A Retrospective Chart Review of Adverse Drug Events (ADE's) on Medicine Units at St. Paul's Hospital Using the Institute for Healthcare Improvement (IHI) Trigger Tool for Measuring Adverse Drug Events

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Background

- In 1999, the United States Institute of Medicine published *To Err is Human* which increased awareness of medical errors and kick started the patient safety movement
- In 2003, *The Canadian Adverse Events Study* found approximately 23.4% of all adverse events to be **drug related**
- Canadian studies have examined adverse events and reported proportions of drug related events but lack data on specific subtypes of adverse drug events
- This study aimed to fill a gap in the literature pertaining to adverse drug events that occurred during hospital admission

Objectives

Primary:

- Identify the incidence of adverse drug events (ADE's) in a sample of adult patients discharged from the general medicine service at St. Paul's Hospital in Vancouver, Canada using the IHI Trigger Tool For Measuring ADE's.

Secondary:

- Identify the five most common triggers that lead to identification of an ADE
- Identify the five drugs most frequency responsible for ADE's

Methods

Design: Retrospective chart review

Patient selection: Random selection of 204 patients (17 per month) discharged from general medicine wards at St. Paul's Hospital from Jan 1, 2011- Dec 31, 2011 inclusive

Inclusion: Patients ≥ 18 yrs after a hospital stay of at least 24 hrs

Exclusion: Patients < 18 yrs at time of hospital encounter or patients admitted for sole purpose of rehabilitation or to a psychiatric service

Data collection:

- Two independent pharmacists reviewed each chart using the IHI ADE Trigger Tool
- ADE causation was assessed using the Naranjo Criteria

Analysis:

- Kappa score between the Naranjo scorings was calculated
- ADE's were assigned preventability and harm ratings based on NCC MERP categories by a physician

Table 1. Description of Triggers

	Description
T1	Diphenhydramine
T2	Vitamin K
T3	Flumazenil
T4	Anti-emetics
T5	Naloxone
T6	Anti-diarrheals
T7	Sodium Polystyrene
T8	Glucose<4mmol/L
T9	*Clostridium difficile* Positive Stool
T10	Partial Thromboplastin Time (PPT) >100 seconds
T11	International Normalized Ratio (INR) >6
T12	White Blood Cell (WBC) Count <3 x 10^9
T13	Platelet Count <50, 000
T14	Digoxin Level >2ng/ml
T15	Rising Serum Creatinine >30% of Baseline
T16	Over-sedation, Lethargy, Falls
T17	Rash
T18	Abrupt Cessation of Medication
T19	Transfer to Higher Level of Care
T20	Caution Sheet Updated
T21	Other (i.e. Discharge Summaries)

