

Comparison of Canadian versus United States emergency department visits for chronic obstructive pulmonary disease exacerbation

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INTRODUCTION: Despite the frequency of emergency department (ED) visits for chronic obstructive pulmonary disease (COPD) exacerbation, little is known about practice variation in EDs.

OBJECTIVES: To examine the differences between Canadian and United States (US) COPD patients, and the ED management they receive.

METHODS: A prospective multicentre cohort study was conducted involving 29 EDs in the US and Canada. Using a standard protocol, consecutive ED patients with COPD exacerbations were interviewed, their charts reviewed and a two-week telephone follow-up completed. Comparisons between Canadian and US patients, as well as their treatment and outcomes, were made. Predictors of antibiotic use were determined by multivariate logistic regression.

RESULTS: Of 584 patients who had physician-diagnosed COPD, 397 (68%) were enrolled. Of these, 63 patients (16%) were from Canada. Canadians were older (73 years versus 69 years; $P=0.002$), more often white (97% versus 65%; $P<0.001$), less educated ($P=0.003$) and more commonly insured ($P<0.001$) than the US patients. US patients more commonly used the ED for their usual COPD medications (17% versus 3%; $P=0.005$). Although Canadian patients had fewer pack-years of smoking (45 pack-years versus 53 pack-years; $P=0.001$), current COPD medications and comorbidities were similar. At ED presentation, Canadian patients were more often hypoxic and symptomatic. ED treatment with inhaled beta-agonists (approximately 90%) and systemic corticosteroids (approximately 65%) were similar; Canadians received more antibiotics (46% versus 25%; $P<0.001$) and other treatments (29% versus 11%; $P=0.002$). Admission rates were similar in both countries (approximately 65%), although Canadian patients remained in the ED longer than the US patients (10 h versus 5 h, respectively; $P<0.001$).

CONCLUSIONS: Overall, patients with acute COPD in Canada and the US appear to have similar history, ED treatment and outcomes; however, Canadian patients are older and receive more aggressive treatment in the ED. In both countries, the prolonged length of stay and high admission rate contribute to the ED overcrowding crisis facing EDs.

Key Words: Canada-USA; Chronic obstructive pulmonary disease; Emergency department; Exacerbation

Une comparaison entre les consultations dans les urgences canadiennes et américaines en raison d'une exacerbation de maladie pulmonaire obstructive chronique

INTRODUCTION : Malgré la fréquence des consultations à l'urgence en raison des exacerbations de maladie pulmonaire obstructive chronique (MPOC), on ne sait pas grand-chose de la variation des pratiques à l'urgence.

OBJECTIFS : Examiner la différence entre les patients canadiens et américains atteints de MPOC et la prise en charge qu'ils reçoivent à l'urgence.

MÉTHODOLOGIE : Les auteurs ont mené une étude de cohorte multicentre prospective auprès de 29 urgences des États-Unis (EU) et du Canada. Au moyen d'un protocole standard, ils ont interviewé des patients consécutifs ayant consulté à l'urgence à cause d'exacerbations de la MPOC, ont analysé leur dossier et effectué un suivi téléphonique au bout de deux semaines. Ils ont comparé les patients canadiens et américains, ainsi que leur traitement et leurs issues. Ils ont déterminé les prédicteurs d'usage d'antibiotiques par régression logistique multivariée.

RÉSULTATS : Des 584 patients atteints d'une MPOC diagnostiquée par un médecin, 397 (68 %) ont participé. De ce nombre, 63 (16 %) provenaient du Canada. Les Canadiens étaient plus âgés (73 ans au lieu de 69; $P=0,002$), plus souvent blancs (97 % par rapport à 65 % ; $P<0,001$), moins instruits ($P=0,003$) et plus souvent assurés ($P<0,001$) que les patients américains. Les patients américains utilisaient davantage l'urgence pour leur médication habituelle contre la MPOC (17 % par rapport à 3 % ; $P=0,005$). Même si les patients canadiens avaient fumé moins de paquets/année (45 paquets/année par rapport à 53 paquets/année; $P=0,001$), la médication courante contre la MPOC et les comorbidités étaient similaires. À leur arrivée à l'urgence, les patients canadiens étaient plus souvent hypoxiques et symptomatiques. Le traitement à l'urgence par bêta-agonistes en aérosol (environ 90 %) et corticoïdes systémiques (environ 65 %) était similaire. Les Canadiens recevaient plus d'antibiotiques (46 % par rapport à 25 % ; $P<0,001$) et d'autres traitements (29 % par rapport à 11 % ; $P=0,002$). Les taux d'hospitalisation étaient similaires dans les deux pays (environ 65 %), même si les patients canadiens demeuraient à l'urgence plus longtemps que les Américains (dix heures par rapport à cinq, $P<0,001$).

