Situation awareness and its role in detecting clinical deterioration

Solutions for Patient Safety
Hospital Improvement Innovation Networks (HIIN)
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Division of Hospital Medicine
Objectives

• Understand the concept of Situation Awareness and its application in health care

• Describe how huddles, proactive risk assessment and mitigation plans are used to improve patient safety

• Share ideas and ongoing work to further leverage patients, families, care teams and big data to improve situation awareness and patient safety

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Clinical Example

• 6 month old is admitted to floor with acute gastroenteritis is initially improved after 2 fluid boluses in ED
• Begun on maintenance fluids but diarrhea increases
• Overnight parents note he is less playful
• Later heart rate rises from 120 to 170
• On morning pre-rounds he is difficult to awake
• Pulses difficult to palpate and code called
Outcome of In-Hospital Arrest

- Pediatric patients that suffer a cardiopulmonary arrest have a dismal prognosis
  - 50-67% mortality
  - Many others with long-term neurologic morbidity
- Many of these arrests are *preventable* if we can identify patients as they begin to deteriorate
“Patients don’t suddenly deteriorate. Healthcare professionals suddenly notice.”
Clinical status vs. Anticipated Recovery

- Admission Assessment
- Systematic identification & Mitigation
- Early Warning Score
- Medical Emergency Team
- Effort needed to return to recovery

Brady Hospital Pediatrics 2014

Time
Inattentional blindness in vigilance tasks

Simons and Chabris 1999

Drew, Vo, and Wolfe 2013
Situation Awareness

1. Gather Information “Perception”

2. Recognize & Understand “Comprehension”

3. Anticipate “Projection”

What?

So What?

What Now?

Decide

Act

Brady Hospital Pediatrics 2014
What is Situation Awareness (SA)?

• Simple Definition:
  • Knowing what is going on around you
  • Having a notion of what is important
  • Anticipation of possible future consequences of the current situation

Dr. Mica Endsley (1995)

• Shared situation awareness:
  • The degree to which team members have the same SA in important areas
So is SA a problem in healthcare?

• In studies looking at agreement among team members (shared SA):
  • In a Scottish ICU, when physicians on same team predicted likelihood of deterioration, they agreed on 45% of patients¹
  • In a US hospital, nurses and physicians caring for the same patients agreed on 42% of medication changes and 11% of planned procedures²

¹ Reader BMJ Quality and Safety 2011
² O’Leary BMJ Quality and Safety 2010
System that improved situation awareness and reduced untreated clinical deterioration would reliably:

- **Proactively** identify patients at risk
  - Through PEWS, gut feeling ("watchers"), high-risk therapies, etc.
- **Mitigate** risk on the unit through primary team
  - With specific, time-bound plans and predictions
- **Escalate** risk that is not fully addressed
  - Through rapid response teams and scheduled huddles
Tacit knowledge: Watchers

Crandall et al 1993
Patient List Screen

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Huddles

• Short, structured briefings designed to:
  • look back on recent events
  • look forward to upcoming events/emerging threats

• We integrate 3 tiers of huddles:
  • Microsystem (e.g. general pediatric unit)
  • Mesosystem (e.g. inpatient system)
  • Macrosystem (organizational)
MICRO LEVEL (Unit Huddle)

Look back: individual providers report on unexpected events, medical response team calls
Look forward: individual providers report on individual patients at risk for safety events
Integration: charge nurse considers overall unit status, planned discharges, staffing needs

MESO LEVEL (Inpatient Huddle)

Look back: charge nurses from each microsystem report on unexpected events, transfers to higher levels of care
Look forward: individual microsystems report on higher risk patients in mesosystem, overall unit status
Integration: Manager of Patient Services (MPS) works with charge nurses to develop plans and predictions for highest risk patients, develop capacity plan through system, predict and mitigate experience failures

MACRO LEVEL (Daily Operations Brief)

Look back: mesosystem leaders report on unexpected outcomes over last 24 hours, resolution of concerns raised at previous brief
Look forward: mesosystem leaders predict and plan for big issues of day with focus on problems at intersections of mesosystems
Integration: administrator of the day identifies responsible party(ies) for each concerns and sets clear follow-up
Proactive escalation through mesosystem huddle

• Three times daily discussion of any concerns not fully addressed and any *predicted* MRTs

• Includes:
  • Charge nurse from each unit
  • Nurse manager
  • Senior attending Safety Officer

• Nurse manager and safety officer coach charge nurses
Safety officer of the day (SOD)

• Attending-level physician with:
  • “gray hair”
  • Clinical expertise
  • Organizational expertise
  • Gravitas
  • Skilled communicator and teacher

OR maybe?

