Pediatric Adverse Drug Events Webinar

April 17th, 2017

Ariana Longley and Jordan Gamart
Patient Safety Movement Foundation

Featured Speakers:
Dr. Anne Lyren, Children’s Hospitals’ Solutions for Patient Safety
Dr. James Broselow, eBroselow
Agenda

• Introduction to Patient Safety Movement Foundation and Actionable Patient Safety Solutions (APSS)
• Pediatric Adverse Drug Event APSS Executive Checklist
• Patient Safety Movement Partner Presentations
  – Anne Lyren - Children’s Hospitals’ Solutions for Patient Safety
  – Jim Broselow - eBroselow
• Q&A
Patient Safety Movement Foundation

- Founded in 2013 by Joe Kiani
- **Mission:** ZERO preventable deaths by 2020
- Connecting the dots between all stakeholders across the healthcare ecosystem
1. Unify the healthcare ecosystem (hospitals, healthcare technology companies, government, patient advocates, clinicians, engineers, etc.)

2. Identify the challenges that are killing patients to create actionable solutions

3. Ask hospitals to implement Actionable Patient Safety Solutions (APSS)

4. Promote transparency and aligned incentives

5. Ask healthcare technology companies to share the data their devices generate in order to create a Patient Data Super Highway to help identify at-risk patients

6. Promote patient dignity & love

7. Empower providers, patients, and families through education of medical terminology and medical errors so they may better advocate for their loved ones

Our Guiding Principles:
# Actionable Patient Safety Solutions (APSS)

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➢ Download at patientsafetymovement.org
An effective program to reduce the incidence of pediatric adverse drug events (pADEs) and harm should be instituted and combine leadership strategies, software (healthcare IT), hardware (drug compounding systems, drug delivery technology, and physiological monitoring systems), and most importantly people (changes in clinical practice, protocols and education) in protecting pediatric patients by focusing on the following key tasks:

- Demonstrate board and executive leadership engagement and commitment by aligning hospital-wide strategic goals, accountability and systems to reduce pADEs.
- Create a multidisciplinary team specialized in neonatal and pediatric medicine that reports regularly to executive leadership, with a focus on pADE.
- Institute an effective software program for identifying, detecting, and reporting pADEs with analysis of the incidence and characteristics of pADEs and the near-misses.
- Deploy a closed loop medication administration system by implementing an electronic medication administration record (eMAR) and barcoding, or other auto identification technology with computerized provider order entry (CPOE) and pharmacy for medication administration.
- Institute proven interventional bundles for pADEs:
☐ Select and implement new enterprise clinical information systems and electronic health records, verify and assess that the features of an organization’s healthcare IT system includes full support for best practices in age and weight specific prescribing, compounding, dispensing and administration of pediatric medications

☐ Consider relevant improvement initiatives and opportunities for collaboration in pADE reduction outside of the hospital system

☐ Disseminate pediatric-specific assistive technologies such as eBroselow (or equivalent) to assure the basic capabilities to stabilize and treat acutely ill or injured children are present 24/7 throughout all environments of care

☐ Ensure that the FDA Safety Communication: “Syringe Pump Problems with Fluid Flow Continuity at Low Infusion Rates can Result in Serious Clinical Consequences” is reviewed and understood by the team.

☐ Utilize Continuous Quality Improvement (CQI) software from infusion pump manufacturers to monitor drug library parameters on a routine basis and to report the frequency of command overrides and alerts triggered for unsafe practices
Children’s Hospitals’
Solutions for Patient Safety
Every patient. Every day.

Anne Lyren, MD, MSc
Clinical Director, Children’s Hospitals’ Solutions for Patient Safety
Strategic Advisor, Quality & Safety, UH Rainbow Babies & Children’s Hospital
Associate Professor, Pediatrics & Bioethics, Case Western Reserve University School of Medicine
Mission

Working together to eliminate serious harm across all children’s hospitals
SPS National Network Targets

By December 31, 2018:
- 40% Reduction in Hospital Acquired Conditions*
- 20% Reduction in 7 Day Readmissions*
- 50% Reduction in Serious Safety Event Rate

By June 30, 2019:
- 25% Reduction DART – Days Away Restricted or Transferred by June 2019
SAFETY GOVERNANCE (SG) & CAUSE ANALYSIS (CA)

LEADERSHIP METHODS (LM)

ERROR PREVENTION (EP)

PATIENT AND FAMILY ENGAGEMENT (PFE)

DISCLOSURE

EMPLOYEE/STAFF SAFETY

ADVERSE DRUG EVENTS

C. DIFF AND ANTIMICROBIAL STEWARDSHIP

CA-URINARY TRACT INFECTIONS (CAUTI)

CLA-BLOOD STREAM INFECTIONS (CLABSI)

PERIPHERAL INTRAVENOUS EXTRAVASATIONS (PIVIE)

