Pre-Operative Study Evaluating Patient Complexity With Pharmacy Triage Tool

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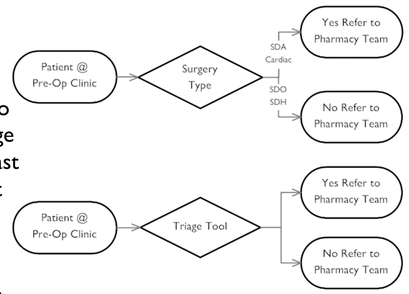
INTRODUCTION

Patients benefit from a comprehensive medication history and assessment by pharmacists and pharmacy technicians prior to surgery.[1-5] In a pre-op clinic seeing over 100 patients each day, a patient triage process is necessary due to limited pharmacy resources. Several triage processes have been developed in the past [6-11], however a triage tool for pharmacist use in a pre-operative setting is novel.

The aim of this study is to accurately identify patients who would benefit most from a pharmacy team referral using a patient self-reported triage process.

Current Work Flow:



Flow diagram of current patient referral process to pharmacy team based on surgical pathway (top) and proposed new process of using a triage tool to direct patient referrals (bottom). SDA = same day admission, SDH = same day home, SDO = same day overnight

METHODS

Prospective observational study to validate and implement a new patient workflow process using risk factors associated with adverse drug events.[9]

Patients filled out a self-reported questionnaire and a triage tool made a decision for pharmacy team referral.

A pharmacy team member independently assessed a patient's need for a pharmacy team referral.

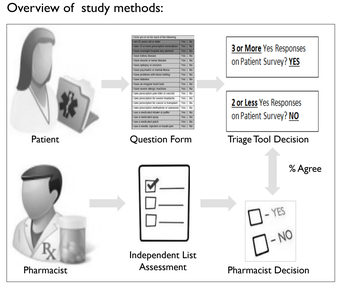
Summary of main study method parameters:

Primary Objective:	% agreement between triage tool and pharmacy team decision (target ≥ 80%)
Secondary Objective:	Sensitivity/specificity of tool, workload metrics, form completion, referrals, pharmacy agreement
Inclusion Criteria:	Patient attending pre-operative clinic at McMaster hospital - approx. 100 patients/day
Exclusion Criteria:	Pediatric (age < 18 years), pregnant, declined participation - approx. 30 patients/day
Initial Triage Tool Referral Criteria:[9]	22 questions total, referral stratified into risk categories (high, moderate, medium and low), referral if: 1 high risk factor, 2 medium risk factors, SDA + 1 patient's own medication or smoker, 3 low risk factors

Triage tool, patient self-reported 19 questions, round 2 revised:

Circle yes or no for each of the following:	
I am 65 years old or older	Yes | No
I take 10 or more prescription medications	Yes | No
I have overnight hospital stay planned	Yes | No
I have kidney disease	Yes | No
I have muscle or nerve disease	Yes | No
I have epilepsy or seizures	Yes | No
I have psychiatric or mental illness	Yes | No
I have problems with blood clotting	Yes | No
I have diabetes	Yes | No
I have an irregular heart beat	Yes | No
I have severe allergic reactions	Yes | No
I take prescription pain killer or narcotic	Yes | No
I take prescription for severe headache	Yes | No
I take prescription for cancer or transplant	Yes | No
I take prescription methadone or suboxone	Yes | No
I use a medicated inhaler or puffer	Yes | No
I use a medicated spray	Yes | No
I use a medicated patch	Yes | No
I use a needle, injection or insulin pen	Yes | No

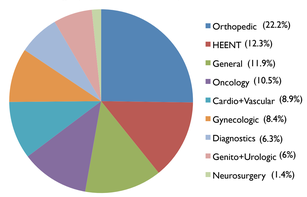
Overview of study methods:



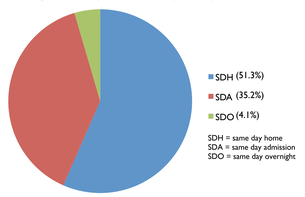
RESULTS

Patient Demographic Data: Study period round 1 from April 7-May 9, 2014 (13 days) and round 2 from June 10-20, 2014 (10 days)

Surgery Type - Breakdown (n=1266)

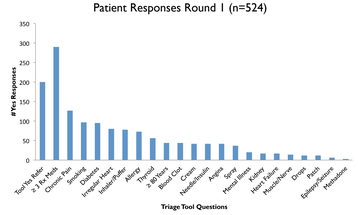


Surgical Pathway - Breakdown (n=1266)

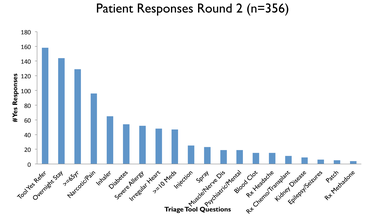


Patient Triage Tool Data: Round 1 n=524 forms completed with initial triage tool, round 2 n=356 forms completed on revised triage tool, total # yes responses for each question and referrals reported

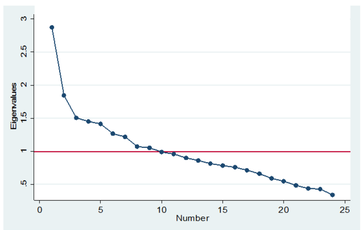
Patient Responses Round 1 (n=524)

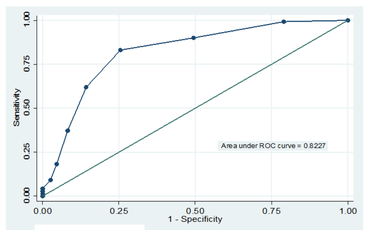


Patient Responses Round 2 (n=356)