• More junior physician with clear access to and authority given from senior leader (e.g., Chief of Staff, CMO)
Our first year: identifying is only a start

- First year of journey moved from relying on individual clinicians to a **system** that identified >90% of patients who had UNSAFE transfers
  - BUT in many cases risk was not successfully mitigated/reversed
  - AND risk was not escalated even when patient was not improving
- Watching the “watchers”
SMART Aim

- Specific
- Measurable
- Actionable
- Relevant
- Time bound

“Some is not a number. Soon is not a time.”

- Don Berwick
Robust Planning Tool

- Identifying the problem or concern
- Making responsible parties aware
- Forming a plan
- Predicting an expected outcome
- Setting a deadline
- Deciding on an escalation plan if outcome is not met
Cincinnati Children’s Hospital Medical Center

Situation Awareness Concern Note

Concern Category: {CONCERN:304610173}

Clinical Concern Details: ****

Vital Signs: Patient Vitals in the past 8 hrs.

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PEWS: Pews Total Score 1

Problem-focused Physical Exam: ****

Assessment: ****

Plan: ****

Expected Outcome: ****

Outcome Deadline: {DEADLINE:304610179}

Escalation Plan: If expected outcome not met, {ESCALATION:304610180}.

Discussed with nurses, RT, and family. Everyone is in agreement with the plan.

PATRICK W. BRADY, MD
Defined as any patient that is transferred from unit to ICU and within 1 hour is:

- Intubated
- Placed on inotropes OR
- Given 3 or more fluid boluses
Proposed model

Implementation Of HRO-SA Huddles -> Improved efficiencies and quality of information sharing

Accountability -> Empowerment

Culture of Collaboration and Collegiality -> Sense of Community

Increased quality of collective awareness leading to enhanced capacity to reduce failures and eliminate patient harm
Huddle results

Improved efficiencies and quality of information sharing

“We learned the new terminology. ….We learned what a watcher was, we learned what high risk therapy was, and then in practice continued to report these concerns, we began to…identify who was at risk on your unit, and who wasn’t.” (Bedside nurse)
Huddle results

Culture of collaboration/collegiality

“Anti-competition, consideration, compassion – don’t assume that the unit is saying no because they don’t want to help, all have a better idea of what’s going on other units and know that everyone is busy!” (Nurse manager)
Improvement learnings—Cincinnati

• Need a multidisciplinary team
  • Nurses, doctors, improvement experts
  • Intensivists and non-intensivists (hospitalists are often great partners)
• Need senior leadership support
• Need outcome metrics (emergency transfers, critical deterioration, etc.)
• Start with the willing and design healthy competition
• Tell stories loudly and often
• Even in sustain needs continued check-in points and coaching (e.g., at huddles)
Spread across Ohio children’s hospitals
Context, context, context

- Organizational structure differs greatly and is tremendously important
  - Need to find the right “boots on the ground” leaders as well as senior leader support
- Mature safety culture is needed
  - Cannot argue about preventability for months
  - Front-line needs some empowerment
- Process metric (reliability of SA bundle) is labor-intensive without an EHR
Take home: doing QI well, with discipline, is really hard
And this is what is published!
Improvement learnings—spread

• Fail often and small: 2-3 PDSAs per week, n of 1 testing
  • It is impossible to get this right the first time or to plan it perfectly
• Understand your system quantitatively and qualitatively before you start
  • What are the most common failures? When do they occur? Does a busy resident or nurse think unrecognized deterioration/situation awareness is an important challenge?
• Have a theory or framework connecting your intervention(s) to your specific and global aims
  • Focus on drivers, not roles or exact processes
• Understand education and communication are likely necessary but not sufficient for reliable improvement
**AIM**
Reduce the Ohio Network’s Emergency Transfer (ET) Rate per 10,000 APD from 4.4 to 2.2 by 12/31/17

**KEY DRIVERS**

1. **Effective Learning Structure**
2. **Senior Leaders Engagement & Support**
3. **Unit Leaders Engagement & Support**
4. **Situation Awareness Bundle: ID, Mitigate, Escalate Unit Risk**
   (Process Measure: %Reliability to SA Bundle)
5. **Culture of RESPECT**

**INTERVENTIONS**

1. **1. QLTY OCHA Board Meetings**
2. **2. Other CEO communications**
3. **3. Resource allocation**
4. **4. Accountability of leaders to uphold hospital respect standards**
5. **5. CEO’s assign Sr. Leader Champions of SSE events**
6. **6. OTHER?**

