EM ADVANCES

Substance-related problems in patients visiting an urban Canadian emergency department

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ABSTRACT

Objective: For many patients with addiction and other substance problems, the emergency department (ED) is the sole provider of medical care. This study sought to determine the prevalence and characteristics of substance-related medical problems in ED patients, as defined by documentation in the medical record. We also sought to compare the ED resource use (length of ED stay and number of revisits) of patients with and without substance problems.

Methods: Trained evaluators using explicit criteria reviewed all ED charts during a 6-week period at a Canadian tertiary care teaching centre. Data was collected on demographics, documentation of problematic substance use and whether the ED visit was due to substance problems. Using a computerized database, we determined how many patients with and without substance problems had 1 or more subsequent ED visits during the 1-year period from Sept. 1, 2002, to Aug. 31, 2003.

Results: Of 6064 visits made by 5194 patients, 6026 visits (99.4%) representing 5188 patients (99.9%) were captured for review. Of those visits, 674 (11.2%, 95% confidence interval [CI] 10.4%–12.0%), made by 600 patients, had documentation of problematic substance use and 521 visits (8.6%, 95% CI 7.9%–9.4%) by 469 patients were caused by substance problems. The mean age of patients with a visit due to a substance problem was 39.2 years, compared with 48.5 years for those with other visits ($p < 0.001$). The admission rate for substance-related visits was 25.3%, compared with 17.6% for other visits ($p < 0.001$). For discharged patients, the median length of the ED visit owing to substance-related problems lasted 232 minutes (IQR [interquartile range] 267 min), compared with 164 minutes (IQR 167 min) for other visits ($p < 0.001$). In 1 year of follow-up, 161 of 600 patients (26.8%) with a substance problem made 466 revisits (mean 0.78 revisits/patient), compared with 975 of 4588 patients (21.3%) without a substance problem who made a total of 2150 revisits (mean 0.47 revisits/patient, $p < 0.001$).

Conclusion: Substance problems contribute significantly to ED visits, hospital admissions and duration of ED stay at a tertiary centre. It is likely that our methodology underestimates the scope of the problem and that a universal screening program would find a higher prevalence. The magnitude of this problem supports the need for an interdisciplinary identification and intervention program for ED patients with substance-related issues.

Keywords: substance abuse, alcohol abuse, addiction, emergency department, emergency department visits

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RÉSUMÉ

Objectif : La salle d'urgence constitue souvent le seul fournisseur de soins médicaux pour de nombreux patients ayant des dépendances ou d'autres problèmes de consommation de substances psychoactives. Cette étude visait à déterminer, à partir de renseignements contenus dans les dossiers médicaux, la prévalence et les caractéristiques des problèmes médicaux liés à la consommation de substances psychoactives chez les patients se présentant à l'urgence. Un deuxième objectif était de comparer l'utilisation des ressources à l'urgence (durée de séjour et nombre de visites subséquentes) par les patients ayant des problèmes de consommation de substances psychoactives à celle des autres patients.

Méthodes : Des évaluateurs qualifiés ont examiné, en fonction de critères explicites, tous les dossiers médicaux au service d'urgence d'un hôpital universitaire de soins de troisième ligne, pendant une période de six semaines. Des données démographiques ont été recueillies de même que des renseignements sur la consommation problématique de substances psychoactives et les raisons de visites à l'urgence, à savoir si les problèmes liés à la consommation de substances psychoactives étaient ou non le motif. À l'aide d'une base de données informatisée, nous avons déterminé combien de patients ayant ou non des problèmes de consommation de substances psychoactives se sont présentés de nouveau à l'urgence une fois ou plus au cours d'une période d'un an, soit du 1er septembre 2002 au 31 août 2003.

