NURSE PRACTITIONERS ON RAPID RESPONSE TEAMS PILOT PROJECT

Vanderbilt University Hospital

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Institute for Healthcare Improvement 100,000 Lives Campaign Objectives

(DECEMBER 2004 – JUNE 2006)

- Save 100,000 lives
- Enroll more than 2,000 hospitals in the initiative
- Build a reusable national infrastructure for change
- Raise the profile of the problem (variability in the quality of American health care) - and our proactive response
The Platform

The six interventions from the 100,000 Lives Campaign:

• Deploy Rapid Response Teams...at the first sign of patient decline
• Deliver Reliable, Evidence-Based Care for Acute Myocardial Infarction...to prevent deaths from heart attack
• Prevent Adverse Drug Events (ADEs)...by implementing medication reconciliation
• Prevent Central Line Infections...by implementing a series of interdependent, scientifically grounded steps
• Prevent Surgical Site Infections...by reliably delivering the correct perioperative antibiotics at the proper time
• Prevent Ventilator-Associated Pneumonia...by implementing a series of interdependent, scientifically grounded steps
Several studies indicate that patients often exhibit signs and symptoms of physiological instability for some period of time prior to a cardiac arrest...


66% (99/150) of patients show abnormal signs and symptoms within 6 hours of arrest and MD is notified in 25% (25/99) of cases. Franklin C, Mathew J. Developing strategies to prevent in hospital cardiac arrest: analyzing responses of physicians and nurses in the hours before the event. Crit Care Med. 1994;22(2):244-247


• Reduction in mean monthly mortality rate (1.01 to 0.83 deaths per 100 discharges) and mean monthly code rate per 1,000 patient-days decreased by 71.7% (2.45 to 0.69 codes per 1,000 admissions) in a children’s hospital. Sharek PJ, Layla M, Parast LM, et al. Effect of a rapid response team on hospital-wide mortality and code rates outside the ICU in a children’s hospital. JAMA. 2007;298(19):2267-2274.

• 17% decrease in the incidence of cardiopulmonary arrests (6.5 vs 5.4 per 1,000 admissions). DeVita MA, Braithwaite RS, Mahidhara R, Stuart S, Foraida M, Simmons RL. Use of medical emergency team responses to reduce hospital cardiopulmonary arrests. Qual Saf Health Care. 2004;13(4):251-254.
Either Ramp up (small group of responders sent to evaluate and further resources deployed as needed)

Ramp down (full team, usually with a physician member, deployed and dismissed as situation dictates.)
Vanderbilt Hospital Rapid Response Initiative

- Oversight by Resuscitation Program
- Ramp up team with RN + RT
- February, 2005 -- Pilot
- April, 2006 – MICU and SICU
- November, 2008 – CVICU
- Family initiated rapid response December, 2008
<table>
<thead>
<tr>
<th>SICU</th>
<th>MICU</th>
<th>CVICU</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 North</td>
<td>11 North</td>
<td>5 South</td>
</tr>
<tr>
<td>9 South</td>
<td>8 North</td>
<td>6 South</td>
</tr>
<tr>
<td>Labor &amp; Delivery</td>
<td>8 South</td>
<td>7 North</td>
</tr>
<tr>
<td>3 Round Wing</td>
<td>7 Round Wing</td>
<td>MCE Cardiology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5th Floor (South Tower)</td>
</tr>
<tr>
<td>4 Round Wing</td>
<td>CRC</td>
<td>Cardiac MRI</td>
</tr>
<tr>
<td>5 Round Wing</td>
<td>6 North</td>
<td>Cath Lab Holding</td>
</tr>
<tr>
<td>6 Round Wing</td>
<td>10 South</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(STATS covered by 10N Trauma)</td>
<td></td>
</tr>
<tr>
<td>4 East</td>
<td>Endoscopy</td>
<td></td>
</tr>
<tr>
<td>Burn Stepdown</td>
<td>Radiology</td>
<td></td>
</tr>
<tr>
<td>4 Maternal Special Care</td>
<td>TVC OBS - ED Holding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 South Bronch Lab</td>
<td></td>
</tr>
</tbody>
</table>
The Rapid Response Team may be activated when non-Intensive Care Unit (ICU) patients meet any of Early Warning Signs. In addition to staff, patients, visitors, or family members may activate the Rapid Response Team using the simple guideline of “something is just not right” or when a medical emergency exists.
If the patient displays any of the following “EARLY WARNING SIGNS,” Call 1-1111 and request the Rapid Response Team without delay. Then call the patient’s primary team physician.

