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Pharmacists identify preventable drug-related visits and provide clinical services within the emergency department

The emergency department (ED) is the entry point for many hospital admissions. Optimizing the use of the ED, identifying preventable causes of hospitalization and implementing programs that avoid admissions are critical to a sustainable health care system. The following studies show the incidence of drug-related visits to the ED and describe clinical practices lead by pharmacists that prevent and/or reduce ED visits and hospital admissions.

- As many as 28% of all ED visits are due to medication-related problems
- More than 1 in 9 ED visits are drug-related; 68% are preventable
- Pharmacists have a positive role in procedural sedation and analgesia in the ED
- Pharmacists successfully manage an ED-based outpatient treatment program for venous blood clots

As many as 28% of all emergency department visits are due to medication-related problems

Zed PJ. Drug-related visits to the ED. *Journal of Pharmacy Practice*. 2005;18:329-334.

Issue: Drug therapy is widely used and it is important to determine the impact of drug-related problems (DRPs) on the health care system. Studies estimate that DRPs are the cause of approximately 5–10% of all hospitalizations. However, these studies fail to capture patients who visit EDs but are not hospitalized.

A solution: This narrative review summarizes the current literature, synthesizing our current understanding the impact of DRPs on ED visits. Both retrospective and prospective studies evaluating ED visits caused by DRPs are reviewed.

What is a drug-related problem (DRP)?

In this study it is defined as one of eight specific occurrences: untreated indication, drug use without indication, wrong drug, too little drug, too much drug, non-compliance, adverse drug reaction and drug interaction.

Overall, drug-related ED visits were found to range between 0.86 to 28%. Prospective studies revealed a higher incidence of drug related ED visits compared to the

retrospective studies. This is expected since retrospective studies will underestimate the true incidence due to missing or inaccurate information. The studies estimate that among patients presenting to the ED with a drug-related cause, 8.6% to 24.2% require hospitalization. Factors which appeared to be associated with a greater risk of drug-related ED visits included female gender, advanced age and increased number of medications and certain medication drug classes also increased risk including antibiotics, anticoagulants, nonsteroidal anti-inflammatory drugs and antidiabetic agents.

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As many as 28% of all emergency department visits are due to medication-related problems. (continued)

Implications: The definition of DRP varied from study to study. A universal definition is required to better evaluate the impact of DRPs on ED visits. There is a lack of research surrounding the use of complementary and alternative medications and their impact on ED visits. It is necessary to include these medications for a more comprehensive understanding of their impact on DRPs. Preventable ED visits are a strain on the health care system, and reducing DRPs could improve the effectiveness of the system.

Background or research methods:

This review compiles the recently published research on DRPs and visits to the ED; literature examined the incidence, classification, severity, preventability and economic impact of drug related visits to EDs. It provides a comprehensive summary of the current literature, and is a good first step towards reducing the negative

consequences of poorly managed drug therapy. Nine retrospective studies with more than 700,000 patients and four prospective studies with roughly 6,500 patients are included in the review. Results of each study were described and no further statistical analysis was conducted. Conclusions were drawn based on trends observed within the selected studies. □

More than 1 in 9 emergency department visits are drug-related; 68% are preventable

Zed PJ, Abu-Laban RB, Balen RM, Loewen PS, Hohl CM, Brubacher JR, Wilbur K, Wiens MO, Samoy LJ, Lacaria K, Pursell RA. Incidence, severity and preventability of medication-related visits to the ED: a prospective study. *Canadian Medical Association Journal*. 2008; 178 (12):1563-9.

Issue: Drug-related adverse events have a significant impact on the health care system, leading to increased costs, as well as on increased patient morbidity and mortality. The majority of patients who visit an ED for drug-related adverse events are not admitted.¹ Despite the burden associated with drug-related adverse events, very few studies have prospectively examined the occurrence of drug-related visits to the ED.

A solution: This study evaluated the frequency, severity and preventability of drug-related visits to the ED in a large tertiary care hospital. Pharmacists trained to identify, measure and categorize adverse drug-related events interviewed patients who arrived in the ED.

Visits to the ED were considered drug-related if the chief complaint of the patient was directly related to a specific category of a pre-defined drug-related problem. A visit was deemed preventable

if the patient's drug treatment, or lack of drug treatment, was inconsistent with current best practices.

Among the 1,017 patients included in the study, the ED visit was identified as drug-related for 122 patients (12.0%); of these, 83 visits (68%) were preventable. The most common classification of drug-related visits was adverse drug reaction (39%), nonadherence (28%), improper drug selection (12%), untreated indication (9%), high drug dose (7%) and low drug dose (5%). Patients who experienced a drug-related visit were more likely to be admitted to hospital than those whose visit was non drug-related. Interestingly, those who were admitted for drug-related visits had a longer median length-of-stay than patients admitted for non drug-related visits.