Résultats : Des 6064 visites faites par 5194 patients, nous avons étudié les dossiers de 5188 patients (99,9 %) qui ont fait 6026 visites (99,4 %). De ce nombre, les dossiers de 600 patients ayant fait 674 visites (11,2 %; intervalle de confiance [IC] à 95 %, 10,4 à 12,0 %) contenaient des renseignements sur la consommation problématique de substances. Par ailleurs, 521 visites (8,6 %; IC à 95 %, 7,9 à 9,4 %) faites par 469 patients étaient motivées par des problèmes liés à l'abus de substances. L'âge moyen des patients s'étant présenté à l'urgence pour un tel problème était de 39,2 ans, par comparaison à 48,5 ans pour les patients ayant consulté pour une autre raison ($p < 0,001$). Le taux d'admission pour les visites liées à un problème de consommation était de 25,3 %, par comparaison à 17,6 % pour les autres visites ($p < 0,001$). Pour ce qui est des patients ayant reçu leur congé, le délai médian de la visite à l'urgence liée à un problème de consommation de substances était de 232 minutes (écart interquartile [EI] = 267 min), par rapport à 164 minutes (EI = 167 min) pour les autres raisons de visites ($p < 0,001$). Lors d'un suivi effectué un an plus tard, 161 des 600 patients (26,8 %) ayant un problème de consommation de substances psychoactives étaient retournés à l'urgence 466 fois (moyenne de 0,78 visite subséquente/patient), par comparaison à 975 des 4588 patients (21,3 %) n'ayant pas de problème de consommation de substances qui ont fait 2150 visites subséquentes (moyenne de 0,47 visite subséquente/patient, $p < 0,001$).

Conclusion : Les problèmes de consommation de substances psychoactives sont à la source d'un nombre important de visites à l'urgence et d'hospitalisations; en outre, ils prolongent la durée de séjour au service d'urgence d'un centre de soins tertiaires. Il est fort probable que notre méthodologie sous-estime l'ampleur du problème et qu'un programme de dépistage systématique afficherait une plus grande prévalence. À la lumière de ces faits, il semble évident qu'il faut mettre en place un programme d'identification et d'intervention interdisciplinaire à l'intention des patients se présentant à l'urgence avec des problèmes de consommation de substances psychoactives.

Introduction

In Canada, 47% of men and 24% of women are estimated to be or to have been heavy drinkers (defined as more than 5 drinks on 1 occasion). The prevalence of alcohol dependence is estimated to be 2.6%.[1] The annual Canadian economic costs attributed to alcohol and illicit drugs is almost $23 billion. These costs include $5.4 billion for law enforcement, $4.4 billion for health care and $11.8 billion for lost productivity owing to alcohol- or drug-related disability.[2] In 1995, alcohol was responsible for 6500 deaths and 172 000 years of potential life lost.[3] Alcohol and illicit drug use often result in problems that require medical attention. Emergency physicians and nurses have long recognized that a considerable minority of emergency department (ED) patients have substance use problems. These problems may be associated with poverty, homelessness, legal troubles, psychiatric illness and medical problems.[4] Numerous studies document a prevalence of substance abuse or dependence in approximately 20% of ED patients.[5–12] Substance abuse has been associated with up to 50% of all injuries.[13–17] Although the bulk of these data is from the United States, the Canadian situation is likely similar.[18]

In this study, we sought to determine the prevalence and characteristics of substance-related medical problems in

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patients visiting an urban, Canadian tertiary care adult hospital ED. We compared ED length of stay, admission rates and 1-year revisit rates between patients with and without substance problems.

Methods

This study was conducted in the ED of Vancouver General Hospital, a tertiary care, adult, urban, level 1 trauma centre with an annual ED census of approximately 55 000 patients. Our institutional clinical ethics review board approved the study.

All study data were extracted by 2 research assistants (RAs) under the direction of the principal investigator and an experienced research nurse. Explicit criteria were developed a priori to define what represented a substance-problem patient and whether or not a particular ED visit was substance-related (directly attributable to substance use). To do this, a convenience sample of 1897 ED charts were reviewed and the RAs recorded common presentation scenarios. Our team (RAs and investigators) held a series of meetings to categorize these scenarios and to develop face valid explicit criteria for the various categories. These criteria are presented in Appendix 1. Once the criteria were agreed upon, we began a 6-week prospective chart review of all ED visits.