<table>
<thead>
<tr>
<th>Staff Concerned/Worried</th>
<th>“THE PATIENT DOES NOT LOOK/ACT RIGHT,” gut instinct that patient is beginning a downward spiral even if none of the physiological triggers have yet occurred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Respiratory Rate</td>
<td>The patient’s RESPIRATORY RATE is less than 8 or greater than 30</td>
</tr>
<tr>
<td>Change in Oxygenation</td>
<td>PULSE OXIMETER decreases below 90%</td>
</tr>
<tr>
<td>Laborated Breathing</td>
<td>The patient’s BREATHING BECOMES LABORATED</td>
</tr>
<tr>
<td>Change in Heart Rate</td>
<td>The patient’s HEART RATE changes to less than 40 bpm or greater than 120 bpm</td>
</tr>
<tr>
<td>Change in Blood Pressure</td>
<td>The patient’s SYSTOLIC BLOOD PRESSURE drops below 90 mmHg or rises above 200 mmHg</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>The patient develops uncontrollable bleeding from any site or port</td>
</tr>
<tr>
<td>Decreased LOC</td>
<td>The patient becomes SOMNOLENT, DIFFICULT TO AROUSE, CONFUSED, or OBTUNED</td>
</tr>
<tr>
<td>Onset of Agitation/Delirium</td>
<td>The patient becomes AGITATED OR DELIRIOUS</td>
</tr>
<tr>
<td>Seizure</td>
<td>The patient has a SEIZURE</td>
</tr>
<tr>
<td>Other Alterations in Consciousness</td>
<td>ANY OTHER CHANGES IN MENTAL STATUS OR CNS STATUS such as a sudden blown pupil, onset of slurred speech, onset of unilateral limb or facial weakness, etc.</td>
</tr>
</tbody>
</table>
Barriers Identified

- Needed immediate provider on rapid response call to decrease delay in treatment
- Provider needed to place off protocol medications, labs, diagnostics quickly
- Provider needed to facilitate communication with primary team and ICU team
- Provider needed to expedite transfer to ICU when necessary
Proposal for pilot presented to Rapid Response Steering Committee in December, 2010

MICU NPs going to calls unofficially since October, 2010, started with pilot January 1, 2011

SICU to daytime calls – January 11, 2011

SICU developed and interim standard of practice through their MDSCC
Training

- Critical Care trained ACNP
- ACLS, FCCS
- History and Goals of Rapid Response
- Communication with Nurse, Primary Team, ICU Fellow/Attending
- Simulation Training
- Documentation/ Billing
Multi-ICU Simulation Training for Emergency Response
Electronic Note Developed

- For Documentation of Evaluation and Management and Critical Care
- Collaboration with VMG Coding/Billing and Star Panel Informatics
- Rapid Response NP/PA Note
Data Collection

- **Research of ACNPs on RRT**
  Pirret, Alison M. The Role and Effectiveness of the Nurse Practitioner on a Critical Care Outreach Service. Intensive and Critical Care Nursing. 2008;24:375-382

- **Data Mining of >100 notes at end of February**

- **Potentially Relevant Data Identified**

- **Database Developed when manual entry and collection recognized too cumbersome**

- **NPs enter information into Secure Redcap Database at end of each call**
Data Collection

- Demographics
- Responding Team and to which Floor
- Triggers for call
- NP Diagnosis/Interventions
- Prior ICU admission, OR or procedures and time since?
- Discussion with MD
- Agreement on Disposition?
- Disposition – to preferred ICU?
- Barriers to Transport
- Further Review Needed – why?
NPs on RRT Redcap Database

- 309 calls Jan-May
- Average time of call 31.8 minutes
- 103 transfers to ICU
- 114 encounters generated critical care billing
- NP unique interventions - 1005
  - 112 lab tests
  - 154 medications
  - 84 x-rays, 88 EKGs
  - 9 procedures
  - 256 education events
NPs on RRT Redcap Database

- 898 calls Jan-Dec
- Average time of call 31.8 minutes
- 303 transfers to ICU
- 317 encounters generated critical care billing
- NP unique interventions - 3056
  - 341 lab tests
  - 454 medications
  - 257 x-rays, 257EKGs
  - 26 procedures
  - 860 education events
Location of Rapid Response Calls
January – May 2011

Cases

- 8N
- 8S
- 7RW (blank)
- 9S
- 9NSM
- Other
- 6N
- ED
- 10SD
- 10S
- 11N
- 3RW
- 6RW
- 4RW
Final Disposition of Patients on Rapid Response Calls January – May 2011

