Characterising Medication Related Harm in a Paediatric Hospital Using a Trigger Tool

Macaskill K[1]., Kochar A[2]., Turner S[1]., Garg A[1].

[1] SA Pharmacy, Women's and Children's Hospital (WCH), Adelaide

[2] Paediatric Emergency Department, Women's and Children's Hospital, Adelaide

Background

- 10% of adults experience medication related harm during their hospital stay (1-2)
- Data is lacking on the rate and types of medication harm (or Adverse Drug Events – ADEs) in a paediatric setting, particularly in Australia (3)
- Voluntary reporting of ADEs captures only 10-20% of the events (4)
- The Institute for Healthcare Improvement's "Global Trigger Tool (GTT)" uses screening criteria to identify possible harm, followed by an in-depth review to look for actual harm
- A trigger is a "prompt" found on review of a patient's chart, observations or laboratory data (5,6)
- Trigger Tool methodology is considered the best single tool approach for detecting the rate and types of ADEs but has previously not been validated in an Australian paediatric population

Aims

- To validate the use of a GTT model within the Australian paediatric healthcare setting
- To characterise types of ADEs that occur within the paediatric population at WCH
- To determine if the identified ADEs were reported via the hospital reporting mechanisms to;
  - WCH Adverse Drug Reaction Committee (ADRC) - Safety Learning System (SLS)

Method

- The primary reviewer completed GTT "suggested reviewer training plan"
- A retrospective audit was conducted of patients admitted to paediatric wards at WCH
- Patients admitted for >48 hrs from 1Jan 2016-31Dec 2016 were randomly selected for review
- A list of 22 triggers (Table 4) were compiled for the audit (adapted from the Takata et al., which comprised 11 triggers from adult trigger tool studies plus four paediatric specific triggers)(7)
- Case notes of selected patients were analysed by the primary reviewer for triggers
- Triggers prompted further investigation into the patient's notes to assess if an ADE had occurred
  - If no, the primary viewer moved on to look for the next trigger on the list
  - If yes, this was noted on the data collection sheet.
- Detected ADEs were secondarily reviewed by a consultant medical officer and/or senior pharmacist
- Confirmed ADE was assessed for **Likelihood** (Table 1), **Severity** (Table 2) and **Preventability** (Fig 1)
- The tool validity was judged by the **Positive Predictive Value (PPV)** of each trigger (percentage of trigger-positive charts with detected adverse event) and the sensitivity of the overall tool.

Table 1: Likelihood of medication caused adverse event

Category	Description
A	Virtually no evidence for management causation
B	Slight to modest evidence for management causation
C	Management causation not likely (less than 50% chance)
D	Management causation more likely (more than 50% chance)
E	Moderate to strong evidence for management causation
F	Virtually certain evidence for management causation

Table 2: Severity Categories of ADEs

Category	Description
E	Contributed to or resulted in temporary harm to the patient and required intervention
F	Contributed to or resulted in temporary harm to the patient and required initial or prolonged hospitalisation
G	Contributed to or resulted in permanent patient harm
H	Required intervention to save life
I	Contributed to or resulted in the patient's death

Results

- 183 patients were reviewed - 97 Males, 86 Females
- Average age was 6.3 years; Average length of hospital stay was 6.6 days
- Average time taken to review each patient was 7 minute 32 seconds

Table 3: ADE determination using Paediatric trigger tool

Measurement	Total
No. of charts reviewed	183
No. of patient days	1219
No. of triggers identified	208
Average triggers per patient	1.14 (range 0-6)
Total number of ADEs detected	37
ADE occurrence	20 per 100 patients
Number deemed preventable	5 (14%)
PPV of tool	17%

- The most recognised trigger was the use of an anti-emetic, however this was not very specific for identifying drug-induced nausea, identifying only 15 ADEs (PPV=21%)
- Opioids, cytotoxic and anti-infective agents were respectively responsible for the majority of ADEs (fig1)
- The patient harm identified by the trigger tool did not uncover any serious harm. Majority of the ADEs (89%) contributed to or resulted in temporary harm to the patient and required intervention. Others contributed to or resulted in temporary harm to the patient and required initial or prolonged hospitalisation.