CONCLUSIONS : Dans l'ensemble, les patients atteints de MPOC aigüé au Canada et aux ÉU semblent avoir des antécédents, un traitement à l'urgence et des issues similaires. Cependant, les patients canadiens sont plus âgés et reçoivent un traitement plus énergique à l'urgence. Dans les deux pays, le long délai avant d'être vu et les taux d'hospitalisation élevés contribuent au débordement des urgences.

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Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality worldwide. COPD is mainly a disease of smokers, and it is the only chronic disease in which mortality rates are increasing (1). In the United States (US), COPD exacerbations are the third most common cause of hospitalization, with an estimated 726,000 hospitalizations in 2000; COPD exacerbation also accounts for approximately 1.5 million emergency department (ED) visits per year (2). Canadian statistics on acute COPD in the ED are less readily available; however, of the 14 million ED visits across Canada (3), if 1.4% are believed to be for COPD (4), this would represent approximately 196,000 ED visits per year.

The management of acute COPD involves early treatment, identification of the etiology of the exacerbation (ie, upper respiratory tract infection) and recognition of respiratory failure. Medical treatment includes the use of bronchodilators (ie, a short-acting beta-agonist, a short-acting anticholinergic or both) (5), systemic corticosteroids (6), judicious use of O₂, antibiotics when indicated (7) and noninvasive ventilation (8) in the event of respiratory failure. At times, intubation and intensive care admission may be required (9).

While there are guidelines for the treatment of stable COPD, they do not focus clearly on ED management and differences among national guidelines exist. Despite attempts to standardize COPD management, there remain wide gaps between what is known and what is practiced (10). Some of these differences may vary from country to country.

The goal of the present multicentre study was to compare patient characteristics, pre-ED management, severity at ED presentation, emergency management and two-week outcomes of patients with COPD in Canadian versus US EDs. Although few multinational comparisons in acute respiratory ED visits have been reported, we recently demonstrated important differences in a variety of patient and treatment factors between Canada and the US for acute asthma visits (11). To our knowledge, this is the first published comparison of Canadian and US ED visits for COPD exacerbations.

METHODS

Study design

The present observational study combined data from two prospective cohort studies performed from November 1999 to June 2000, and December 2000 to May 2001, as part of the Multicenter Airway Research Collaboration. The institutional review boards at each of the 29 participating hospitals approved the study, and informed consent was obtained from all participants.

Study setting and population

The Multicenter Airway Research Collaboration is a division of the Emergency Medicine Network (EMNet, www.emnet-usa.org). Details on design and data collection have been previously published (9). In brief, using a standard protocol, investigators at 29 EDs in 15 US states and three Canadian provinces provided 24 h/day coverage for a median of two weeks. Repeat visits by individual subjects were excluded. All patients were managed at the discretion of the treating physician, and no standardized admission criteria were used. Inclusion criteria were a physician diagnosis of COPD, presentation to the ED for treatment of a COPD exacerbation (defined by increasing shortness of breath, worsening cough or

change in sputum production [1,12-15]), 55 years of age or older, and the ability to provide informed consent.

Study protocol

Trained research personnel performed the ED interview and assessed patients' baseline clinical characteristics, COPD history and details of their current COPD exacerbation. Data on ED management and course were obtained by chart review. Follow-up data were collected by telephone interview two weeks after the ED visit. Site investigators reviewed all forms before submission to the EMNet Coordinating Center in Boston (Massachusetts, USA), where they underwent further review by trained personnel and then double data entry.

Measurements

Hospital admission was defined as an admission to an inpatient unit, observation unit or intensive care unit. Each patient's diagnostic group was based on the following question: "Has a doctor ever said that you have asthma, COPD or chronic bronchitis?" Patients were classified as COPD patients if they reported COPD, emphysema or chronic bronchitis. Patients reporting asthma and fulfilling the definition of COPD were classified as having both COPD and asthma (ie, 'mixed' disease).