- No, stayed in current location: 200 cases
- Yes, transferred to the preferred ICU: 80 cases
- Yes, moved to non-ICU higher level of care: 20 cases
- Yes, transferred to a non-preferred ICU: 10 cases
- (blank): 5 cases
- No, died: 0 cases
Triggers for RN, Staff, MD or Family to Call a Rapid Response Jan- May 2011

- Change in heart rate: 60 cases
- Change in oxygenation: 50 cases
- Change in BP: 45 cases
- Decreased level of consciousness: 35 cases
- General concern: 30 cases
- Labored breathing: 25 cases
- Seizure: 20 cases
- Change in respiratory rate: 15 cases
- Hemorrhage: 10 cases
- Agitation/delirium: 5 cases
- Other change in consciousness: 5 cases
- (blank): 5 cases
- Chest pain: 1 case
NP Interventions on Rapid Response Calls January – May 2011

- Assessment and exam
- Medication / fluid / blood products
- Education-support of patient / family
- Laboratory test
- Education-support of nurse
- ECG
- Radiographs ordered
- Education-support of physician
- Airway suctioning
- Procedure
- Cardiopulmonary resuscitation

Cases

0 50 100 150 200 250 300
Lab Tests Ordered by NP on Rapid Response Calls January – May 2011

[Bar chart showing the frequency of various lab tests ordered by a NP on rapid response calls. The tests include:

- Cardiac enzymes / troponin: 90 cases
- Electrolytes / Creatinine: 60 cases
- ABG: 40 cases
- CBC: 30 cases
- Glucose: 20 cases
- Coagulation: 10 cases
- Lactate: 5 cases
- Cultures: 2 cases
- Liver function: 1 case]
Medications Ordered by NP on Rapid Response Calls January – May 2011

- Oxygen: 60 cases
- Fluids: 45 cases
- Analgesic: 20 cases
- Other: 15 cases
- Antiarhythmic: 10 cases
- Bronchodilator: 10 cases
- Naloxone: 8 cases
- Antihypertensive: 8 cases
- Sedative: 6 cases
- Diuretic: 6 cases
- Nitrates: 5 cases
- Anticonvulsant: 5 cases
- Antiplatelet agent: 5 cases
NP Contacted MD on Rapid Response Calls January – May 2011

Cases

- Primary resident: 250
- ICU Fellow: 150
- Primary attending: 50
- Primary fellow: 50
- Consulting fellow: 50
- ICU resident: 50
- ICU attending: 50
- Consulting resident: 50
- Consulting attending: 50
Barriers Identified by NP on Rapid Response Calls January – May 2011

- ECG response
- Delay in ICU bed availability
- Response of patient’s primary MDs
- Radiology response
- Complicated / prolonged transport
- Getting lab results
- Difficulty obtaining medications
- Response of ICU MDs
- Other
- Response of consultant MDs
- Difficult or disruptive physician
- Unavailable / delayed / broken equipment
- You getting to the patient

Cases
Rapid Response calls by month 2011
ICU Team RRT Calls

2011

<table>
<thead>
<tr>
<th>RRT by ICU Team</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>RRT CVICU Team</td>
<td>144</td>
</tr>
<tr>
<td>RRT MICU Team</td>
<td>720</td>
</tr>
<tr>
<td>RRT SICU Team</td>
<td>493</td>
</tr>
</tbody>
</table>
Triggers Jan-Dec

- Change in BP
- Change in heart rate
- Decreased level of consciousness
- General concern
- Chest pain
- Labored breathing
- Seizure
- Change in respiratory rate
- Other change in consciousness
- Hemorrhage
- Agitation / delirium
- Blank

Data Update Jan-Dec
ACNP Diagnoses Jan-Dec

- Respiratory distress / hypoxemia: 22%
- Pain: 16%
- Hypotension: 14%
- Tachyarrhythmia: 12%
- Sepsis: 11%
- Hypertension: 9%
- Angina / MI / ACS: 8%
- Stroke: 8%

Update Jan-Dec Data
RRT vs Code 2011

Update Jan-Dec Data
Did We Address the Initial Problem?

Have you found having an ICU Nurse Practitioner on the Rapid Response Team beneficial? 96% Yes
If you answered yes, please tell us why

- Placed additional orders such as diagnostics, labs and medications (24)
- Facilitated a quicker transfer to the ICU when needed (9)
- Encouraged and facilitated communication with the primary team (21)
- Collaborated with me and others of the healthcare team on action plan (15)
- Provided support to me on the rapid response team (17)
- Other (20)

VANDERBILT UNIVERSITY MEDICAL CENTER
Is NP beneficial on RRT? 96% yes
- Provides orders outside RN scope 100%
- Facilitated quicker transfer to the ICU when needed 62.5%
- Facilitated communication with primary team 70.8%
- Collaborated with healthcare team on action plan 83.3%
- Provided support to CN 87.5%

Knowledgeable and skilled in emergency? 100% yes

Promote teamwork? 100% yes

Provide education? 86% yes, 14% n/a
I liked it, because before the NPs went on the RRTs I would typically find myself in a room with the patient acutely going bad while the primary team would say "The ICU nurse is here we are going to take care of our other patients." So I would not only be trying to get the patient back to the ICU but trying to take care of the patient at the same time. I like the additional support the NPs provide, because they can put in additional orders that I might need, while I concentrate on taking care of the patient.