PRESSURE INJURIES (PI)

READMISSIONS

SEROUS FALLS

SURGICAL SITE INFECTIONS (SSI)

UNPLANNED EXTUBATIONS

VENOUS THROMOEMBOLISM (VTE)

VENTILATOR-ASSOCIATED EVENTS

40% reduction in pediatric HACs and 20% reduction in the readmit rate across SPS by 12/31/18

50% reduction in SSEs by 12/31/18

25% reduction in DART by 6/30/19

40% reduction in pediatric HACs and 20% reduction in the readmit rate across SPS by 12/31/18
SPS Prevention Bundles

- Surgical site infections
- Serious falls
- Pressure injuries
- Central line-associated blood stream infections
- Catheter-associated urinary tract infections
- Readmissions
- Adverse Drug Event Roadmap (launching 5/17)
ADE Roadmap: Background

- Cohort of 20 SPS hospitals
- Planned experimentation model
- June ‘14 – Dec ’16
- Tested factors associated with all phases of medication delivery system
- Reviewed available peer-reviewed literature
ADE Roadmap: Results

- Significant ADE reduction
- 13 system-level elements associated with decreased harm
- 3 additional – widely implemented, no further analysis
- ADE Prevention Roadmap
ADE Reduction

- NCC MERP Level E:
  - Cohort rates dropped by 62% (vs. 29% non-cohort)
    - From 1 ADE every 2,660 to 1 every 6,993 days
  - NCC MERP Levels E
    - Cohort rates dropped by 71% vs. 35% non-cohort
    - From 1 ADE every 13,158 days to 1 every 45,555 days
ADE Roadmap Elements

Ordering

- Medication reconciliation
- Standard order sets
- Dose range checking
- Ordering through CPOE
- Alert fatigue reduction
- Pharmacist on rounds
- Pharmacy intervention database
ADE Roadmap Elements

Dispensing

- Independent verification
- Dispensing cabinet/Omnicell overrides
ADE Roadmap Elements

Administration
- Barcode-assisted medication administration
- Smart pumps/guard rails
- Smart pump data analysis
- Standard medication hand-off process at shift change
ADE Roadmap Elements

Recommended (not tested)

- 5 Rights
- Independent double check for high-risk medications
- Basic alerts to avoid common ordering issues
ADE Roadmap Next Steps

- May, 2017 – Launch to entire SPS Network at Learning Session
- Hospitals conduct a self-assessment
- Baseline and annual hospital survey re: use of Roadmap elements
- Numerous collaborative learning opportunities
- Eliminate ADEs!
eBroselow

James Broselow, MD
Clinical Associate Professor of Emergency Medicine,
University of Florida College of Medicine
Developer, Broselow Tape and Color Coding Crash Carts
CMO, eBroselow
The Challenge
First “Lean” Clinical System
Lessons Learned

Standardization + Simplification = Safety
In the beginning...

Acute drug administration was simpler.
In the beginning...

- Only a few drugs
- Ordered and administered by Physician
As time Passed…

- More Drugs
- Ordered by physician
- Administered by nurses
As time Passed...

- Still Safe
- Physician and nurse present at bedside
  - Direct communication
    - Shared Knowledge
As more time Passed...

- Relatively safe
- Few indications
Modern Hospital Silos

Doctor

Nurse

Pharmacist
Modern Hospital Silos

**Doctor Silo**

- Knows clinical indications
- Minimal knowledge of administration process
Understanding process

Knows patient

Can't possibly check each drug and indication every time
Modern Hospital Silos

Pharmacist Silo

- Knows drugs
- Can access encyclopedic information
- Does not always know clinical situation
- Mostly not at bedside
Too many mistakes...

“...10 times the proper dose...”

“...the baby died...”

“...accidental miscalculation...”

Baby dies at Seattle Children's hospital after overdose

An infant in the intensive-care unit of Seattle Children's hospital died after she was administered 10 times the dose of a medication, calcium chloride, by a hospital nurse, according to a notice sent by hospital CEO Tom Hansen to the staff.

By Carol M. Ostrom
Seattle Times health reporter

Eight-month-old Kaia Zautner was in the intensive-care unit of Seattle Children's hospital, battling back from serious heart problems and surgeries, when a hospital nurse gave her 10 times the proper dose of a medication, calcium chloride.

Five days later, on Sept. 19, after suffering a brain hemorrhage, the baby died.

Tom Hansen, hospital CEO, in a notice to staff on Sept. 22, said the hospital has offered “heartfelt apologies” to the family, without naming them. “This was a catastrophic outcome for the patient and the family, and caused serious distress for staff members as well,” Hansen said.

In a family blog, Kaia's parents, Jared and Alana Zautner, of Puyallup, had described their baby's fight to overcome the heart problem she'd had since her birth on Jan. 12 and then, just days after her 8th month birthday, the “horrible turn of events” that gave them “one of the scariest days of our lives.”