1. **Unit Leader Rounding to Influence**
2. **Unit Daily Huddles**
3. **Unit Top 10 Problem List**

1. **1. Identify** patient-level risk factors such as:
   - PEWS
   - Watcher/gut feeling
   - High-risk therapies
   - Family concerns
2. **2. OTHER??**

1. **1. Mitigation** of pt. level risk factors such as:
   - Unit huddles
   - Planning tools such as checklists, templates, and -
   - EHR tools
2. **2. OTHER??**

1. **1. Escalation** of pt. level risk factors such as:
   - Inpatient huddles
   - Safety officer of the day
   - Safety rounds
   - Family-activation of rapid response team
2. **2. OTHER??**
Leadership Methods for SA

• Daily Organizational Safety Brief
  • Share if you had an Emergency Transfer (formerly UNSAFE transfer) during brief
  • Follow up on a future brief re: results of lessons learned from Emergency Transfer

• Senior Leader Walkaround
  - Senior Leaders focus (with script) on progress with SA Bundle and key lessons learned by bedside and unit leaders

• Unit Leaders utilize structured tools such as an Apparent Cause Analysis for each transfer
Leadership Methods for SA

• Daily Rounding to Influence at Unit Level
  • Unit leaders round to identify barriers with the SA Bundle
  • Talk with staff about any events and lessons learned
  • Reinforce significance of SA work

• Daily Unit Huddles
  • Review last 24 hours SA Bundle reliability, events, etc.
  • Predict for next 24 hours

• Top 10 Problem List
  • Barriers identified with implementation are placed on list
  • Process issues from events placed on list
What still keeps me up at night....

• We use only a tiny fraction of patients and families’ expertise, will, and time

• We collect vast amounts of data and have often quite limited ways of organizing and displaying for clinicians

• Our care teams continue to grow, further taxing modest communication and teamwork structures
Developing and evaluating the success of a family activated medical emergency team: a quality improvement report

- Family-activated METs were uncommon and not a burden on responders
- Patients were transferred to the ICU less commonly following family vs. clinician-activated METs
  - Although ~1/4 were transferred to the ICU and may have otherwise been missed
- Families identify high risk safety scenarios that clinicians may have been missed
Background

- Families of children with chronic illness have nuanced understandings of their child’s baseline behavior and temperament
- This may enable them to recognize changes in their child’s status before clinicians
- In primary care family belief that an illness was different from previous illnesses was associated with >25 fold increased odds of serious infection\(^1\)
- Little evidence exists on how to partner with families to use this expertise in hospital\(^2\)

\(^1\)Van den Bruel BMJ 2012
\(^2\)Berger BMJ Q&S 2014
Family-clinician partnership

Family expertise:
- child’s behavior
- temperament
- sleep
- appetite
- experience with prior illnesses & treatments

Clinician expertise:
- physical exam
- lab interpretation
- illness severity & triage
- differential diagnosis
- pattern recognition
- evidence-based treatment

Thanks to Julie Elkus, MBA
Objective

• Develop a comprehensive understanding of how families identify and communicate about their child’s worsening illness in the hospital
Eligibility and recruitment

- Eligible children:
  - Hospitalized on our complex care team
  - Have a ICD-9 or 10 diagnosis of neurologic impairment and/or a neurologic complex chronic condition
  - <18 years of age

- Eligible families:
  - Primary caregivers of the patient

- Targeted sample to obtain data across experience with chronic illness and hospitalization
Methods

• Collected data through
  • 1-on-1 interviews
  • Parent journals

• Interviews were recorded, de-identified, and transcribed

• Each transcript was independently reviewed by 4 trained analysts including a pediatric hospitalist, nurse scientist, mixed methods expert and research coordinator
Analysis

- Inductive thematic analysis
  - Preliminary codes assigned independently
- Members met regularly to:
  - Develop a consensus preliminary codebook
  - Compare individual codes and collaboratively resolve differences
- Once codebook was finalized, transcripts were re-reviewed to interpret results and determine unifying themes and subthemes
Results: Participant characteristics

- 21 mothers, 2 fathers, 1 step-mother/guardian, 2 mother-father dyads
- Children included 16 girls, 10 boys

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<td>Days in hospital in last 3 years</td>
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“He writes his own book”

- Child’s baseline often misunderstood
- “It’s kind of frustrating if we see something at home and we know, where, like, they don’t always know what her baseline is. So, that can be kind of hard to explain like we know something is wrong but it’s hard to explain like—she can’t talk, but we know what she’s showing us.”
“He writes his own book”