This has been wonderful! We can immediately start ordering labs, tests, and such to investigate patients' condition. This is a great time-saver. Their additional knowledge of diseases and treatment of conditions is very helpful.

The house staff are more receptive to the NP’s suggestions.

I feel more comfortable with them on the call because I feel like more things will get done in a timely manner. I also feel that those calls which pts. may or may not need to come (to the ICU), the NPs can help make that decision. This will provide appropriate transfers to be made.
Multiple processes identified for further research and improvement

- Recommended improvements to bed assignment process flowchart
- Established criteria for always contacting ICU fellow/attending
- Systems improvement to expedite CXR and EKG
- Systems improvement underway to expedite lab results and medication delivery
- Improved communication of updates to housestaff, nursing and administration
Criteria for the RRT ACNP to contact the ICU fellow/attending and discuss the situation and whether a transfer is warranted.

1. If the patient needs a higher level of care.
2. Inability to resolve the reason for the RRT call within 30 minutes.
3. If the RRT has been called multiple times on the same patient.
4. If there is not mutual agreement between the Primary team and the RRT that the RRT should be dismissed from a patient.
5. If any of the following conditions occur:

   **CNS** — Altered mental status; Any new focal neurologic deficit

   **PULM**— BIPAP and/or FiO2 50% or >: Suspected new onset PE/pneumonia/ARDS/pulmonary edema/suspected or witnessed aspiration

   **CV** — HR < 40 or >140/min; SBP <90 or >180 mmHg; New onset Arrhythmia; ACS with instability; Acute CHF

   **METABOLIC** — Temperature > 41 OR < 35 degrees centigrade; HHHK or DKA. New onset hypoglycemia (BG < 60, requiring > 1 ampule of glucose)

   **HEMATOLOGIC** — Massive acute bleeding; HCT <24 after >4 units of PRBCs in 24 hours; PLTs< 50,000 with persistent bleeding

   **ID** — SIRS with hemodynamic instability; Sepsis

   **RENAL** — Acute renal failure; Anuria despite resuscitation; UOP <25cc/hr >12hr; Cr doubled during hospital stay

   **LABS** — Lactate >4 despite fluid resuscitation; pH <7.25 despite resuscitation
NP Role Clearly Defined

- Respond with charge nurse and respiratory therapist
- Perform assessment and initiate early management
- Facilitate team communication and collaboration
- Provide critical care management when necessary
- Perform emergent procedures if immediately needed
- Triage to appropriate level of care
- Document evaluation and management
- Collect data and participate in process improvement
- Take issues and grievances to ICU collaborative meetings. Persistent or sentinel system issues can be taken to the Rapid Response Steering Committee and Institutional Critical Care Committee.
Conclusions

• NPs decrease time between symptom onset and treatment.
• NPs facilitate rapid transfer to ICU when necessary.
• NPs evaluate, diagnose and initiate consistent, early management.
• NPs facilitate team communication and collaboration.
• NPs provide critical care management when necessary.
• NPs perform emergent procedures if immediately needed.
Conclusions (cont’d)

• NPs provide staff, patient and family education.
• NPs facilitate early consultation with other healthcare teams.
• NPs decrease unnecessary returns to ICU by early communication and management.
• NPs collect additional data for identification of issues and process improvement.
• NPs are able to bill for calls.
Barriers?

- Not enough NPs to cover RR 24/7 while managing ICU patients
- Variable NP experience
- Need for Backup NPs when ICU NP involved in procedure or high acuity patients in the ICU
• NPs on all Emergency Response – RR, Stat, Codes
• NP, RN, RRT Team Training
• Research NP on Stroke Alert Team
• Multiple Research Projects Identified as a Result of Pilot – Encouraging MD/NP Research Teams
• Dedicated Rapid Response Team
MICU and SICU Nurse Practitioners
Vanderbilt Nursing
MICU and SICU Multidisciplinary Teams
Vanderbilt Lifeflight
Rapid Response Steering Committee
Critical Care Anesthesia