Results

Figure 1: ADEs classified by drug class and their preventability

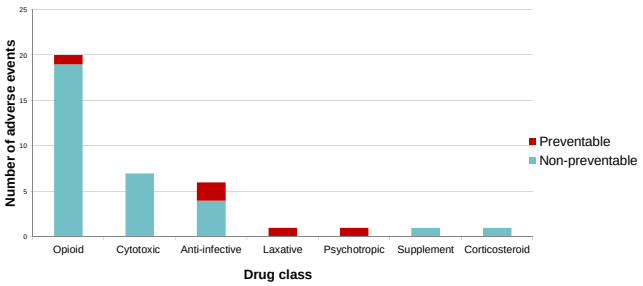

Table 4: List of triggers and ADEs identified and sensitivity of each trigger

Trigger	Resource used	Times identified by tool	ADE identified	PPV (%)
Delayed discharge	Case notes	4	0	0
Readmission/unplanned admission	Case notes	6	0	0
MET call/Code Blue	Paediatric MET service / code blue log book	0	0	0
Vitamin K given	Medication chart	5	0	0
Naloxone given	Medication chart	1	1	100
Flumazenil given	Medication chart	0	0	0
Glucagon or glucose given	Medication chart	0	0	0
Laxative/stool softener given	Medication chart	22	10	45
Rash/Antihistamine given	Medication chart	23	3	13
Anti-emetic given	Medication chart	70	15	21
Resonium use	Medication chart	0	0	0
IV bolus >10ml/kg given	Fluid chart	12	0	0
Hypoxia (O2 <85%)	Observation chart	6	0	0
Abrupt medication stop	Medication chart	11	2	18
Thrombocytopenia (<100)	OACIS clinical care suite	7	2	29
High INR (>5) or APTT>100 sec	OACIS clinical care suite	2	0	0
Rising urea/creatinine (>2x baseline)	OACIS clinical care suite	3	0	0
Na+ <130 or >150	OACIS clinical care suite	5	0	0
K+ <3.0 or >6.0	OACIS clinical care suite	12	1	8
Drug level out of range	OACIS clinical care suite	6	1	16
Over sedation	Observation chart	9	1	11
Other	Various	1	1	100

Current Hospital reporting/ADE identification

- Applicable ADEs were compared to hospital reporting systems
- Only one ADEs had been reported through the SLS and ADRC systems each

Conclusions

- **The trigger tool identified 94% more ADEs than conventional reporting methods**
- The use of trigger tool is an effective method to identify medication related harm in a paediatric hospital
- Traditional reporting methods are inadequate in identifying patient harm
- The time taken to review a patient reduces with appropriate training and practice
- A run chart drawn from regular reviews will be ideal in tracking service improvements and deficits

Limitations

- ADE identification was subjective to primary reviewer interpretation - only those thought to be an ADE by the primary reviewer were secondarily reviewed
- Data collected was subject to the quality of documentation during each admission
- Only first 30 days of an admission were reviewed for each episode of care (based on past studies)

References

1. Wilson RM, et al. The Quality in Australian Health Care Study. Med J Aust. 1995;163(9):458-71
2. Thomas EJ, et al. A comparison of iatrogenic injury studies in Australia and the USA: Context, methods, case mix, population, patient and hospital characteristics. Int J for quality health care: 2004;12(5):371-8
3. Hibbert PD, et al. Care Track Kids-part 3. Adverse events in children's healthcare in Australia: study protocol for a retrospective medical record review. BMJ open. 2015;5(4):e007750
4. Griffin FA RR. IHI Global Trigger Tool for Measuring Adverse Events (Second Edition). IHI Innovation Series white paper. 2009
5. Rozich JD, et al. Adverse drug event trigger tool: a practical methodology for measuring medication related harm. Quality & safety in health care. 2003;12(3):194-200
6. Resar RK, et al. Methodology and rationale for the measurement of harm with trigger tools. Quality & safety in health care. 2003;12 Suppl 2ii:39-45
7. Takata GS, et al. Development, testing, and findings of a pediatric-focused trigger tool to identify medication-related harm in US children's hospitals. Pediatrics. 2008;121(4):e927-35

For more information contact Alka Garg at alka.garg@sa.gov.au