Validation set

To address possible diagnostic misclassification, a validation study was performed involving all patients presenting with asthma or COPD during the study period at three of the sites: Massachusetts General Hospital (Massachusetts, USA), MetroHealth Medical Center (Ohio, USA) and University of Alberta Hospital (Alberta, Canada). Patients were confirmed to have COPD (regardless of asthma diagnosis) if they met both of the following criteria: they stated that a physician had given them a diagnosis of COPD, emphysema or chronic bronchitis; and if on review of their medical records, they had a baseline forced expiratory volume in 1 s of less than 80% predicted, a forced expiratory volume in 1 s/forced vital capacity ratio of less than 70%, or other evidence of COPD (radiologist's interpretation of COPD from chest radiograph or computed tomography scan [eg, obvious bullous disease or hyperinflation with flattening of the diaphragm]). Among the 66 patients who reported doctor-diagnosed COPD, none had contradictory spirometric results. Spirometry, chest radiograph and chest computed tomography scan were not performed (or at least were not available) for all patients; however, 82% of self-reported cases of COPD were confirmed (16).

Insurance status was categorized as private (commercial or private), Medicaid, other public (all Canadian and Medicare) or none. Primary care provider (PCP) status was assigned on the basis of the following question: "Do you have a primary care provider (such as a family doctor, internist, or nurse practitioner)?" Smoking status was coded as never-smoker, former smoker or current smoker. Pack-years of smoking represented cumulative smoking exposure, which was calculated by multiplying the number of packs per day by the number of years of smoking. Symptom frequency between COPD exacerbations was classified into four levels: no symptoms, some symptoms on some days, some symptoms on most days and symptoms most of the time. Subjective symptoms of a current exacerbation were assessed using the following three questions: "Over the past 24 hours, how often did you experience COPD symptoms?"; "Over the past 24 hours, how

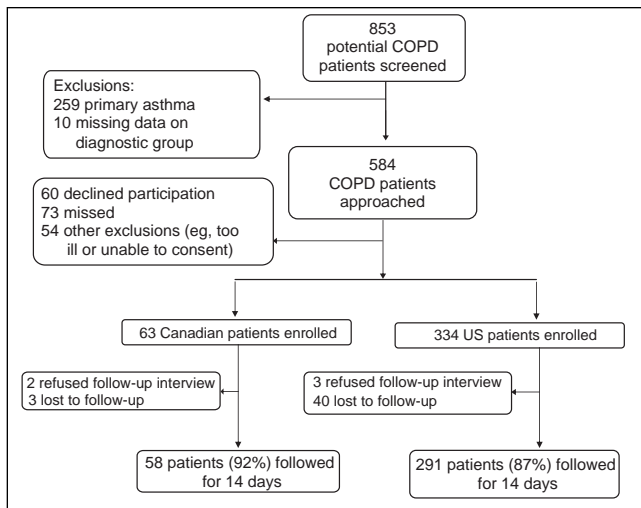


Figure 1 Patient flow diagram for chronic obstructive pulmonary disease (COPD) exacerbation study. US United States

much discomfort or distress have you felt because of these COPD symptoms?"; and "Among all of the activities that you have done over the past 24 hours, how much has your COPD limited you?" The three questions were scored on a four-point scale (1, none; and 4, severe).

Two-week follow-up outcomes were relapse and ongoing exacerbation. Relapse was defined as a worsening of respiratory symptoms that led to an urgent unscheduled clinic visit or ED visit for further care. Ongoing exacerbation during the two-week follow-up period was assigned to patients who reported 'severe symptoms' during the preceding 24 h on at least one of two questions (ie, COPD symptoms 'most of the time', or 'severe' discomfort and distress due to their asthma), or who stated that their COPD was 'about the same' or worse than at the time of their ED presentation.

Data analysis

All analyses were performed using Stata v9.0 software (StataCorp, USA). Data are presented as proportions or medians with interquartile ranges. The associations between Canadian and US baseline clinical characteristics were examined using the χ^2 test, Fisher's exact test or Mann-Whitney U test, as appropriate. All P-values are two-sided, with $P < 0.05$ considered statistically significant; however, due to multiple comparisons, comparisons of $P > 0.001$ should be interpreted with caution.

