ePOD
(early Predictor Of Deterioration)

Presenters:
• Kathy Simpson, BSN, RN - MET Director, IMC
• Kathryn Kuttler, PhD - Medical Informaticist
• Scott Evans, MS, PhD - Medical Informatics Director, Intermountain

Initial Collaborators/Developers:
• Scott Evans PhD, Kathryn Kuttler PhD, Kathy Simpson RN, Stephen Howe BS, Peter Crossno MD, Kyle Johnson, Misty Schreiner RN, James Lloyd, William Tettelbach MD, Roger Keddington APRN, Alden Tanner RN, Chelbi Wilde RN, Terry Clemmer MD, Jeff Moore
Objectives

• Why ePOD was developed
  • IHI Mortality Diagnostic
• “Failure to Rescue” or Delays in Rescue (deterioration time) and how they affect patient outcomes
• Effective rapid response systems need two limbs:
  • Afferent (recognition)
  • Efferent (response/treatment)
• ePOD, what it is, what it does
• ePOD publication
“People die unnecessarily every single day in our hospitals. The goal is to respond to a “spark” before it becomes a “forest fire”” 2005 Institute for Healthcare Improvement

<table>
<thead>
<tr>
<th></th>
<th>ICU Admission</th>
<th>No ICU Admission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort Care</td>
<td>86/3175 3% (0-14%)</td>
<td>402/3175 13% (0-40%)</td>
</tr>
<tr>
<td>Non Comfort Care</td>
<td>1161/3175 37% (10-72%)</td>
<td>1526/3175 48% (18-76%)</td>
</tr>
</tbody>
</table>

Aggregate Results for 64 US Hospitals
Three things that lead to patient deterioration and death

*(IHI 2005)*

1. Failures in planning
   - Includes assessments, treatments, goals
2. Failure to communicate
   - Patient-to-staff, staff-to-staff, staff-to-physician, etc.
3. Failure to recognize a problem

These three problems often lead to *Failure to rescue*
Failure/Delays in Rescue
what we know...

• Risk of death from in-hospital cardiac arrest is 50-90%

• “Unexpected” cardiac arrests usually preceded by 6-8 hours of instability (deterioration time)
  
  Chest 1990; 98: 1388-92

• Patients who are attended to within 30-60 minutes of physiological deterioration have significantly lower mortality rates
  
Delays in Rescue
Mike Young et al

Identified simple clinical predictors of rapid deterioration in patients on the acute care floors who may have benefited from prompt ICU admission

*JGIM 2003;18: 77-83*
Delays in Rescue
91 consecutive non-cardiac patients

- Determined the time each pt. first met physiologic criteria (deterioration time)
- Categorized patients into “rapid” transfers (<4hrs) and “slow” (≥4hrs) transfers
Delays in Rescue

Followed the patients’ through their hospital course and determined that “delays in rescue” were directly associated with increased morbidity, mortality and cost.
“Delays in Rescue” affects a person’s ability to function independently at discharge.
To be effective, Rapid Response Systems must have two limbs:

- Afferent (recognition)
- Efferent (medical response/treatment)
The success of the Healthcare system’s ability to prevent acute care codes and keep their patient’s safe is directly tied to individual nurses’:

- experience
- clinical judgment
- work environment
- ability to recognize deterioration
Annihilating Failure to Rescue: Recognition

• Support our indispensable nurses.... Because we know that half of patients who die on acute care units do so unexpectedly; many of them after prolonged deterioration...

• Support nurses with a clinical algorithm that helps them recognize their patient’s deterioration sooner...

