

Frequency of in-office emergencies in primary care

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ABSTRACT

OBJECTIVE To quantify the frequency and types of in-office emergencies seen by FPs.

DESIGN A retrospective descriptive analysis of the frequency and types of in-office emergencies seen by FPs was done using the City of Ottawa Emergency Medical Services database.

SETTING Community medical offices in the Ottawa, Ont, region during a 3-year period (2004 to 2006).

PARTICIPANTS All patients for whom an ambulance was called to a medical office or clinic during the study period.

MAIN OUTCOME MEASURES Number of emergency calls from FPs' offices, primary complaints, seasonal variation, distance to the nearest emergency facility, and patients' demographic characteristics.

RESULTS A total of 3033 code 04 (life-threatening) emergency calls were received from FPs' offices during the study period. Demographic analysis of the calls showed that 91.3% of calls were regarding adult patients with an average age of 51.5 years. There was an overall statistically significant difference in the sex of the patients presenting ($P < .001$), but it was attributable to calls about genitourinary emergencies, which were almost all for women.

The most common type of emergency reported was cardiovascular complaints. Of the 992 cardiovascular emergencies, 74.3% were complaints of ischemic chest pain.

CONCLUSION There is a great burden on the health care system from emergency calls, with continued unpreparedness from FPs. Clearly, FPs must take seriously the risk of being unprepared for in-office emergencies. Dissemination strategies must be developed so that the guidelines that have been developed can be effectively implemented in FP offices across the country.

EDITOR'S KEY POINTS

- Studies have repeatedly shown that FPs are not prepared for in-office emergencies. Many guidelines aimed at rectifying the lack of preparedness have been developed, but there are no published data regarding the frequency of in-office emergencies in Canada. This study aimed to examine the frequency and types of emergencies seen in a large urban area.
- Two percent of all calls for life-threatening emergencies originated from FPs' offices; this represents more than 1000 in-office emergencies a year in the Ottawa, Ont, area. The most common types of emergencies were cardiovascular, respiratory, and neurologic.
- There was significant age ($P < .001$) and seasonal ($P = .012$) variation by type of complaint. Knowing this might help physicians plan for emergencies relevant to their patient populations. For example, physicians who serve elderly patient populations should probably be prepared for cardiovascular emergencies; those with younger, predominantly female populations should be prepared for allergic-type and gynecologic or obstetric emergencies. The seasonal variation in types of emergencies suggests that at peak times of the year doctors should anticipate seeing specific types of emergencies. Respiratory emergencies are more common in the winter and less common in the summer. Musculoskeletal emergencies increase in the winter and fall.

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Fréquence des urgences au bureau dans les soins primaires

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RÉSUMÉ

OBJECTIF Déterminer la fréquence et le type d'urgences que les MF rencontrent au bureau.

TYPE D'ÉTUDE Une analyse descriptive rétrospective de la fréquence et du type d'urgences que les MF voient au bureau a été effectuée à l'aide de la base de données des services médicaux d'urgence de la ville d'Ottawa.

CONTEXTE Bureaux médicaux communautaires de la région d'Ottawa, Ontario, durant une période de 3 ans (2004 à 2006).

PARTICIPANTS Tout patient pour lequel on a demandé une ambulance à un bureau de médecin ou une clinique médicale durant la période d'observation.

PRINCIPAUX PARAMÈTRES À L'ÉTUDE Nombre d'appels d'urgence venant de bureaux de MF, plaintes initiales, variations saisonnières, distance du service d'urgence le plus proche et caractéristiques démographiques des patients.

RÉSULTATS Au total, 3033 appels d'urgence (code 04, danger de mort) ont été reçus de bureaux de MF durant la période d'observation. L'analyse démographique des appels révèle que 91,3% des appels concernaient des patients adultes ayant en moyenne 51,5 ans. Dans l'ensemble, on notait une différence statistiquement significative dans le sexe des patients concernés ($P < .001$), laquelle était toutefois due à des appels pour des urgences génito-urinaires qui provenaient presque toutes de patientes. Le type d'urgence le plus souvent rapporté concernait des problèmes cardiovasculaires. Sur 992 urgences cardiovasculaires, 74,3% concernaient des douleurs thoraciques ischémiques.

CONCLUSION Les appels d'urgence représentent un fardeau important pour le système de santé, alors que la préparation des MF demeure déficiente. De toute évidence, les MF doivent prendre au sérieux le risque d'être mal préparés en cas d'urgence au bureau. On doit mettre au point des stratégies d'information pour que les directives existantes soient instaurées de façon efficace dans les bureaux des MF partout au pays.