RESULTS

Enrolment

Of 853 potential COPD and/or asthma patients screened, 584 had physician-diagnosed COPD (mixed asthma-COPD or COPD only). Of these patients, 397 (68%) were enrolled. The patient flow is shown in Figure 1. Enrolled and nonenrolled patients were similar across several sociodemographic factors (data not shown) except age, with nonenrolled patients tending to be slightly older than enrolled patients (mean age 73 versus 70 years, respectively; $P < 0.001$). Enrolments were similar in Canadian versus US sites (66% versus 68%, respectively; $P = 0.59$). A two-week follow-up was obtained for 349 (88%) of the enrolled patients. Follow-ups were also similar in Canadian versus US sites (92% versus 87%, respectively; $P = 0.27$).

TABLE 1
Characteristics of 29 participating emergency departments (EDs) according to country

Characteristic	Canada (n=5)	United States (n=24)	P
Public hospital, %	100	25	0.004
Number of ED visits in one year, median (IQR)	59,734 (59,495–74,146)	64,396 (47,807–76,161)	0.91
Has an emergency medicine residency program, %	80	96	0.32
Has a designated COPD treatment area, %	20	26	1
Has a guideline for managing COPD, %	20	26	1

COPD Chronic obstructive pulmonary disease; IQR Interquartile range

ED characteristics

Five Canadian and 24 US sites participated in the present study (Table 1). Canadian and US sites were similar according to annual ED volume and having an emergency residency program, designated COPD treatment area or guideline for managing COPD. By contrast, all Canadian sites were public hospitals, whereas only 25% of US sites were public hospitals.

Pre-ED factors

Demographic and baseline clinical characteristics are shown in Table 2. The mean (\pm SD) age of the present cohort was 70 ± 9 years, and 52% were women. Sixty-three patients (16%) were seen in Canadian EDs. Canadian patients were older, more likely to be white, but less likely to have completed high school. Canadian patients were all covered by public health insurance, were more likely to have a PCP, and were less likely to use the ED for their COPD prescriptions. The frequency of health service use in the past year did not differ between Canadian and US patients. Although the distribution of smoking status did not differ between the two groups, the lifetime pack-years of smoking was slightly lower in Canadian patients. Canadian patients were less likely to have mixed diseases, less likely to have taken systemic corticosteroids, and also were less likely to have used inhaled beta-agonists during the preceding month. Canadian and US patients did not differ according to comorbidity status.

ED assessment and treatment

The severity of the index COPD exacerbation differed between Canadian and US patients (Table 3). Canadian patients reported more frequent and severe COPD symptoms and more severe activity limitation before ED presentation. They also had higher respiratory rates, lower O_2 saturations and lower partial pressures of CO_2 at ED presentation. The presence of concomitant medical disorder did not differ between the two groups. With respect to ED management, Canadian patients were more likely to receive antibiotics and other adjunct therapies in the ED. While Canadians received more anticholinergics than the US patients (86% versus 76%, respectively; $P = 0.08$), this difference did not reach significance.

Post-ED outcomes

With regard to outcomes, Canadian and US patients were equally likely to be admitted overnight to the hospital; however,

TABLE 2
Demographic and health characteristics of patients presenting to the emergency department (ED) with chronic obstructive pulmonary disease (COPD) exacerbation, according to country