During the 6-week period from June 25, 2002, to Aug. 6, 2002, charts of all patients visiting our ED were reviewed. RAs reviewed all available ED documentation, including emergency medical service (EMS) patient care records, nursing notes, social worker consultations, emergency physician notes and consultant notes. The inpatient records of admitted patients were not reviewed. Reviewers used the criteria developed previously (Appendix 1) to answer 2 questions:

1. Does the patient have documentation of a substance abuse problem?
2. Is this visit related to the patient's use of alcohol or drugs?

For any positive response, the involved substance(s) were recorded. Additional information, including the date and time of admission and discharge, final disposition, age and sex, were captured from an electronic ED database.

Throughout the study period, the principal investigator and reviewers met regularly to discuss ambiguous cases. For patients with multiple visits during the study period, each visit was considered a discrete event based on the documentation available for that visit only. The exception to this was for patients who returned for a scheduled revisit (e.g., to receive antibiotics for cellulitis) and for whom the subsequent visits were classified based on the initial visit.

During the 6-week data collection period, we measured interrater agreement by having both RAs independently review a sample of 300 charts. Cases of disagreement were resolved by consensus between the RAs and the principal investigator.

Finally, the frequency of patient revisits was determined using the electronic ED database for the 1-year period from Sept. 1, 2002, until Aug. 31, 2003. The 3-week interval between the end of chart reviews on Aug. 6 and the beginning of the revisit period on Sept. 1 was chosen to increase the likelihood that revisits were for a new problem not directly related to the index presentation.

Statistics

Statistical analyses were performed using Stata (Version 5.0, Mac, StataCorp, College Station, Texas). Binomial confidence intervals (CIs) were calculated for noteworthy proportions. Secondary comparisons between proportions were done using a 2-tailed Pearson χ^2 test. Means of normally distributed continuous variables were compared using 2-tailed, 2-sample t tests with adjustment for unequal variance as appropriate. The Mann–Whitney test was used to compare the means of the nonparametric variables. A p value of 0.05 or less was considered statistically significant for the secondary statistical comparisons. No adjustment for multiple comparisons was performed.

Results

During the 6-week study period there were 6064 visits by 5194 patients. We were able to capture 6026 visits (99.4%) by 5188 (99.9%) patients. Of these, 38 visits were excluded because we were unable to locate the records. Of the 5188 patients reviewed, 600 (11.6%, 95% CI 10.7%–12.5%) had at least 1 visit with documentation of a substance problem. Most patients with substance problems were male (414/600, 69.0%). The most commonly abused substance was alcohol. Patients with substance-related visits were younger than those without (39.2 yr v. 48.3 yr, $p < 0.001$). Table 1 provides the age and sex breakdown of patients with various types of substance problems.

Five hundred and twenty-one visits (8.6%, 95% CI 7.9%–9.4%) made by 469 patients were related to a substance-related medical problem. The mean and median time spent in the ED before discharge was 322 and 232 minutes, respectively (IQR [interquartile range] 267 min), for substance-related visits, compared with 252 and 164 minutes, respectively (IQR 167 min), for other visits ($p < 0.001$). For admitted patients, there was no

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significant difference between the time spent in the ED before transfer to the wards during a substance-related visit (mean 927 min, median 597.5 min, IQR 910 min) when compared with a nonsubstance-related visit (mean 1061 min, median 656 min, IQR 1102.5 min; $p = 0.087$).

Visits with a documented substance problem resulted in admission to hospital more often than other visits. Of 674 visits with a documented substance problem, 177 (26.3%) resulted in admission to hospital, compared with 926 admissions during 5352 visits (17.3%) for patients without documentation of a substance problem ($p < 0.001$). Patients with substance problems were also more likely to leave against medical advice or without being seen, and men with substance problems were more likely to leave in police custody. Patients were discharged to a withdrawal management ("detox") unit in only 1% (5/521) of visits with a recorded substance problem. Table 2 shows combined male and female disposition data. These results were similar when stratified by sex, except that no females were discharged into police custody.

