Modified Early Warning Score (MEWS) in the Electronic Health Record (EHR)
Andy Schmid RN, MHA  Regional Director IT Optimization
Sashikanth Kodali, MD  Director Clinical Innovation
Amanda C Bengier BA   Clinical Innovation Analyst
Geisinger Medical Center, Danville, PA

Introduction
- Despite a formal and high functioning Rapid Response Team (RRT) practice at Geisinger:
  - Anecdotal review of 2008-2010 RRT’s concluded that there were delays in identifying patient deterioration
  - A majority of 2010 RRT patients displayed a decline in physiologic parameters 4-12 hours prior to the RRT
  - Increased RRT calls can develop from incorrect patient placement, especially in hospitals with high census peaks. (1)
- Modified Early Warning Score (MEWS) is linked to:
  - Transfer to the ICU
  - Mortality
  - Cardiac Arrest (2,3,4)

Project Goals
- Implementation of MEWS protocols and standard of care
  - Use real-time automatic calculation of MEWS in the EHR from existing vital sign documentation - NO HAND CALCULATION
- Display MEWS real-time in the EHR
- No delays in communication
- Provide IT decision support in the EHR that facilitates MEWS protocols
  - Create automated reporting of process metrics
  - Use information from the Geisinger data warehouse
- No chart reviews to review process metrics
- Timely feedback to nursing units on current status
- Outcomes to be measured:
  - Length of stay
  - Mortality outside the ICU
  - Transfers to the ICU
  - Codes outside the ICU

Implementation Team
- Chairperson: Code and RRT committee
- Nursing: nurse educators, staff nurses, managers, IT Director of Optimization
- Providers: Clinical Innovation IT Director
- Clinical Innovation: Intermediate analyst
- IT: Inpatient EHR build analysts

MEWS Calculation and Algorithm

<table>
<thead>
<tr>
<th>MEWS Score</th>
<th>Nursing Action</th>
<th>MEWS Calculation Algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>Routine Monitoring</td>
<td>Temp, HR, Resp, GCS, SPO2</td>
</tr>
<tr>
<td>3-4</td>
<td>Increased nursing surveillance, Q1 and Q2 hrs.</td>
<td>Increased nursing surveillance, provider bedside</td>
</tr>
<tr>
<td>5-7</td>
<td>Notify RN</td>
<td>Temp, HR, Resp, GCS, SPO2</td>
</tr>
<tr>
<td>8-10</td>
<td>Notify RN, transfer to ICU</td>
<td>Temp, HR, Resp, GCS, SPO2</td>
</tr>
<tr>
<td>11-15</td>
<td>Notify ICU, transfer to ICU, codes outside of ICU</td>
<td>Temp, HR, Resp, GCS, SPO2</td>
</tr>
</tbody>
</table>

Evaluation
- Process Metrics – Leadership was provided twice weekly reports of patients currently in the hospital and how nurses and providers were following the MEWS policy
- Nursing Process Metrics:
  1. Increased vital sign frequency with elevated MEWS
  2. Documentation of evaluation of elevated MEWS

Outcomes
1. Successful implementation of real time automated MEWS calculation and implementation of standards incorporated in daily EHR workflows is possible, as evidenced by > 90% nursing process compliance by month 3.
2. Implementation of MEWS within the EHR allowed for timely and automated process review.
3. Consistent results following MEWS implementation:
   - Codes outside the ICU: Decreasing
   - Unsafe transfers to the ICU: Decreasing
   - Mortality outside of the ICU: Decreasing
   - Transfers to the ICU: One hospital increased and one hospital decreased
   - Length of stay: One hospital increased and one hospital decreased

References
1. JAMA: The Journal of the American Medical Association, Issue/volume 304(12), 22/29 September 2010, p 1375-1376 Eugene Litvak, PhD, Peter Pronovost, MD, PhD  “Rethinking Rapid Response Teams”
3. JAMA: The Journal of the American Medical Association, Issue/volume 304(12), 22/29 September 2010, p 1375-1376 Eugene Litvak, PhD, Peter Pronovost, MD, PhD  “Rethinking Rapid Response Teams”
4. Carle C., et.al. : Use of a Modified Early Warning System to Predict Outcome in Patients Admitted to a High Dependency Unit. Critical Care 2007, vol 11