Characteristic	Canada (n=63)	United States (n=334)	P
Demographic factors			
Age, years, mean ± SD	73±9	69±9	0.002
Women, %	46	53	0.31
White, %	97	65	<0.001
High school graduate, %	37	57	0.003
Body mass index, kg/m ² , median (IQR)	24.7 (21.8–28.4)	25.0 (21.0–30.0)	0.56
Health care-related factors			
Insurance status, %			<0.001
Private	0	29	
Medicaid	0	17	
Other public	100	42	
None	0	12	
Had a primary care provider, %	97	89	0.05
ED is the usual site for problem COPD care, %	52	53	0.89
ED is the usual site for COPD prescriptions, %	3	17	0.005
Number of admissions for COPD in the past year, median (IQR)	0 (0–1)	0 (0–1)	0.65
Number of urgent clinic visits in the past year, median (IQR)	0 (0–2)	0 (0–1)	0.23
Number of ED visits in the past year, median (IQR)	1 (0–3)	1 (0–4)	0.65
Smoking-related factors			
Current smoker, %	30	30	0.98
Past smoker, %	60	61	
Never-smoker, %	10	9	
Pack-years of smoking, median (IQR)	44 (25–56)	54 (31–84)	<0.001
Diagnosis			
COPD only, %	68	54	0.04
Mixed COPD and asthma, %	32	46	
Severity of COPD			
Duration of COPD history, years, median (IQR)	8 (2–16)	8 (4–20)	0.58
Breathing between COPD exacerbations, %			0.42
No symptoms	16	20	
Some symptoms on some days	23	30	
Some symptoms on most days	24	22	
Symptoms most of the time	37	28	
Ever had an admission for COPD, %	68	65	0.66
Ever had intubation for COPD, %	11	15	0.47
Ever taken systemic corticosteroids for COPD, %	54	67	0.05
COPD medication in the past four weeks			
Inhaled beta-agonists, %	75	85	0.04
Inhaled anticholinergics, %	59	65	0.38
Inhaled corticosteroid, %	54	48	0.40
Systemic corticosteroid, %	40	36	0.57
Long-acting inhaled beta-agonist, %	13	16	0.55
Home oxygen use, %	17	26	0.15
Antibiotics, %	11	19	0.13

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TABLE 2 – CONTINUED
Demographic and health characteristics of patients presenting to the emergency department (ED) with chronic obstructive pulmonary disease (COPD) exacerbation, according to country

Characteristic	Canada (n=63)	United States (n=334)	P
Comorbidities			
Coronary artery disease, %	24	22	0.69
Congestive heart failure, %	22	18	0.39
History of arrhythmia, %	16	12	0.35
Depression, %	10	13	0.50

IQR Interquartile range

TABLE 3
Emergency department (ED) presentation and clinical course of patients with chronic obstructive pulmonary disease (COPD) exacerbation, according to country

	Canada (n=63)	United States (n=334)	P
Presentation			
ED triage time, %			0.59
00:00–07:59	14	16	
08:00–15:59	63	59	
16:00–23:59	21	27	
Pre-ED arrival condition			
Duration of symptom onset, h, median (IQR)	48 (18–108)	48 (18–108)	0.17
Number of inhaled beta-agonist puffs within 6 h of ED stay, median (IQR)	3 (0.5–12)	4 (1–8)	0.90
Number of inhaled anticholinergic puffs within 6 h of ED stay, median (IQR)	2 (0–6)	0 (0–4)	0.06
COPD exacerbation in the past 24 h			
Frequency of COPD symptoms, %			
None of the time	2	3	0.004
Some of the time	17	27	
Most of the time	26	36	
All of the time	55	34	
Severity of COPD symptoms			
None	1	4	0.01
Mild	3	13	
Moderate	37	34	
Severe	59	49	
Activity limitations			
None	0	5	0.007
Mild	7	14	
Moderate	24	29	
Severe	69	52	
ED presentation			
Respiratory rate, breaths/min, median (IQR)	24 (24–28)	24 (20–28)	0.03
O ₂ saturation in room air*, % median (IQR)	89 (86–93)	93 (90–96)	<0.001
FEV ₁ †, L, median (IQR)	0.76 (0.46–1.15)	0.74 (0.5–1.08)	0.84
PEF‡, L/min, median (IQR)	170 (70–180)	149 (100–180)	0.96

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TABLE 3 – CONTINUED
Emergency department (ED) presentation and clinical course of patients with chronic obstructive pulmonary disease (COPD) exacerbation, according to country