Patients with substance-related problems had more revisits during 1 year follow-up than those without. Of the 600 patients with documented substance problems, 161 (26.8%) had at least 1 revisit, compared with 975 of 4588 patients without substance problems (21.3%, $p = 0.002$). Patients with substance problems averaged 0.78 revisits per patient, compared with 0.47 revisits for patients without substance problems ($p < 0.001$). Additional revisit data are shown in Table 1.

Interrater agreement between reviewers with regard to patient categorization was excellent. For 297 of 300 charts (99%), there was complete agreement between the 2 reviewers with regard to whether or not the patient had a substance-related visit and whether or not they had documentation of a substance problem.

Discussion

We found that substance problems are a frequent cause of ED visits and hospital admissions in an urban Canadian hospital. Although we found documentation of substance problems in approximately 18% of males and 8% of females visiting our ED, our numbers are lower than in some other ED-based studies. Whiteman and colleagues[19] screened 2432 adult patients visiting an inner city US hospital and found evidence of alcohol problems in 24%. In other US studies involving direct patient interviews, researchers found evidence of alcohol problems in 54% of drinking college students presenting to ED,[7] in 43% of young adult drinkers[8] and in 21% of all adult ED patients.[9] In a British study, Thom and coworkers[10] found that 37% of young adults attending the accident and emergency

Table 1. Characteristics of patients with and without substance problems*

	Group										
	Male		Female		Total				No. of revisits per patient		
Category	No. (and %) of patients	95% CI	No. (and %) of patients	95% CI	No. (and %) of patients	95% CI	Mean age (and SD), yr; *p* value	No. (and %) of patients with ≥ 1 revisit; *p* value	Mean (and SD)	Median (and IQR)	*p* value
All patients	2694 (100.0)	—	2494 (100.0)		5188 (100.0)	—	47.7 (21.1)	1136 (21.9)	0.50 (2.59)	0 (0)	—
Patients with no substance problem	2280 (84.6)	—	2308 (92.5)		4588 (88.4)	—	48.5 (20.8)	975 (21.3)	0.47 (2.4)	0 (0)	—
Patients with a substance problem											
Any substance	414 (15.4)	14.0–16.8	186 (7.5)	6.5–8.6	600 (11.6)	10.7–12.5	39.2 (14.5); 0.001	161 (26.8); 0.002	0.78 (1.88)	0 (1)	< 0.001
Alcohol	295 (11.0)	9.8–12.2	114 (4.6)	3.8–5.5	409 (7.9)	7.2–8.7	40.6 (15.8); < 0.001	104 (25.2); 0.049	0.67 (1.64)	0 (1)	0.023
Cocaine or heroin	119 (4.4)	3.7–5.3	69 (2.8)	2.2–3.5	188 (3.6)	3.1–4.2	37.7 (10.2); < 0.001	54 (28.7); 0.015	0.89 (2.01)	0 (1)	0.004
Marijuana	52 (1.9)	1.4–2.5	20 (0.8)	0.5–1.2	72 (1.4)	1.1–1.7	32.5 (10.5); < 0.001	17 (23.6); NS, 0.63	0.79 (2.03)	0 (0)	0.45
Prescription drug	23 (0.9)	0.5–1.3	7 (0.3)	0.1–0.6	30 (0.6)	0.4–0.8	43.2 (10.6); 0.011	15 (50.0); < 0.001	1.91 (3.3)	0.5 (2)	< 0.001
Other substance	21 (0.8)	0.5–1.2	15 (0.6)	0.3–1.0	36 (0.7)	0.5–1.0	32.8 (18.9); < 0.001	10 (27.8); NS, 0.34	1.11 (2.36)	0 (1)	0.19
Patients who visited ED because of substance use	330 (12.3)	11.0–13.6	139 (5.6)	4.7–6.5	469 (9.0)	8.3–9.9	38.4 (14.4); < 0.001	127 (27.1); 0.004	0.78 (1.91)	0 (1)	< 0.001

CI = confidence interval; ED = emergency department; IQR = interquartile range; NS = not statistically significant; SD = standard deviation.
**p* values are for comparison to patients without a substance problem.

