

# Provision of Pharmaceutical Care at a Canadian Military Surgical Centre in Bosnia-Herzegovina

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## INTRODUCTION

The impact of pharmaceutical care has been described for many pharmacy settings such as the community, nursing homes, and acute care hospitals. The role of military pharmacy services has also been described for an international peacekeeping setting in Haiti.<sup>1</sup> From its genesis earlier in this decade<sup>2</sup> to the diverse practice forms into which it has evolved today, pharmaceutical care has been firmly adopted by many Canadian pharmacists attempting to put its principles into everyday practice.<sup>3,4</sup> Many studies,<sup>5,8</sup> including a recent review in another Canadian pharmacy journal,<sup>9</sup> have investigated the potential impact of a pharmacist's influence on health and economic outcomes. In this paper I will characterize the drug-related problems (DRPs) identified and describe the patient outcomes monitored through provision of pharmaceutical care to selected ambulatory and hospitalized patients at a Canadian military surgical centre in the former Yugoslavia.

## METHODS

All assessments and follow-ups were conducted at the pharmacy of the Advanced Surgical Centre (ASC), a 20-bed Canadian military medical facility deployed in support of 1200 Canadian Forces personnel in Bosnia-Herzegovina from January 10 to June 27 (excluding 4 weeks during which the pharmacist was absent from the ASC). The ASC was staffed by 27 personnel including a general surgeon; an anesthetist; operating room, critical care, and general-duty nurses; medical assistants; laboratory, radiology, operating room, dental, and biomedical equipment repair technicians; a pharmacist (D.D.); and a dentist. In a military operation (such as a

peacekeeping operation) the role of the ASC is to provide emergency trauma and surgical care, as well as routine surgical and medical services. In Bosnia-Herzegovina the pharmacist provided direct care to ambulatory patients presenting to the pharmacy and to patients who had been admitted to the ASC.

The subjects for this study were Canadian military personnel and people from other North Atlantic Treaty Organization countries serving in the area, workers in nongovernmental organizations (such as the International Committee of the Red Cross and the United Nations), and civilians employed at the Canadian military camp. Routine medical care was not offered to civilians who presented to the ASC, but emergency care could be provided, and, once they were clinically stable, patients were transferred to a nearby civilian hospital.

Data were collected by the single pharmacist officer, who assessed patients to identify drug-related problems (DRPs) and to categorize these problems as "actual" (the patient experiencing the problem at the time of assessment) and "potential" (the patient at risk of experiencing the problem). A pharmacy care plan was completed for each DRP; the plan consisted of a statement of the DRP, background patient data, desired outcome(s), an assessment of the options, a therapeutic plan, the desired endpoints of therapy, and a monitoring plan. A DRP was deemed "prevented" or "resolved" if the therapeutic outcome specified in the care plan was achieved within the specified time frame.<sup>10,11</sup> Time frames for endpoints and outcomes were determined by the pharmacist or the patient on the basis of the degree of urgency of each DRP. An example of a pharmacy care plan is shown in Figure 1.

The clinical significance of each pharmacy care plan was evaluated by another military pharmacist according

**Figure 1. Sample of a pharmacy care plan.**

Patient: [name here]  
 M / E Age: 25 Phone: \_\_\_\_\_

Pharmacist: D.D.  
 Date: 19 Jan 97

DRP Category: \_\_\_ Actual  Potential Resolved: Yes / No Date: 21 Jan 97

1. taking a drug/receiving a drug for which there is no valid indication
2. the patient requires drug therapy and is not receiving it
3. he patient is taking the wrong drug product
4. the patient is taking too little drug
5. the patient is taking too much drug
6. the patient is not taking the drug appropriately
7. the patient is experiencing an adverse reaction ( not dose-related)
8. the patient is experiencing a drug-drug, drug-food, drug-lab interaction

**Drug-Related Problem:**

Patient is at risk of prolonged signs/symptoms of pneumonia due to inadequate antibiotic coverage.