	Canada (n=63)	United States (n=334)	P
ED presentation – CONTINUED			
Arterial blood gas [§] , mmHg, median (IQR)			
pO ₂	61 (51–70)	68 (56–91) [¶]	0.03
pCO ₂	42 (36–50)	49 (42–62)	0.004
Concomitant medical disorder (%)			
Pneumonia	18	16	0.74
Congestive heart failure	19	11	0.07
Significant arrhythmia	5	3	0.42
Pneumothorax	0	0.3	1
ED course			
Given systemic corticosteroids, %	65	62	0.66
Inhaled beta-agonist treatments – first hour ^{**} , median (IQR)	1 (0–2)	1 (0–2)	0.06
Total inhaled beta-agonist treatments in the ED ^{**} , median (IQR)	3 (2–8)	3 (2–3)	0.01
Inhaled beta-agonist medication in the ED, %	89	91	0.57
Inhaled anticholinergic treatments – first hour ^{**} , median (IQR)	0 (0–1)	1 (0–1)	0.38
Total inhaled anticholinergic treatments in the ED ^{**} , median (IQR)	1 (1–4)	1 (1–2)	0.004
Inhaled anticholinergic medication in the ED (%)	86	76	0.08
Received antibiotics in the ED (%)	46	25	0.001
Noninvasive ventilation treatment (%)	0	4	0.24
Received other COPD treatments in the ED ^{††} (%)	29	11	<0.001
Intravenous MgSO ₄ in the ED (%)	6	2	0.08

*Available for 277 patients; †Available for 42 patients; ‡Available for 104 patients; §Available for 113 patients; ¶Some patients were receiving supplemental oxygen; **Each nebulizer treatment was counted as equivalent to six puffs from a metered-dose inhaler; ††Other than inhaled short-acting beta-agonist, inhaled anticholinergic, systemic corticosteroid, antibiotic treatment or noninvasive ventilation. FEV₁ Forced expiratory volume in 1 s; IQR Interquartile range; MgSO₄ Magnesium sulphate; pCO₂ Partial pressure of carbon dioxide; PEF Peak expiratory flow; pO₂ partial pressure of oxygen

Canadian patients had a significantly longer length of stay in the ED (Table 4). On discharge, Canadian and US patients were equally likely to receive systemic corticosteroids and antibiotics. At the two-week follow-up, Canadian and US patients did not differ according to ongoing exacerbations or a relapse requiring acute medical care, except that the relapse rate within 48 h was higher among the Canadian patients than among the US patients.

DISCUSSION

The present large, prospective multicentre study is the first to compare Canadian and US ED visits for COPD exacerbations. Overall, patients with COPD exacerbations in Canada and the US appeared to have a similar COPD history, but Canadian patients were older at presentation. Most markers of disease severity at presentation (ie, vital signs, spirometry, need for noninvasive ventilation [8], and so forth) were similar between

TABLE 4
Outcomes, discharge medication and two-week follow-up of emergency department (ED) patients with chronic obstructive pulmonary disease (COPD) exacerbation, according to country

	Canada (n=63)	United States (n=334)	P
ED outcomes			
Length of stay, h, median (IQR)	10 (5–21)	5 (3–7)	<0.001
Length of stay 6 h or greater, %	70	35	<0.001
Admitted, %	67	60	0.30
Admitted or ED length of stay greater than 6 h, %	76	66	0.13
Discharge medications			
Sent home on systemic corticosteroids*, %	57	59	0.90
Sent home on antibiotics*, %	48	29	0.09
Relapse[†]			
	(n=58)	(n=291)	
Relapse within 48 h [‡] , %	8	2	0.03
Relapse within two weeks [‡] , %	15	18	0.62
Relapse within two weeks leading to hospital admission [§] , %	9	12	0.77
Ongoing exacerbation [¶] , %	40	35	0.52

*Restricted to patients sent home from the ED (n=151); †Restricted to patients available for follow-up (n=349); ‡Relapse event based on patient reporting a 'worsening of COPD symptoms' that led to an urgent care visit; §Urgent care visit, routine COPD visit or other visit that led to a hospital admission; ¶See the Methods section for details. IQR Interquartile range

the groups. Canadians had access to more universal medical coverage, more frequently identified a PCP and less frequently used the ED as their usual source of prescriptions. Both groups appeared to rely on the ED for the delivery of acute COPD care. Despite these observations, the reasons could not be explored in further detail and await additional investigations. The main differences between the countries were with respect to treatment received within the EDs and some variations in discharge therapy; however, there were very little differences between the countries with respect to patient outcomes (both in the ED and during short-term follow-up).