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department were drinking harmfully, and 15% considered their visit to be alcohol related. Cherpitel and colleagues[18] interviewed patients in 2 Canadian EDs and found that 22% of injured patients and 11% of noninjured patients in 2 Canadian EDs reported using alcohol in the 6 hours before their visit, and that 3% of injured patients and 2% of noninjured patients reported drug use in the previous 6 hours.

We believe that our lower numbers are largely explained by the fact that we relied on chart review rather than direct patient interviews to identify patients with substance problems. Our results are similar to other chart review studies that found documentation of alcohol problems in 13% of all ED visits by college students[20] and documentation of any "alcohol or drug use" in 15% of ED visits by adolescents.[21]

Future directions

Our findings suggest that substance problems exist in a significant proportion of ED patients and thus support the need for ED-based services targeting such patients. The potential societal benefit of ED-based programs of screening and intervention for substance problems is highlighted by the fact that approximately 13% of Canadians visited an ED in 2003.[22] Inpatient counselling services, although beneficial, will miss the majority of ED patients with substance problems. In our study, 67% of ED patients with substance-related visits were discharged home, 25% were admitted to hospital and only 1% were discharged to a withdrawal management unit. There is growing evidence that even brief interventions that could be applied in the ED are beneficial for patients with substance problems.[23] Several recent studies have investigated programs of screening and brief intervention for ED patients with substance problems. These programs had promising results, including fewer hospital admissions and fewer drinking and driving episodes.[21–27] Unfortunately, no trial has yet evaluated interventions provided by ED clinical staff. This has created a barrier to their translation into clinical practice. Furthermore, there have been no Canadian trials of brief interventions for ED patients.

Limitations

As with any chart review, our study is limited by the quality of the information that is recorded in the medical record. During the time of this study our ED did not have universal screening for substance problems, and it is likely that many substance problems went undetected. It is also probable that some patients were recognized as having substance problems but that these problems were not recorded in the medical record either because they were not considered relevant to the presenting complaint or because they were not perceived as being particularly harmful. Another limitation is that our study was restricted to the summer months and is therefore unable to detect any seasonal variation in substance use and related problems.

Our findings are strengthened by the fact that we developed explicit criteria defining a substance problem and substance-related visit. These criteria were deemed to have face validity by our team of emergency medicine and addictions experts. Nevertheless, some of our criteria may appear to be overinclusive. For example, not all patients who have an injury after drinking alcohol are problem drinkers. However, there is evidence that most patients who present to the ED after drinking alcohol do indeed have an alcohol-use problem. For example, Savola and coworkers[24] found that the vast majority (84%) of injured patients with detectable serum alcohol levels had substantially elevated concentrations (≥ 22 mmol/L).

Conclusion

We found that a significant proportion of patients visiting a tertiary ED had documented evidence of a substance problem.

Table 2. Disposition data for 6026 emergency department visits

	Group; no. (and %) of patients							
	Reason for ED visit		Substance abuse problem documented during ED visit					
Disposition	Substance problem; *n* = 521	Not substance problem; *n* = 5505	Any; *n* = 674	None; *n* = 5352	Alcohol; *n* = 450	Cocaine or heroin; *n* = 217	Marijuana; *n* = 79	Prescription drugs; *n* = 34
Discharged	345 (66.3)*	4266 (77.5)	443 (65.7)*	4170 (77.9)	295 (65.6)*	136 (62.7)*	37 (46.8)*	25 (73.5)†
Admitted to hospital	132 (25.3)*	971 (17.6)	177 (26.3)*	926 (17.3)	121 (26.9)*	62 (28.6)*	37 (46.8)*	2 (5.9)†
Left against advice or without being seen	31 (6.0)*	159 (2.9)	39 (5.8)*	151 (2.8)	23 (5.1)*	13 (6.0)*	4 (5.1)†	6 (17.7)*
Discharged to "detox"	5 (1.0)*	0 (0.0)	5 (0.7)*	0 (0.0)	4 (0.9)*	0 (0.0)†	0 (0.0)†	1 (2.9)*
Discharged into police custody	6 (1.2)*	4 (0.1)	7 (1.0)*	3 (0.1)	6 (1.3)*	4 (1.8)*	0 (0.0)†	0 (0.0)†
Died in the ED	0 (0.0)†	21 (0.4)	1 (0.1)†	20 (0.4)	1 (0.2)†	0 (0.0)†	0 (0.0)†	0 (0.0)†
Transferred to another institution	2 (0.4)*	84 (1.5)	2 (0.3)*	82 (1.5)	0 (0.0)*	2 (0.9)†	1 (1.3)†	0 (0.0)†