POINTS DE REPÈRE DU RÉDACTEUR

- Les études ont montré à plusieurs reprises que les MF ne sont pas préparés pour les urgences au bureau. Plusieurs directives destinées à corriger ce problème ont été élaborées, mais aucune donnée concernant la fréquence des urgences au bureau au Canada n'a été publiée. Cette étude voulait déterminer la fréquence et les types d'urgence observées dans une grande région urbaine.
- Deux pour cent de tous les appels pour des urgences menaçant la vie provenaient de bureaux de MF; cela représente plus de 1000 urgences au bureau par année dans la région d'Ottawa, Ontario. Les urgences les plus fréquentes étaient d'ordre cardiovasculaire, respiratoire et neurologique.
- Le type d'urgence variait de façon significative selon l'âge ($P < .001$) et la saison ($P = .012$). Cette information pourrait aider le médecin à se préparer pour des urgences propres à son type de clientèle. Ainsi, celui qui traite des patients âgés devrait probablement être prêt à répondre à des urgences cardiovasculaires; celui qui a une clientèle plus jeune, principalement féminine, devrait se préparer à des urgences d'ordre allergique et obstétrique ou gynécologique. Les variations saisonnières du type d'urgence donnent à penser qu'à certains moments cruciaux de l'année, le médecin devrait s'attendre à des types spécifiques d'urgence. Les urgences respiratoires sont plus fréquentes en hiver, plus rares en été. Les urgences musculo-squelettiques augmentent durant l'hiver et l'automne.

*Le texte intégral est accessible en anglais à www.cfp.ca.

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More than 80% of Canadians will access primary medical care each year.¹ Although most of these individuals will present with routine medical problems, patients with urgent and emergent medical needs will also be seen by FPs in their offices. It is important that physicians have adequate training and equipment on site to deal with these patient emergencies, yet this is not always the case. Despite the recognition in the early 1980s that FPs were underprepared,² and despite subsequent development and introduction of Canadian guidelines in 1991,³ multiple studies have since shown that FPs have not adopted many of the recommendations and, thus, continue to be unprepared for in-office emergencies.⁴⁻⁶ There are several possible explanations, ranging from the fact that we know that there is generally poor uptake of clinical guidelines⁷ to differences in perceptions of risk to a lack of awareness regarding the actual frequency and types of emergencies likely to occur in practices.

The frequency and types of emergencies seen by Canadian FPs have not yet been studied. Limited data are available from other countries such as Australia, where a study showed that 95% of FPs had seen at least 1 patient requiring resuscitation in the previous 12 months.⁸ In this population of physicians surveyed, 72% had managed acute asthma in the previous 12 months; 58% had managed psychiatric emergencies; and 49% had managed convulsions.⁸

Data from the United States are limited; only 1 survey of FPs examined the frequency and types of in-office emergencies. Results showed that 71% of the FPs surveyed reported having emergent patients with chest pain, dyspnea, and seizures occurring in their offices 1 or more times in their practice careers.²

American studies looking specifically at primary care pediatric clinics found that 62% of pediatricians and FPs saw at least 1 child per week requiring hospitalization or urgent care.⁹ There is huge variation in the pediatric data, with 1 review suggesting that the rate of emergencies in primary care practices that provided care to children varied from 0.9 to 38 emergencies per office per year depending on the patient population being served.¹⁰

It is difficult to prepare for all emergencies; thus, an understanding of the most likely types of emergencies that might be encountered could assist FPs in implementing simple protocols. Our study was designed to address the question of the frequency and types of in-office emergencies seen in primary care offices in Canada. This study examines these occurrences using retrospective administrative emergency services data from Ottawa, Ont, a large, mainly urban, city.

METHODS

This descriptive study is based on data collected

from the City of Ottawa Emergency Medical Services (EMS) database. The City of Ottawa EMS covers an area of 2700 km², with a population of 877280 people. Aggregate data were collected regarding the number of times ambulances were called to medical offices or clinics during a 3-year period (2004 to 2006).

For our study, a *medical clinic* was defined as any doctor's office, walk-in clinic, or health care provider that did not have a master number assignment, which every hospital has been given for EMS purposes (administrative database definition). Family health care units located within the same building as an emergency department were therefore excluded from the data.

The calls to EMS were classified into 4 categories, ranging from code 01 calls (nonurgent) to code 04 (life-threatening). We were specifically interested in the code 04 calls, which are the most urgent and are defined by a standardized, provincewide protocol. Communications officers ask callers key questions like "Is the patient awake and able to speak?" "Is the patient breathing normally?" and "Is the patient bleeding profusely?" These questions enable them to determine the medical nature of the emergency and assign the call a priority according to a standardized algorithm.¹¹ Once a code 04 has been determined, the ambulance must respond with lights and sirens.