Overall, pre-ED care of COPD was similar, with many patients receiving bronchodilators, 50% receiving inhaled corticosteroids, and many already initiating preventive treatment for their exacerbation. In general, standard in-ED treatment with corticosteroids and bronchodilators was similar, although Canadian patients received more aggressive therapy (ie, anticholinergics, antibiotics and 'other' agents). This Canadian preference for anticholinergic bronchodilators also was reported in a recent Canada-US comparison of acute asthma care (11). Other care gaps were identified (9); for example, evidence suggests that more antibiotics (7) and corticosteroids (6) should be used in this population, based on their initial severity.

COPD outcomes were similar; in both countries patients received care for extended periods of time and commonly required hospital admission. Both the prolonged length of stay and the high admission rate contribute to the ED overcrowding crisis (3,17). One interesting difference between the two countries is the ED length of stay. In Canadian EDs, patients stayed for prolonged periods, yet the admission proportions were similar across countries. Are Canadian emergency physicians more

willing to persist longer with ED management in hopes of discharging the patient to home? Alternatively, do Canadian consultants persist with ED-based therapy longer and delay admission because of a lack of either hospital or intensive care unit beds? Whether this is a true between-country difference in 'standard ED care' or 'standard length of ED care' remains unanswered, but merits further study.

Finally, discharge care was similar between the countries for an evidence-based treatment such as systemic corticosteroids (18). By contrast, the use of antibiotics both in the ED and after discharge was more common in Canada (7). Despite these evidence-based treatments, more than one-third of patients would be considered to have failed therapy at the two-week follow-up. For clinicians, this complex disease is difficult to treat, requires close follow-up and perhaps requires home assessments (19) or specialty chronic disease management clinics. In other chronic diseases (ie, coronary artery disease, heart failure), multidisciplinary clinics may be able to more closely monitor disease status, begin rehabilitation, encourage preventive interventions (ie, smoking cessation, immunization, nutrition) and improve outcomes for the most severe cases (20-22).

Current COPD guidelines have not been focused on acute management in the ED. Moreover, there is limited guidance regarding certain issues such as admission criteria. For example, the guidelines recommend that patients with a severe background for COPD should be admitted during an exacerbation; however, the definition is based on spirometric measurements that are rarely collected in the ED. A recent study from this cohort examined admissions to the ED and identified several factors that may assist ED physicians with these complex admission decisions (10). For example, older age, female sex, higher pack-years of smoking, recent use of an inhaled corticosteroid, self-reported activity limitation in the past 24 h, higher respiratory rate at ED presentation and having a concomitant diagnosis of pneumonia increased the likelihood of COPD admission. As this and other new evidence becomes available, it is possible that ED management decisions will become more evidence-based.

LIMITATIONS

The study has some potential limitations. First, the ED sample is not representative of all North American EDs. It is a volunteer, convenience sample of ED sites that over-represents the academic, urban, inner-city setting and socioeconomically disadvantaged patients, especially in the US sample. While we recognize this, efforts to secure a more balanced representation were not successful. It is likely, however, that these are some of the most interested ED sites in both countries, and this sample may overestimate the quality of care received by North American COPD patients in the ED.

Second, the data were collected by volunteer medical personnel, some of whom had limited research experience. Site research assistant training, a simplified data collection form, ED physician supervision, and data review by the site physician were all performed in an effort to decrease information bias. Third, these data are now somewhat dated and the management of COPD may have changed since the conclusion of data collection in late 2001. For example, these results may have changed somewhat with the recent introduction of long-acting beta-agonists and long-acting anticholinergics to the COPD pharmacopeia. In addition, the introduction of innovative approaches, such as action plans (23), self-management clinics

and home hospitalization (19), may have changed since the end of the present study. While we recognize this possibility, these observations were made during the same time frame in both countries, thus maintaining the integrity of the comparisons. Future research will be required to determine whether the observed gaps in care have improved since these data were collected. Finally, this sample is under-represented by Canadian patients (n=63) and sites (n=5). Although the small sample size should reduce the chance of identifying differences, we identified a number of major differences. Moreover, because the Canadian sites are representative of other urban/academic EDs, we believe the conclusions are sound.

CONCLUSIONS

This comparison of Canadian and US ED care revealed differences between the countries with respect to access to health care and certain management choices for COPD exacerbations; however, the outcomes remain remarkably similar. Given the relative paucity of research on COPD exacerbations, the present study illustrates the gaps between practice and evidence in both countries with respect to COPD treatment (9,24).

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