The overdose was an accidental miscalculation, Alana Zautner wrote on the blog, thanking friends for their continued prayers.
Too many mistakes...

“...1000 times the dosage...”
Too many mistakes...

“10 times the amount...”

Overdose Kills 9-Month-Old At Children’s

Author: Avram Goldstein

Children’s Hospital officials said that, instead of two 0.5 milligram doses of morphine, a narcotic prescribed to control postoperative pain, the child was given two doses of 5 milligrams each — 10 times the amount the surgeon intended. The doses were given two hours apart April 11 as the girl recovered from successful surgery that day. Officials said the girl did not exhibit a reaction until hours later.

Most drug orders at Children’s are screened and entered into computers by hospital pharmacists first. But that procedure isn’t followed immediately for drugs stored on nursing floors for quick access if they are needed soon after surgery. In such cases, handwritten orders are used temporarily, [Peter Holbrook] said.
Too many mistakes...

“A three year old boy...”
Too many mistakes...

“This is a system failure.”

Third baby dies after error at Indiana hospital

Updated 9/26/2008 11:20 PM ET

By Theodore Kim and Tammy Webber, USA TODAY

INDIANAPOLIS — A third premature baby has died in a case of medical error here that has shaken one of Indiana’s largest hospitals.

Five-day-old Thursday Dawn Jeffers died late Tuesday, said Jon Mills, a spokesman for Methodist Hospital.

The Jeffers infant was one of six premature babies who received overdoses of the anti-clotting drug heparin Saturday in Methodist’s neonatal intensive care unit.

Thursday Dawn was being treated at Riley Hospital for Children, where she had been transferred after being born at Methodist.

“They killed my baby. Why, oh why?” the child’s mother, Heather Jeffers, asked her mother as they hugged outside the younger woman’s apartment.

“We are all saddened by this news and our hearts are with this family, and all the families who have been affected,” Mills said in a statement Wednesday.

Two other infants died late Saturday: 5-day-old D’myia Alexander Nelson and 2-day-old Emmery Miller. The other three babies are expected to survive, Mills said.

“Ultimately, the blame for our errors falls upon the institution” Sam Odle, president and CEO of Methodist Hospital, said following the first two deaths. “This is a system failure.”
Too much at stake...

Children's Hospital nurse under investigation ends own life
By Tracy Vedder | Published: Apr 19, 2011 at 5:12 PM PDT | Last Updated: Apr 19, 2011 at 5:41 PM PDT

SEATTLE -- A nurse involved in a case under investigation at Seattle Children's Hospital has committed suicide.

KOMO News has learned Kimberly Hiatt took her own life earlier this month. At the time, she was still under investigation by the state in connection with the death of a critically-ill baby at the hospital.

The investigation began with the death of little Kaia Zautner last September. Kaia was being kept alive with the help of a Berlin heart, but she suffered a setback when a nurse in the hospital's intensive care unit gave her 10 times the normal dose of calcium chloride. She died several days later.
In pediatrics, incorrect dosing is the most common error.

A ten-fold error for an adult:
A ten-fold error for a child:
Not Just Children

- Mag. Sulfate 4 gms IV ordered – 16 gms delivered

Hospital says error killed woman

An 18-year-old who had come to South Florida Baptist with labor pains received four times the ordered dosage of magnesium sulfate.
We have a Problem

- Beyond human capability?
An Unseen Problem

- EMRs document intentions
Look familiar?

- Every calculation is an opportunity for error
Look familiar?

- Every calculation is an opportunity for **error**
People Make Mistakes

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<td>Under stress</td>
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The Adult Learner

- Wants just-in-time knowledge within the **clinical** workflow
“Two Standards?”
The Answer has to be technology!
Two Standards?
Day

Night?
High Reliability Preparation: Scanning the Vial

- Avoids selection errors
- Prevents concentration misreads and calculation mistakes
Turning the “NDC Code” into a “knowledge code”

The unique role of “assistive technologies” in pediatric med safety

1) Verifies Dose
2) Checks warnings
3) Administration guidelines
4) Y site compatibilities
5) Adverse side effects
6) Patient counseling
Does it work?

Using Children’s Hospital’s own References

- 17% of 130 prepared meds had errors
- 7% clinically significant errors
- Dose error range: 50% to 900%

Evidence-based

Simulation Study: Using eBroselow

- 0 clinically significant dosing errors
- 0 pharmacy consults needed
- Reduced time to prepare meds - including less experienced nurses

10 minutes training - 13 nurses - 130 med orders

When **lives** are on the line, we **do math**
When **money** is on the line, we **barcode**!
Q & A

We encourage your participation
Thank you!

Join us for our next quarterly webinar on Airway Safety

June 14, 2017