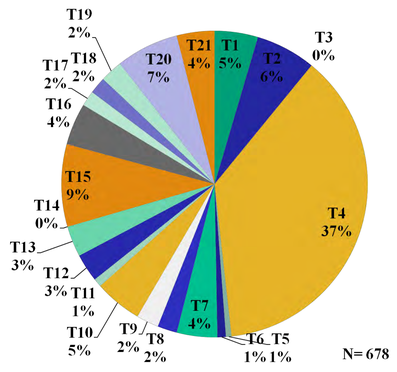


Figure 1: Distribution of total triggers found

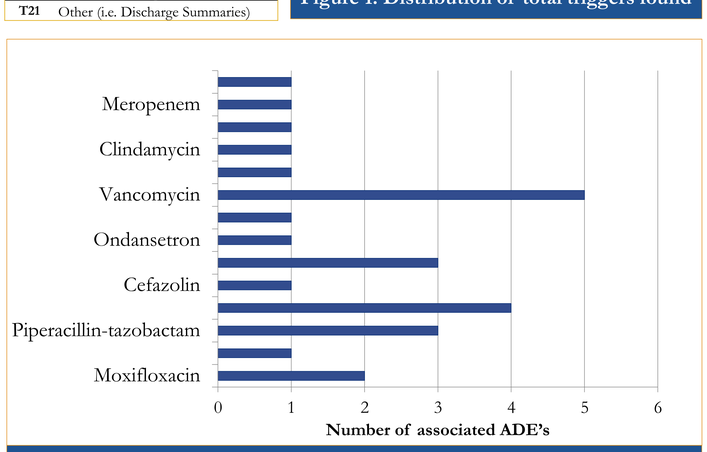
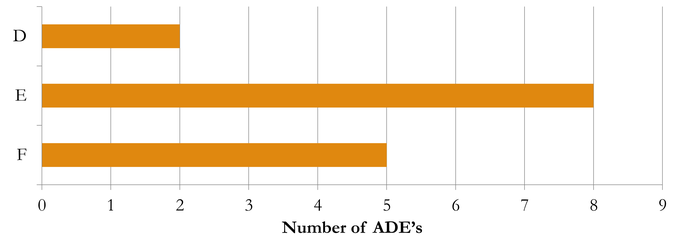


Figure 2 : Drugs implicated in adverse drug events



Category D: required monitoring/interventions to prelude harm
Category E: temporary harm to the patient and required intervention
Category F: temporary harm to the patient and required initial or prolonged hospitalization

Figure 3 : NCC MERP categories of harm for adverse drug events found

Results

- 204 patient encounters were reviewed and a total of 15 ADE's identified. Prevalence of ADE's was 7% over a one year period.
- Five drugs most frequently responsible for ADE's were Vancomycin, Ciprofloxacin, Ceftriaxone (tie), Piperacillin-tazobactam (tie), and Moxifloxacin respectively.
- Common triggers that lead to the identification of an ADE were T20 (Caution Sheet Updated), T9 (*C. difficile* Positive Stool) and T21 (Other: discharge summaries, consults).
- The majority of ADE's were deemed to be non preventable and resulted in temporary harm requiring intervention or prolonged hospitalization (NCC MERP Class E or F).

Discussion

- 15 ADE's that occurred prior to admission (and in some cases lead to admission) were identified. This was equal to the number of ADE's that occurred during admission and consistent with ongoing research on ADE's resulting in emergency department visits and/or hospitalizations.
- Unlike events captured by voluntary reporting in the PSLS system, ADE's found in this study were largely not preventable and resulted from inherent characteristics of drugs, rather than incorrect dosages or dosage forms. PSLS reports are comprised mainly of medication administration errors that are almost always preventable.

Limitations

- Despite effort to define ADE's and related terms prior to commencing the study, inter-reviewer subjectivity was evident in interpretations of documented events and willingness to accept plausibility of drugs causing events
- *A priori* definitions of ADE's did not capture events that were caused by drugs but did not result in patient harm or trigger additional investigations

IHI ADE Trigger Tool

- IHI suggests allotting a maximum of 20 minutes to review each chart. While the time limit streamlines the quality assurance process, 20 minutes is likely not adequate for lengthy and/or complex admissions
- Some triggers (such as T4 Anti-Emetics) were present in nearly every admission but seldom assisted in identifying ADE's

Naranjo Criteria

- Contained questions that were not possible to answer with limited information from a retrospective chart review or that were impractical in a real practice setting (e.g. giving a placebo). Thus it was not possible to assign a "definitive" score to any of the ADE's identified.
- The two pharmacist reviewers exhibited considerable variability in their assessments of causality as demonstrated by a Kappa score of 0.21

Conclusions

- Prevalence of ADE's detected using the IHI ADE Trigger Tool in patients discharged from general medicine service at St. Paul's Hospital was 7% over 1 year.
- Detecting ADE's early in admission could prevent unnecessary harm and reduce costs associated with treatment and prolonged hospital stay.
- Would not recommend IHI ADE Trigger Tool and current methodology to detect ADE's
  - Triggers need to be narrowed and adapted to improve utility
- Tool/criteria to assess causality of ADE's in a real world setting would be beneficial

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