’s afferent limb requires sustained education of hospital-ward staff. Without this effort, the system is likely to fail. Accordingly, repeated and multimodal education of existing and new hospital-ward staff is crucial.”
Parting thoughts…

- Inappropriate implementation and support of an RRS can “dumb down” floor staff if you aren’t careful
- Inadequate data available to determine best strategy to avoid this problem efficiently
- Successful RRS implementation requires a major investment in the afferent limb to avoid ALF and ensure the “first 5 minutes” are handled well
- Development of RRS rotations for trainees/orienting staff is a potential strategy