**Patient Data:**

17 Jan - A Czech soldier, brought to ASC from nearby Czech camp

- S/Sx: fever, fatigue, cough, N&V, SOB, positive chest x-ray
- Rx erythromycin 250 mg IV q6h

19 Jan - after 2 days Rx patient still has spiking fever >40°C, fatigue, cough, N&V, WBC 12 x 10<sup>9</sup>/L

- on room air but SOB less
- N&V keeping patient NPO
- medical officer asks for other therapeutic options

**Assessment:**

- increase erythromycin to 500 mg q6h (incr dose may worsen her current nausea)
- add ceftriaxone for gram-neg coverage (no other 2nd/3rd generation cephalosporin available)

**Outcome(s):**

Achieved: Y  
 Date: 21 Jan 97

- decrease fever, cough, fatigue & WBC to <10 x 10<sup>9</sup>/L within 3 days; eliminate cough in 10-14 days

**Therapeutic Plan:**

1. Add ceftriaxone 1g IV q24h

Endpoints:	Resolved? Date	Monitoring Plan:				
		Who	Parameter	When	Resolved? (Y / N)	Initials/ Date
Temp <38°C in 3 days	Yes, 21 Jan					
Fatigue, cough decreased in 3 days	Yes, 21 Jan	DD	Cough, fatigue	Daily x5	Yes	21 Jan
WBC <10x10 <sup>9</sup> /L in 3 days	Yes, 20 Jan	DD	WBC, lytes, fluid status, temp	Daily x5	Yes	21 Jan
		DD	Side effects: rash, N&V, phlebitis	Daily x5	Not seen	
<b>Comments:</b> 20 Jan- WBC 7.0; some N&V 22 Jan- d/c to home unit on erythro 250 mg po qid & cefuroxime axetil 250 mg po bid		DD	Cough	5-10 days after d/c	Unknown	

1995, Régis Vaillancourt (Ottawa, ON) & Douglas Doucette (Halifax, NS). Revised Nov 1996.



to the classifications of Hatoum and colleagues<sup>12</sup>: adversely significant (improper intervention), not significant (information only), somewhat significant (benefit to patient depends on professional interpretation), significant (elevated care to standard of practice), very significant (prevented major organ dysfunction), or extremely significant (prevented death).

## RESULTS

A total of 404 medication orders were presented to the pharmacist over the 20-week study period. Thirty-four DRPs were identified in 21 patients, a mean of one DRP for every 12 medication orders. Ten (29%) of the DRPs occurred in hospital patients and 24 (71%) in ambulatory patients. The majority of subjects (17 [81%]) were male.

The most frequent DRP was that a patient required drug therapy but was not receiving it (in 14 [41%] of the cases), followed by adverse drug reactions (not related to dose) (6 [18%]), administration of a drug for which there was no indication (4 [12%]), and administration of the wrong drug product (3 [9%]). Patients taking too much drug, patients experiencing a drug interaction of some type, and patients not taking a drug appropriately each accounted for 2 (6%) of the DRPs, and one subject (3%) was taking too little of a prescribed drug. Figure 1 presents an example of a care plan for a patient requiring a drug but not receiving it.

Overall, 85% of the desired patient outcomes had been achieved on completion of the study. Desired outcomes were achieved in 21 of 22 actual and 8 of 12 potential DRPs. Desired outcomes were not achieved for 3 DRPs (9%), and for 2 DRPs (6%), the patients were lost- to follow-up.

When the pharmacy care plans were rated for their clinical significance, 23 (68%) were considered significant, 6 (18%) were considered very significant, and 5 (15%) were considered somewhat significant (percentages sum to greater than 100 because of rounding). No care plans were considered adversely significant or extremely significant.