- Parent intuition difficult to convey
- “I mean, the more you’re around [my child], the more you could see the triggers, so I can honestly say, his immediate family would know because they’ve seen him a lot, but I’m aware to know that a person whose never see him, I’m going to have to coach them through that process because they actually have to be here with him to see it because it could be misunderstood as a whole lot other things.”
Informal, learned pathways to navigate confusing system

- Understanding how to listen and negotiate with trainees
- “When there’s a reasonably articulate parent… and especially as people get older like us and you have a 30-year-old physician… they’re like, OK. This person is old enough to be my dad and [the trainee is] going to be combative and so, I’m going to have to be assertive.”
Informal, learned pathways to navigate confusing system

• Value of shared experience with clinicians in building trust and respect

• “And then on days that I do have to leave, I’ve asked, ‘can you send somebody who knows him?’ He really needs somebody that knows him and how to handle [him]…. I know we’ve learned the hard way of how to do these things and it’s not something that I can train somebody in five minutes.”
Informal, learned pathways to navigate confusing system

- **Importance of an explicit, clear, and shared plan of care**

- “There was one day we have very different plans. We had five different plans on one day…. we know that they’re communicating with the proper people. I know that they… that the information that they’re bringing me was true at one point in time. I also know that they’re bigger and ongoing conversations happening, you know like with multiple teams.”
Importance of advocacy and persistence

- Clinical team recognizes and respects family as expert with their child

- “I think most people are careful to say ‘you know him better than we do so tell us’ which we really appreciate, but once in a while there’s somebody who takes the opposite view, and then that puts us in uncomfortable position of having to be, you know, more assertive, yeah, slash, aggressive.”
Importance of advocacy and persistence

- Family has confidence in role as advocate, this can take time to develop
- “I mean I beat myself up all the time, but I have to say that I look at it and I think, dear God, what about the parents of kids who, you know, don’t care, aren’t able to be here that way to communicate, or limited in their own understanding or their own intellectual functioning or anything else or have compromises of that. God knows how they navigate all of this.”
“We’re not your typical parents”

• Expertise of family and care team can seem competing, adversarial

• “There are always people who think they know my child better because they have a degree. And I just won’t stand for it. If that’s how they’re going to be, then they can hand me to someone else with that same degree. Because I’m his mother, I’m with him day in, day out.”
“We’re not your typical parents”

• Family is part of the monitoring system in the hospital, including objective data

• “Because if we see that she’s getting worse, we’ll see that she’s getting worse before anybody else will because we know her the best. So, we may recognize subtle things that they wouldn’t notice. Like today, I’m a little nervous because like her oxygen sat is down, just a couple—a couple percentage from what it was yesterday.”
Medical culture does not support partnership

• “They probably wrote it in my chart by now”
• “There’s a fine line between persistence and obnoxiousness and sometimes, I have trouble with that and I know that about myself, but... Sometimes, you have to go over to being obnoxious, but most of the time just saying or reminding the teams that are working with the team that you need, ‘Hey, I’d like to talk to them.’”
Medical culture does not support partnership

- Doctors often lack emotional intelligence, listening skills
- “I don’t know if you notice that they stand on that side of the bed [the far side of the bed close to the door, away from the parent] like they’re always in a hurry to get back out of the door where the team will come in and will talk to you and will surround you and be involved, be engaged in the conversation.”
Running on empty

• Difficult to think when low on sleep, food, and basic needs
• “I’m usually pretty good at just kind of keeping all the notes together and knowing what question I want to ask just because I think we’ve had experience with it. But, like yesterday, I told [my husband], I said, you know, we’re in day 13 now and I feel like my brain is full. So, I knew— and plus we’re exhausted because she hasn’t slept for like four nights.”
Running on empty

• Hospital is a lonely, scary, disorienting place
• “There’s not really anything else for me, except for to watch him. You feel like that’s all you do is focus on him and you are frightened because it’s just the two of you.”
Major Themes

• “He writes his own book,” textbooks of little help
• Informal, learned pathways to navigate complex and confusing system
• Importance of advocacy and persistence
• “We’re not your typical parents,” parents/doctors learn roles as part of hospital care team
• Medical culture and practice do not support partnership
• Running on empty; stress, fear, and lack of sleep in the hospital
Abundance

• “We should work not from an assumption of scarcity, but from an assumption of abundance.”
  - Paul Batalden

• We have abundant & underused:
  • Patient/family expertise
  • Clinician expertise
  • Data

• SA provides a framework to better leverage these to improve safety and quality of care
Questions
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