Statistical Analysis: Stata® software used for factor analysis (left graph), factors containing groups of strongly correlated questions with Eigenvalues ≥ 1 were retained, receiver operator curve (ROC) used to estimate a cut-off for referral based on # yes responses (right graph)





Triage Tool Performance: Round 1 and round 2 triage tool performance was calculated, the initial triage tool was a risk stratification model with lower agreement, the final triage tool improved agreement by using a threshold # yes cut-off with additional conditional logic (see below)

Round 1:	Pharm +	Pharm -	Total
Tool +	147	53	200
Tool -	53	139	192
Total	200	192	392

	% (95% CI):
Sensitivity	**73.5 (0.67-0.79)**
Specificity	**72.4 (0.66-0.78)**
Kappa	**46.0 (-0.07-0.11)**
Agreement	**73.0 (0.69-0.77)**

Round 2:	Pharm +	Pharm -	Total
Tool +	119	39	158
Tool -	22	124	146
Total	141	163	304

	% (95% CI):
Sensitivity	**84.4 (0.77-0.89)**
Specificity	**76.1 (0.68-0.82)**
Kappa	**60.0 (-0.06-0.12)**
Agreement	**79.9 (0.75-0.84)**

Results:

- Round 1 of data collection (n=524) did not meet the primary endpoint since agreement was 73%, sensitivity of 73.5 and specificity of 72.4
- The tool was modified based on Stata® factor analysis: 6 questions eliminated, 5 questions modified wording, 3 new questions added
- Changed decision threshold from risk stratification to total # yes ≥ 3
- Further enhancements in referral accuracy was gained through adding in conditional logic (below)
- Round 2 of data collection (n=356) showed an increase in the agreement, sensitivity and specificity
- Primary endpoint was met proving tool has been successfully validated and ready for implementation

Final Decision Rules With Optimal Triage Tool Agreement:

1) # yes ≥ 3
2) Methadone alone
3) Narcotic + one other yes
4) Diabetes + one other yes
5) Age + one other yes
6) Overnight + one other yes
7) Not age + overnight together with # yes = 2

DISCUSSION

A new patient triage process has been designed specifically for pharmacist use in a pre-operative setting. The patient triage process developed is novel since it is created for pharmacist use and is patient self-administered survey.

A challenge was creating a yes or no referral from multiple questions. The initial triage tool consisted of 22 questions with a risk stratified referral. A weighted scoring tool added additional complexity for users. To simplify, a 19 question tool with a threshold of yes responses and conditional logic was optimal.

Risk factor-directed triage is a significant improvement from the previous model of referral based on surgical pathway alone. The percent agreement between the triage tool and a pharmacist's assessment reached the primary endpoint of 80%. During the implementation phase, further study is needed to measure the impact on patient care and workflow.

Strengths: Patient self-administered survey, novel triage tool for pharmacist use, reached 80% agreement, independent pharmacist assessment for validation.

Limitations: Survey completion rate ranged from 54-68%, triage tool may refer more patients than can be seen, validated in a pre-operative setting, agreement dependent on the professional opinion of a small group of people, potential bias due to the same pharmacist performing assessments and meeting with patients.

APPLICATION

The new patient triage process will be implemented in the pre-operative setting at Hamilton Health Sciences. It is projected that the tool will refer approx. 36 patients each day to the pharmacy team. The threshold # yes for referral can be easily shifted to adjust for workload and staffing changes. There is opportunity to use this tool in similar patient populations and in high flow environments to guide pharmacist referrals. Moving towards an electronic data collection and decision process will streamline usability and workflow.

CONCLUSIONS

Using a triage tool process to refer patients to see a pharmacist for a medication review is an efficient way to optimize patient care in a busy clinic environment. The new triage process has been successfully validated. Moving forward, the triage process will be implemented and compared to baseline. The next step will be to use an internet or application based system to streamline the referral process.

References: (1) Kwan Y. *et. al.* Pharmacist medication assessments in a surgical preadmission clinic. *Arch Intern Med.* 2007;167(10):1034-40. (2) Sen S. *et. al.* Implementation of a pharmacy technician-centered medication reconciliation program at... *Am J Health Syst Pharm.* 2014;71(1):51-6. (3) Musallam K.M. *et. al.* Smoking and the risk of mortality and vascular and respiratory events inpatients… *JAMA Surg.* 2013;148(8):755-62. (4) Lee S.M. *et. al.* The effectiveness of a perioperative smoking cessation program: a randomized clinical trial. *Anesth Analg.* 2013;117(3):605-13. (5) Falk J.M., Raymond C.B. Role of the pharmacist in a presurgical clinic designed to optimize… *Am J Health Syst Pharm.* 2010;15;67(16):1314-7. (6) Parker B.M. *et. al.* Redefining the preoperative evaluation process and the role of the anesthesiologist *J Clin Anesth.* 2000;12(5):350-6. (7) Richardson J.D. *et. al.* Perioperative risk assessment in elderly and high-risk patients. *J Am Coll Surg.* 2004;199(1):133-46. (8) Moonesinghe S. *et. al.* High-risk surgery: epidemiology and outcomes. *Anesth Analg.* 2011;112(4):891-901. (9) Hohl CM *et. al.* Clinical decision rules to improve the detection of adverse drug events in emergency dept… *Acad Emerg Med.* 2012;19(6):640-9. (10) Hilditch W.G. *et. al.* Validation of a pre-anaesthetic screening questionnaire. *Anaesthesia.* 2003;58(9):874-7. (11) Ogan K. *et. al.* Perioperative Assessment of Elderly Surgical Patients *Curr Transl Geriatr and Exp Gerontol Rep*, 2013;2(2):45-50.