## DISCUSSION

This study demonstrated a relatively high success rate, in that 85% of desired outcomes were achieved in a selected group of military patients serving in the former Yugoslavia. This was the first study in a military setting of the pharmaceutical care practice model described by Winslade and colleagues.<sup>13,14</sup> Previous studies have characterized patients in a given pharmacy practice

site and described the frequency of various DRPs identified, but few have used outcome management and a pharmaceutical care model. One study<sup>15</sup> reported that 95% (219/231) of interventions suggested by 4 PharmD students during their 6-week rotations in adult internal medicine, infectious disease, or critical care were accepted by physicians. The authors of that study also reported the types of DRPs solved by the students, the most frequent being underdose (32%), overdose (17%), untreated indications (14%), and drug administered without indication (14%). Interventions were classified by preceptors, and 69% were considered significant to patient care, 5% were considered very or extremely significant, and none resulted in adverse consequences to the patient. Patient outcomes were not uniformly documented, but the goals of the interventions were achieved in all cases in which outcome was documented. Half of the interventions were estimated to have resulted in cost savings, approximately one-quarter led to cost increases, and one-quarter had no effect on cost. Although other studies characterizing DRPs and examining patient outcomes have been presented in abstract form, the variety of patient populations and study designs and the lack of peer review make comparisons difficult.<sup>16</sup>

As with any study that involves a limited number of practitioners, there is potential for bias related to the specific pharmacist involved. For example, a pharmacist's level of experience and training will likely influence the therapeutic options considered to resolve or prevent a patient's DRP. The perception of what constitutes a DRP may be influenced by either the pharmacist's or the patient's perspective. In addition, the availability (or lack of availability) of certain medications because of an institution's formulary or other logistical barriers (such as reliance on a Canadian supply source to acquire and ship medications to remote locations in eastern Europe) may limit the therapeutic options that can be considered for a patient's DRP.

Figure 1 is presented to illustrate the process and documentation used to follow patients while delivering pharmaceutical care. Although guidelines on empiric treatment of community-acquired pneumonia<sup>17,18</sup> recommended a macrolide alone for a patient in this situation, a cephalosporin was added for increased coverage of gram-negative organisms, because her living and working conditions in nearby towns and villages might have exposed her to a broad range of pathogens. Unfortunately, her inability to take medications orally and the lack of a second-generation cephalosporin necessitated adding ceftriaxone to erythromycin.



Because of experience gained in over 3 years of medical support to Canadian military personnel in the former Yugoslavia, other antimicrobial agents have been added to the ASC stock, such as IV cefuroxime sodium and oral clarithromycin and azithromycin. The care plan shown (Figure 1) relates to only one of several DRPs identified for this patient. Others included her inability to tolerate oral antibiotics earlier in her illness and the potential for increased or prolonged nausea and vomiting on administration of oral doxycycline or IV erythromycin. Nausea and vomiting were temporally related to the patient's attempts to ingest food and water, in spite of premedication with IV dimenhydrinate, but she did respond favourably to IV metoclopramide. Other examples of the design and implementation of pharmacy care plans have been published recently for a variety of practice settings and disease states.<sup>10,11,19,20</sup>

For a number of reasons, a low number of prescriptions and medication orders were received by the pharmacy over the study period. First, the study population consisted mainly of 18- to 55-year-old Canadian military personnel who were generally in excellent health. Only a small fraction of the patients were of non-Canadian origin and presented with chronic medical problems such as anemia, hypertension, and asthma. Second, not all medications were dispensed by the pharmacist. After being seen by a medical assistant, nursing officer, or medical officer, some patients may have had their prescriptions filled from a limited wardstock in the medical inspection room, between 8:00 AM and 4:00 PM, or the ASC ward, between 4:00 PM and 8:00 AM. These wardstocks were necessary because the pharmacist officer's nonclinical duties required him to be out of the pharmacy and away from the military camp for several hours or days at a time. All prescriptions filled from the ASC ward or medical inspection room wardstocks were reviewed by the pharmacist and stored in the pharmacy. Although candidates for this study could have been selected from patients whose medication was dispensed by nurses or medical assistants, review of these prescriptions did not indicate a need to initiate care plans. Finally, the overall injury and illness rate for Canadian military personnel during the deployment was low, which resulted in few admissions to hospital and infrequent outpatient visits.

