Determining Adverse Events in the Paediatric Population – Development of the Canadian Pediatric Trigger Tool

Dr. Anne Matlow
Medical Director Patient Safety
Hospital for Sick Children

So many questions…..

- What do we know about adverse events in pediatrics?
- What are current approaches to detecting adverse events in pediatrics?
- What is a trigger tool?
- What efforts are underway to develop a Canadian pediatric trigger tool?

ERROR vs HARM?

DEFINITIONS

Adverse Event (AE)

An **unintended injury** or complication which results in 1) disability at the time of discharge, 2) death or 3) prolonged hospital stay and is caused by health care management rather than the underlying disease process

Preventable AE

An AE judged to be potentially preventable based on retrospective physician reviewer judgment

Canadian Adverse Events Study, CMAJ 2004

Incidence Estimates from Chart Review Studies

Country	N	Year	Incidence of AE	Preventable?
Canada	3,745	2000	7.5%	37%
USA (U&C)	14,700	1992	2.9%	Not reported
Australia	14,179	1992	16.6%	51%
UK	1,014	1999	10.8%	48%
New Zealand	1,326	1998	12.9%	37%
USA (NY)	30,195	1984	3.7 %	Not reported

What do we know about harm in pediatric in-patient care?

- NOT MUCH
- All adverse events: ~1.0/ 100 patients
  (Woods Pediatrics 2005; Miller Pediatrics 2003 and 2004)
- Adverse drug events:
  - True: 2.3-11/ 100 admissions
  - Potential: ADE 10/ 100 admissions
  - 22-60% preventable (Kaushal JAMA 2001;Holdsworth APAM 2003; Takata IHI Annual Forum 2001)
- NICU:
  - 74 per 100 admissions
  - 56% preventable Sharek Pediatrics October 2006

What do we know about harm in pediatric ambulatory care?

- Even less
- McPhillips:
  - 15% dispensed medication with a potential error
  - 8% potential over-dose (eg analgesics) ; 7% under (eg: antiepileptics)
  - < 35kg most vulnerable

McPhillips J Peds Dec 05

DETECTING ADVERSE EVENTS: HOW??

Detecting adverse events……

- Occurrence reports
  - Underutilized; detect only 2-8%
- Concurrent or retrospective or chart review
  - Inconsistent definitions
  - Labour intensive
- Medical record review of deaths, unexpected intensive care unit admissions, and clinician referrals (Dunn Arch Dis Child 2006)
- Trigger based chart review

WHAT IS A TRIGGER TOOL?


WHERE'S
THE CAT??


MEOW


A TRIGGER IS A CLUE
MEOW
A TRIGGER TOOL IS A SCREENING TOOL

Computerized surveillance of ADE in hospitalized patients Classen JAMA 1991

- Customized software linked to the patient's medical record and hospital pharmacy system
- Used to identify sentinel signals or "triggers" (e.g. naloxone, abrupt stop orders) suggestive of medication-related medical error and ADE

more detailed review of the chart +/- intervention.

Trigger Tools to detect AEs

Study	Date	# Charts	#Trigger Positive
Harvard MPS	1984	30195	7817 (26.0%)
Australia	1992	14210	6210 (43.7%)
UT/CO	1992	14700	2868 (19.5%)
England	1998	1000	405 (40.5%)
New Zealand	1998	6731	4197 (62.0%)
Canada	2000	3745	1527 (40.7%)

CAES Screening Criteria

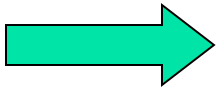
Criteria	%	PPV
1. Unplanned admission before index admission	16.8	13.5
2. Unplanned readmission after discharge from index admission	13.6	11.8
3. Hospital-incurred patient injury	2.9	34.5
4. Adverse drug reaction	3.1	25
5. Unplanned transfer from general care to intensive care	1.9	31.5
6. Unplanned transfer to another acute care hospital	2.0	20.3
7. Unplanned return to the operating room	0.8	55.2
8. Unplanned removal, injury or repair of organ during surgery	0.9	46.9
9. Other patient complications (AMI, CVA, PE etc.)	6.2	32.8
10. Development of neurological deficit not present on admission	0.4	40

CAES Screening Criteria (cont.)

Criteria	%	PPV
11. Unexpected death	2.0	29.3
12. Inappropriate discharge to home	0.9	8.6
13. Cardiac/respiratory arrest	0.7	34.6
14. Injury related to abortion or delivery	0.1	50
15. Hospital acquired infection/sepsis	3.1	39.1
16. Dissatisfaction with care documented in medical record	1.4	21.6
17. Documentation indicating litigation	0.2	28.6
18. Any other undesirable outcomes not covered above	5.8	20.7
Number of medical records screened	3475	

CAPHC's TRIGGER TOOL DESIGN GROUP

- Anne Matlow,
- Virginia Flintoft
- Elaine Orrbine
- Barbara Brady-Fryer
- Gerarda Cronin
- Cheri Nijssen-Jordan
- Mark Fleming
- Mary-ann Hiltz
- Michele Lahey
- Margaret Zimmerman
- G. Ross Baker



OBJECTIVES

1. Incidence of AEs in Canadian children

2. Incidence of AEs in Canadian children vs Canadian adults

3. Launch QI efforts

PROCESS TO DATE

- Environmental scan
- Developed comprehensive modular tool with 47 triggers
- Developed procedure manual/ toolkit

	CARE MODULE
C1	Transfusion/ use of blood products
C2	Any code or arrest
C3	Dialysis (New Onset)
C5	Diagnostic Imaging for Embolus/thrombus with/without confirmation
C7	Patient fall
C8	Decubiti / Skin Breakdown
C9	Readmission within 30 days
C10	Restraint use
C11	Infection of any kind
C12	In hospital stroke
C13	Transfer to higher level of care
C14	Procedure complication
C16	Rash
C17	Hypotension
C18	Catheter infiltration/burn
C19	Wrong Maternal Breast Milk
C20	Incorrect Central Venous Catheter (CVC) placement (radiographic)
C21	Complication related to Central Venous Catheter (CVC)
C22	Necrotizing Enterocolitis (NEC)
C23	Seizures

	MEDICATION MODULE
M6	Vitamin K (excluding newborns)
M7	Benadryl (Diphenhydramine) - for symptoms of allergic reaction
M8	Romazicon (Flumazenil)
M9	Narcan (Naloxone)
M10	Anti-emetic Use (for treatment of symptoms)
M11	Over sedation / hypotension
M12	Abrupt medication stop
M14	Antidiarrheals - Diphenoxylate (Lomotil), Loperamide (Imodium), Kaopectate, Pepto-Bismol
M15	Sodium or Calcium Polystyrene (Kayexalate, Resonium)
M16	Laxatives or Stool Softeners
M17	Heparin or Low Molecular Weight Heparin
~M13~	Other / Any other undesirable outcome related to medications not covered above

Feasibility test

- at 3 sites: stand alone pediatric, hospital within a hospital, and community
- 40 charts/ site; 2 reviewers/ chart
- 10 from four age categories: 0-28 days, 28 days - 1 year, 1 year - 5 years, and >5)
- 5 charts from medicine; and 5 from surgery
- Inter-rater agreement: Kappa statistic 0.83
- 32% of charts triggered

Next step: Refining the tool

- Validation and reliability testing
- Proposal to Canadian Medical Protective Association (CMPA) submitted

Ultimately: Prospective study across Canada using the trigger tool to define the incidence of AE in hospitalized children, and compare to data in adults


MEOW