ED = emergency department.
*$p < 0.05$.
†No significant difference when compared with visits by patients without a substance problem.

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Patients with substance problems were younger but spent longer in the ED before discharge, were more likely to be admitted to hospital and were more likely to revisit the ED the following year. Our findings suggest that programs targeting ED patients with substance problems could benefit a substantial portion of the ED patient population.

Competing interests: None declared.

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See Appendix on next page

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Appendix 1. Face valid explicit criteria to define what represented a substance-problem patient and a substance-related emergency department visit

The following criteria for documentation of (A) a substance problem and (B) a substance-related visit were arrived at by consensus of our research group after our chart reviewers performed a pilot study to determine the common scenarios documented in our emergency department charts.

Question A: Does the patient have a substance problem?

Any of the following documentation is considered to constitute a substance problem:

1. Alcohol
    a. Drank alcohol and came to hospital with a seemingly related problem such as a car crash, a fall or a fight
    b. Presented to hospital with an alcohol level greater than the "legal limit" (17.4 mmol/L)
    c. Had "alcoholic," "alcoholism" or similar diagnosis recorded on the chart
    d. Had a previous visit for alcohol withdrawal
2. Cocaine or heroin
    a. Any patient for whom the current use of cocaine or heroin was documented in the chart
    b. "IVDU" (intravenous drug user), "IVDA" (intravenous drug abuse) or similar diagnosis was recorded in the chart
    c. Any patient with a positive urine screen for cocaine
    d. Any patient with a visit for heroin withdrawal
3. Marijuana
    a. Any patient with daily use of marijuana documented in the medical record
    b. Any patient whose marijuana use has (according to documentation in the chart) caused an injury, health problem, psychiatric problem, social problem or financial problem
4. Prescription drugs
    a. Feigning an illness to obtain analgesics or sedatives
    b. "Drug seeking behavior," "opioid dependency," "analgesic abuse" or similar diagnoses recorded in the chart
    c. Any visit made specifically for renewal of a narcotic or sedative medication considered to probably constitute a problem
    d. Uses prescription medications with the intent of "getting high" or "to feel normal," or for any use other than the intended purpose
    e. Any visit for benzodiazepine withdrawal
5. Other substances (any visit to the emergency department because of the use of the following illegal substances)
    a. Ecstasy, crystal methamphetamine or other amphetamines
    b. Gamma hydroxybutyrate
    c. Other illegal substance

Question B: Is this visit related to substance misuse or addiction?

A visit related to substance abuse includes intoxication, injuries occurring when intoxicated as well as medical, social or psychiatric complications related to *current* substance abuse and related lifestyle. Some examples include:

1. A driver involved in a collision with serum alcohol level above 17.4 mmol/L or evidence of impairment
2. A patient requiring medical attention for an overdose of heroin, alcohol or cocaine
3. Medical problems associated with substance misuse in *current* users: HIV-related visits, endocarditis or injection site abscesses in an intravenous drug user, liver cirrhosis in an alcoholic or other medical conditions commonly associated with substance abuse. We did not consider the visit to be related if the patient had stopped using the implicated substance.
4. Patients with psychiatric and social complications of substance abuse, misuse and addiction: addicted patients who came to emergency department looking for help to find a place to stay or because of psychosis or depression, and patients who stopped taking their psychiatric medications because of substance use (e.g., while on a binge)

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