• ePOD early Predictor Of Deterioration
ePOD

- Applies to acute care patients ≥ 13 years
- Exclusions: ED, ICU, OR, PACU, L&D, hospice/comfort care
- 11 patient parameters analyzed and assigned a “score” every time new vitals are entered
  - SBP, HR, RR, temp, change in oxygen requirement and neuro data
- When cumulative score is ≥ 4, an alert is sent to designated clinician on the unit (charge nurse), who further assess the patient with the bedside nurse
  - Emails or pages can be sent to other recipients as well (e.g. manager, educator, nursing supervisor)
<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP</td>
<td>≤50</td>
<td>51 - 70</td>
<td>71 - 81</td>
<td>82 - 90</td>
<td>91 - 199</td>
<td>≥ 200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>≤ 34</td>
<td>35 - 40</td>
<td>41 - 51</td>
<td>52 - 114</td>
<td>115 - 124</td>
<td>125 - 129</td>
<td>130 - 200</td>
<td>≥ 201</td>
<td></td>
</tr>
<tr>
<td>Temp</td>
<td>≤ 38.0</td>
<td>38.1 - 38.9</td>
<td>≥ 39.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR</td>
<td>≤ 7</td>
<td>8 - 9</td>
<td>10 - 23</td>
<td>24 - 25</td>
<td>26 - 29</td>
<td>≥ 30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>O2 increase by ≥ 3 LPM</td>
<td>Change from NC to mask</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAMDU</td>
<td>Moderate sedation</td>
<td>Deep sedation</td>
<td>Unconscious</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ranchos</td>
<td>Level 3: Localized response</td>
<td>Level 2: generalized response</td>
<td>Level 1: no response</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orientation LOC</td>
<td>Arouses with difficulty requires painful stimuli to arouse</td>
<td>Unresponsive/ unable to arouse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GCS</td>
<td>Inappropriate</td>
<td>Incomprehensible</td>
<td>no verbal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAM</td>
<td>Positive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RASS</td>
<td>-5 no response to verbal prompt or to physical stimulus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuro/ AVPU</td>
<td>Unresponsive to Pain</td>
<td>Responds to Voice</td>
<td>Alert</td>
<td>New agitation/ confusion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• After they receive the ePOD alert, clinicians should take the appropriate actions including notifying LIP/MD, appropriate care interventions and problem charting

• An icon in HELP2 can be accessed to display 24 hours’ worth of vital sign data in graphical form, assisting the clinician in identifying trends and deterioration
HELP2
Graphs
HELP1 ePOD alerting methods

- E-mail
- Pager
- Cell Phone
- Vocera – Audio & Text alert
- Specktralink
HELP1 email alert

Room: T111  Patient: 098765432  Name: XTEST, SAM H
Age: 79Y  Gender: M  Admit Diagnosis: PYELONEPHRITIS
Height: 160 cm  Weight: 72 kg  BSA: 1.83 sqm  BMI: 24.9
Advance Directive found: 02/07/15 00:31

ePOD Alert
ePOD (early Predictor Of Deterioration): 7 Triggered at: 02/09/15 15:51

SBP: 51, 02/09/2015 15:39, Points: 3
HR: 119, 02/09/2015 14:10, Points: 0
RR: 10, 02/09/2015 14:05, Points: 0
Temp: 0, --/--/---- --:--, Points: 0
O2 LPM: --/--/---- --:--, Points: 0
LOC (unresponsive): 02/09/2015 15:51, Points: 4
HELP1 pager/cell/Vocera alerts

Mar 12, 7:33 AM

(ePOD Alert) Room: T1307
Patient: 123456789
Advanced Directive found. POLST found.
SBP: 57
HR: 128

• Only displays values with points
• Date and time is the date and time of the page/text, not alert
• Vocera only says/text “ePOD alert” and room #
After a two year prospective observational study of ePOD, we found:

- Positive Predictive Value between 91-98%
- Significant increase in appropriate MET calls (60 vs 29, \( p = 0.0004 \))
- MD notified 44-90% of the time after receiving an alert
- Interventions occurred 52-72% of the time (recognized sooner)
- Significantly fewer patients died [84 (2.6%) vs 125 (3.7%), \( p = 0.022 \)] (Deterioration time affected)
Questions?