It was difficult to establish the desired endpoints and outcomes of drug therapy since there are few published resources in this area, and still fewer resources were available in the ASC pharmacy. For example, it was difficult to define some endpoints such as the number of days or weeks needed to resolve rebound

congestion due to overuse of a nasal decongestant or to eliminate a complaint of mild peripheral neuropathy due to a too-high dose of isoniazid. This barrier will probably continue to be a source of frustration for pharmacists attempting to implement pharmaceutical care in daily practice. It should be emphasized that these endpoints should be used when known, but they are not a substitute for follow-up to ensure that therapeutic interventions are leading to positive outcomes.

There was thorough follow-up of outpatients receiving prescriptions from the ASC pharmacy because of the close living and working conditions of the personnel stationed there. There were two cases in which the outcome of therapy was unknown: one patient was an elderly civilian woman from a nearby village whose address was unknown and the other was a military patient who did not return to the ASC for reassessment of his blood pressure. This environment was admittedly quite different from that encountered by most pharmacists. Attempts were made to reach some patients by telephone, although this was problematic at times, given the difficulties in getting telephone links between the military and civilian systems. There are specific reasons why the level of follow-up was likely higher than in routine practice: first, these patients were subjects in a study examining outcomes so the investigator made a concerted effort to carry out the necessary follow-up, and second, the low incidence of injury and illness offered more time for follow-up than if there had been a larger number of prescriptions to review and process.

It is anticipated that the results of this study will be used as baseline data for future deployments. There is potential for future implementation in non-operational settings (such as for ambulatory patients in military pharmacies) after pharmacist officers have been given more training in the pharmaceutical care model, such as that in recently published CSHP modules.<sup>10,11</sup> The Canadian Forces are currently implementing pharmacy software to enable dispensing and pharmacy care plans to be managed from the same database. This computer project may allow military pharmacists to more efficiently implement pharmaceutical care by enhancing follow-up and documentation of DRPs and outcomes achieved.

The clinical significance of the care plans was rated by another military pharmacist with similar experience (previous hospital and ambulatory practice) and seniority in rank. Most of the DRPs were deemed significant, although some would not have adversely affected the person's ability to perform his or her duties. For example, many patients presented with persistent



symptoms of seasonal allergies, which were untreated or not responding to first-line therapy with oral antihistamines. These patients were not excused from duty because of their symptoms, but were at times seriously inconvenienced by rhinorrhea, nasal congestion, and conjunctivitis. These DRPs were relatively easy to resolve, and the resolution of these problems likely enabled soldiers to better concentrate on their daily tasks. However, other DRPs were more serious and, if not addressed, could have resulted in a delay of a day or more before the patient could return to duties. For example, one soldier suffered from frequent migraine headaches and was treated only with acetaminophen, caffeine, and codeine tablets. Two other patients with pneumonia vomited after oral and IV doses of erythromycin and had to be admitted to receive IV antibiotics and antiemetics.

This study did not evaluate the economic impact of the pharmacy care plans and their outcomes. However, it was obvious that a commander's military objective would be more easily achieved if his or her personnel were able to return to duty more quickly, whether the patients be suffering from seasonal rhinitis, community-acquired pneumonia, post-surgical pain, or a ballistic injury. The cost of replacing a soldier in the field on an international mission is considerable. Thus, any intervention that hastens the return to duty of sick and injured personnel will save countless government dollars and lessen the social and psychological impact on patients, their families, and the personnel serving with them.

In summary, pharmaceutical care was delivered to selected ambulatory and hospitalized patients at a Canadian military surgical centre, and 85% of desired patient outcomes were achieved. The majority of DRPs and interventions were considered clinically significant. The contributions of patient-oriented pharmacist officers result in positive patient outcomes and may assist the military medical service's efforts to conserve staffing levels.

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