In this study, the number of medications was independently linked with drug-related visits, suggesting that reducing the

total number of medications for a particular patient might decrease the number of drug-related ED visits.

Implications: Sixty-eight percent of drug-related events can be prevented before the patient arrives in the ED. Further research focused on primary care interventions that improve patient adherence, optimal prescribing, drug therapy monitoring and communication between health care professionals should be a priority. These interventions outside the hospital could help reduce the number of drug-related ED visits. The fact that patients who are admitted to hospital due to a drug-related visit end up staying in hospital longer leads to the increased utilization of health care resources. This study demonstrates that pharmacists, working with emergency physicians, can successfully identify drug-related adverse events. Once identified, these problems can be appropriately resolved.

1. Zed PJ. Drug-related visits to the ED. *Journal of Pharmacy Practice* 2005;18:329-35.

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Background or research methods:

This observational study was conducted over a 12-week period from March 13 to June 4, 2006, at Vancouver General Hospital, a 955-bed adult tertiary care, referral and trauma centre and a University of British Columbia teaching hospital. All patients who presented to the ED, excluding those transferred from another hospital or those returning for a scheduled visit, were eligible for enrolment. Three trained pharmacists collected the data for the study using

an electronic form. During a four-week pilot period, the pharmacists became familiar with the data-collection process. Pharmacists conducted a thorough assessment of every patient to determine the chief complaint, history of the present illness, past medical history, medication history and allergy status. Additional resources (e.g. family members, other health care providers) were consulted when necessary. For each patient the pharmacist used an algorithm to determine if the problem was drug-related. Pharma-

cists met with emergency physicians—who had no knowledge of the pharmacist assessment—to ask if they felt the visit was drug-related, and if yes, the nature of the drug-related cause. Consenting patients were contacted for follow-up by telephone one month after their initial visit to determine progress and outcomes. □

Financial Support: Vancouver General Hospital and University of British Columbia Hospital Foundation through the in it for life Fund

Pharmacists have a positive role in procedural sedation and analgesia in the emergency department

Grindrod KA, Taddei A. The role of the pharmacist in procedural sedation and analgesia in the ED. *Canadian Journal of Hospital Pharmacy*. 2008; 61 (1):49-54.

Issue: Overcrowding, fragmented care, shortages of anesthesiologists and skilled emergency staff are issues faced by many EDs.² Pharmacists have an important role to play in improving emergency care and improving patient flow through the ED. This paper examines the practice of a trained ED pharmacist who participates in procedural sedation and analgesia (PSA).

A solution: Pharmacists are the only health care professional solely trained to focus on the safe and effective use of medications. Any situation involving drugs provides the opportunity for pharmacists to utilize their therapeutic skills. PSA — formerly known as conscious sedation — places the patient in a depressed level of consciousness while still allowing them to keep his/her own airway open and respond to verbal commands. Its primary use is to provide comfort to patients during diagnostic, therapeutic and surgical procedures.

Clinical pharmacists possess a high level of knowledge about medications used in PSA, and can be utilized to increase the safety and efficacy of sedation. In addition, pharmacists can assist by educating the patient and family members on the risks associated with sedation and analgesia, providing written and verbal information on the drugs that will be used, addressing any questions or concerns related to drug therapy, and obtaining the patient's medical and medication history (i.e. drug allergies, medical conditions). During this time, nurses and physicians make preparations for the diagnostic or surgical procedure.

The clinical pharmacist can also participate in the selection and preparation of appropriate medications, doses and antidotes for PSA. During the procedure, the pharmacist can assist by administering the medications to achieve the desired response while monitoring for rate and depth of respiration, oximetry and other

vital signs, and the patient's level of sedation. The pharmacist then can complete the required documentation for drug administration and can discuss side effects with the patient's family or caregivers.

Implications: Participation of a pharmacist in PSA decreases nursing time required for patient assessment, preparation and documentation of medication, and patient counseling. At the Royal Columbian Hospital, the addition of an ED pharmacist has been well received, especially at a time of high staff turnover among nurses and a nursing shortage. The pharmacist optimizes medication selection and administration, possibly increasing patient throughput in the ED. Future research should focus on assessing the effects of clinical pharmacist participation in PSA on patient outcomes and health resource utilization.