We collected demographic information on the patient (sex, age), location of the clinic, date of the call, and the primary emergency being responded to. All primary complaints were divided into categories based on the body system being affected.⁸

The location of the referring physician relative to the closest emergency department and the driving distance from the call address to all emergency facilities in Ottawa were mapped. The minimum distance was used in the statistical analysis. The 2 exceptions to minimum distance were for cardiovascular (CV) emergencies and pediatric cases, in which all patients would be brought to designated emergency facilities rather than to the closest emergency facility. In these 2 cases, the minimum distance was calculated as the distance to the designated facility.

Descriptive statistics were used to summarize the EMS calls. Differences in patients' age and sex and seasonal variations were compared between complaints for different body systems using ANOVA or χ^2 tests. The study received ethics approval from both the Ottawa Hospital Research Ethics Board and the Bruyère Continuing Care Research Ethics Board.

RESULTS

During the study period, EMS received a total of 272752 calls. Of these, 67% were code 04 calls, with 2% of all code 04 calls originating from primary care medical

clinics, or approximately 1000 calls per year for life-threatening emergencies. Descriptive characteristics of the calls are shown in **Table 1**.

Table 1. Descriptive characteristics of calls: Of the 272 752 emergency calls received during the study period, 181 674 (67%) were code 04 (life-threatening emergency*) calls, and 3033 (2%) of the code 04 calls were from FPs' offices; mean age of patients was 51.48 (SD 21.66) years and mean distance to the closest emergency department was 11.95 (SD 7.51) km.

CHARACTERISTICS	NO. OF CALLS (%) N=3033
Age of patient, y	
• 0-18 (pediatric)	264 (8.7)
• 19-55	1319 (43.5)
• >55	1450 (47.8)
Male patients	1389 (45.8)
Season	
• Winter (Jan-Mar)	801 (26.4)
• Spring (Apr-Jun)	801 (26.4)
• Summer (Jul-Sep)	697 (23.0)
• Fall (Oct-Dec)	734 (24.2)
Distance to closest emergency department, km	
• 0-14	2635 (86.9)
• 15-29	361 (11.9)
• ≥30	37 (1.2)

*A call is categorized by the 911 dispatch going through the Ambulance Response Information System II Dispatch Priority Card Index (DCPI) algorithm to determine the urgency of the call. The DCPI is implemented with software programs that are standard across the province of Ontario for all communications centres for 911 calls.

Types of complaints

Cardiovascular, respiratory, and neurologic complaints made up approximately 60% of the total code 04 calls from medical clinics. Cardiovascular system complaints were the most common reason that EMS was called to medical clinics; 74.3% of these calls were for ischemic chest pain. Respiratory system complaints including asthma, respiratory distress, obstruction, and inhalation injury made up 12.8% of calls. Neurologic complaints including stroke, syncope, and headache followed closely with 12.7% of code 04 calls.

Twenty percent of the EMS calls were classified under the "other" category, in which the primary complaint affected more than 1 body system. The 2 most common primary complaints that fell into the "other" category were "general illness/weakness" and "other medical/trauma" (**Table 2**).

Analysis showed a significant age variation across body-system categories ($P < .001$). With the exception of patients presenting with hematologic complaints, patients presenting with CV complaints were on average 13 years older than all other patients presenting with emergencies. Additionally, patients presenting with endocrine emergencies, which included allergic reactions, anaphylaxis, and diabetic emergencies, were statistically younger than patients presenting with genitourinary complaints and pharmacologic emergencies ($P < .001$ in both cases) (**Table 2**).

When all complaints were considered, we observed significant differences in sex ($P < .001$). This was attributable, however, to calls in the genitourinary category, in which almost all patients were female (93.2%). Further breakdown of these complaints showed that 27 (61.4%) calls were obstetric emergencies and 9 (20.5%) calls were gynecologic emergencies.

Table 2. Frequency of primary complaints and mean age of patients: N=3033.