2. Canadian Association of Emergency Physicians presentation to the Commission on the Future of Health Care in Canada (Romanow commission). Ottawa (ON): Canadian Association of Emergency Physicians; 2002 [cited 2006 Aug 17]. Available from: <http://caep.ca/CMS/%7B63974AD3-0F11-437C-BAEE-591BA3BE93D1%7D.pdf>

Background or research methods:

This article is based on the historical experience of Dr. Edward Dillon and current experience of Dr. Anthony Taddei, both clinical pharmacist specialists at the Royal Columbian Hospital, a 380-bed tertiary care hospital in metropolitan Vancouver. Full-time clinical pharmacist specialists are well inte-

grated into the ED team and have conducted advanced emergency medicine and life support training. As drug experts, they support 27 physicians and over 90 registered nurses. In the case of Dr. Taddei, he has experience in administering drugs by injection since 1987, and has demonstrated competency in administration of medications for

rapid-sequence intubation and resuscitation — skills now being applied to procedural sedation and analgesia. □

Financial Support: Dr. Grindrod is currently funded by the Michael Smith Foundation for Health Research and the Canadian Institutes of Health Research

Pharmacists successfully manage an emergency department-based outpatient treatment program for venous blood clots

Zed PJ, Filiatrault L. Clinical outcomes and patient satisfaction of a pharmacist-managed, ED-based outpatient treatment program for venous thromboembolic disease. *Canadian Journal of Emergency Medicine*. 2008; 10(1):10-7.

Issue: Venous thromboembolism (VTE) disease includes both deep vein thrombosis and pulmonary embolism, which can be life threatening. VTE occurs in an estimated 67 per 100,000 people and in the past has required treatment over a 5 to 7 day period in hospital. Outpatient treatment programs have been designed as most patients are usually healthy and clinically stable, thus, they do not need to be admitted. Many models have been designed for the outpatient care of VTE, some of which are pharmacist managed.

A solution: This study is unique in that it is based in the ED, is pharmacist-managed and most patients were enrolled by emergency physicians without requiring hospitalization. The purpose of the study was to measure efficacy, safety and patient satisfaction of this unique treatment program. Most patients experiencing VTE first present to the ED. The purpose of having the VTE treatment program based in the

The VTE treatment program serves as a model for pharmacist-managed services based in the ED.

ED was to expedite discharge and ensure continuity of care, consequently eliminating the prolonged ED stay that can lead to hospital admission.

Patients had to agree to return to the hospital on a daily basis to receive daily injections of low molecular weight heparin (LMWH) and had to be available to be contacted by telephone at home. Patients beginning the program received a written information package, baseline blood work, warfarin 10 mg orally and daily injections of LMWH. A clinical pharmacist conducted an education session

with each patient within 24 hours of program enrolment. Each day patients would return to the hospital to receive blood work, an injection of LMWH, a bleeding assessment and a recommended warfarin dose to help achieve therapeutic INR. Pharmacists, at the time of discharge from the program, transferred care verbally and in writing to the family physician who continued to monitor treatment.

Implications: The results indicated that this program has safety and efficacy outcomes consistent with reported rates in randomized trials. The cost savings of this program were estimated at \$786,000 based on 1,689 avoided admission days. The VTE treatment program serves as a model for pharmacist-managed services based in the ED. Significant cost savings, reductions in waiting times, patient safety and patient satisfaction could be obtained with the widespread implementation of this model.

Background or research methods:

Over a seven year period (1999-2006), patients were enrolled in the pharmacist-managed, ED-based outpatient VTE program at Vancouver General Hospital. Patients eligible for the outpatient VTE treatment program were eligible for the study. If patients had certain medical conditions that increased their risk of bleeding, they were excluded from the program. A total of 305 patients were enrolled in study, of which 36 (11.8%) received initial

inpatient treatment prior to enrolment. The efficacy evaluation found that 2 patients experienced a recurrent VTE at 3 months, and 5 patients had a recurrence at 6 months. The safety assessment demonstrated a very low level of bleeding. One patient experienced a major bleed and 7 patients experienced a minor bleeding complication. A satisfaction survey was sent following discharge and patients were contacted at 3 and 6 months to determine recurrence of VTE. Over 95% of patients who

responded to the satisfaction survey were very satisfied or satisfied with the treatment they had received in the outpatient program. □

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Contributors

Joseph Blais, BSc(Pharm) (candidate)
Marie-Anik Gagné, HBSocSc, MA, PhD
Cynthia S. Leung, BSc, BPharm (candidate)

Reviewers

Peter J. Zed, BSc, BSc(Pharm), ACPR, PharmD, FCSHP
Kelly Grindrod, BSc(Pharm), ACPR, PharmD

Contact Information

Marie-Anik Gagné
Director of Policy and Research
Canadian Pharmacists Association

mgagne@pharmacists.ca
(613) 523-7877, ext. 225
1-800-917-9489

www.pharmacists.ca/research