BODY SYSTEM AFFECTED	TOTAL NO. OF CALLS (%)	MEAN AGE OF PATIENT, Y (SD)
Cardiovascular (ischemic pain, palpitations, CHF, cardiac medical, cardiac trauma, etc)	992 (32.7)	58.76 (14.89)
Other (general illness or weakness, other medical or trauma, infectious disease, hypothermia or exposure, near drowning, etc)	607 (20.0)	53.10 (21.57)
Respiratory (respiratory distress, respiratory disease, inhalation injury, obstruction or foreign body, etc)	388 (12.8)	49.49 (28.06)
CNS (post ictal, syncope, TIA, stroke, headache, psychiatric, behavioural, head trauma, etc)	386 (12.7)	46.45 (24.09)
Endocrine (local allergic reaction, anaphylaxis, diabetic emergency, etc)	214 (7.1)	33.49 (20.32)
GI (abdominal pain NYD, nausea, vomiting, etc)	200 (6.6)	48.93 (20.39)
MSK (back pain, paralysis or spinal trauma, chest wall pain)	125 (4.1)	48.53 (23.86)
Hematologic (major and minor hemorrhage, hypotension, etc)	48 (1.6)	58.17 (20.38)
Genitourinary (gynecologic emergency, obstetric emergency, etc)	44 (1.5)	36.48 (16.34)
Pharmacologic (poisoning or toxic exposure, alcohol intoxication, overdose, etc)	29 (<0.1)	36.62 (12.46)

CHF—congestive heart failure, CNS—central nervous system, GI—gastrointestinal, MSK—musculoskeletal, NYD—not yet diagnosed, TIA—transient ischemic attack.

Research | Frequency of in-office emergencies in primary care

In total, 86.9% of the emergency calls came from within a 0- to 14-km radius of a local emergency department. We did not find any association between number of calls, types of calls, and location of clinic.

Seasonality was not observed in the overall data, with close to 25% of calls occurring during each 3-month period. There was, however, a statistically significant difference ($P=.012$) in the types of emergencies presenting at various times throughout the year (Table 3), with respiratory, pharmacologic, and musculoskeletal emergencies more common in the fall and winter. Genitourinary emergencies most frequently presented during the spring, and hematologic emergencies had their highest frequency during the winter. Respiratory emergencies were the least likely to be seen during the summer.

DISCUSSION

This study quantifies the number and types of emergencies seen in an urban Canadian city, allowing the medical community to grasp the importance of improving preparedness for in-office emergencies. We have shown that 1000 calls per year—or 2% of all life-threatening emergency calls—originate from community medical offices.

Our data showed that CV emergencies were the most common emergencies, with most defined as ischemic in origin. As would be expected with CV patients, the age group affected was older than other groups. A simple emergency-preparedness plan ensuring in-office availability of chewable acetylsalicylic acid could have a tremendous positive effect on patient outcomes. Indeed, acetylsalicylic acid used in the treatment of acute coronary syndromes has been shown to decrease mortality from myocardial infarction.¹² Larger clinics might also consider being equipped with automated external defibrillators.¹³

Respiratory emergencies, which include asthma exacerbation, were the third most common emergency,

occurring mostly in the winter. Emergency planning might need to include up-to-date salbutamol with holding chambers for various ages that could be used to begin the treatment of acute asthma exacerbation. In-office safety for respiratory illness also includes the ability to institute droplet precautions (eg, gloves, masks, isolation gowns) when patients present with potentially transmittable respiratory infections. In the case of airborne transmission, N95 masks should be available for all staff.¹⁴ A clinic could incorporate updates to equipment specific to respiratory emergencies along with annual planning for influenza immunization clinics.

Although we observed a slight variation in the mean ages, the presenting emergencies were broad, sweeping across the entire age range of the adult population, and were not predominantly among elderly people as one might have expected. We were also surprised by the low proportion of calls for the pediatric age group (8.7% of cases).⁹ This could be because there is a large pediatric hospital with a dedicated pediatric emergency department in the study area; thus, pediatric patients might present directly to the emergency department rather than to their FPs.

The differences in the mean ages of patients presenting with various emergencies might be useful in preparing physicians for emergencies that are relevant to the patient populations they serve. For example, physicians who serve elderly patient populations would probably consider it a top priority to be prepared for CV emergencies. Alternately, those with a younger, predominantly female population should be prepared for allergic-type and gynecologic or obstetric emergencies.

The seasonal variation in types of emergencies suggests that at peak times of the year doctors should anticipate seeing specific types of emergencies. Respiratory emergencies are more common in the winter and less common in the summer. This could be the result of the increased number of respiratory infections seen during the winter. There are also increased numbers of

Table 3. Seasonal variation in the primary complaint of emergencies presenting to community medical clinics: Percentages might not add to 100% owing to rounding.

PRIMARY COMPLAINT	WINTER (JAN-MAR), %	SPRING (APR-JUN), %	SUMMER (JUL-SEP), %	FALL (OCT-DEC), %
Cardiovascular	26.7	26.6	22.7	24.0
Central nervous system	25.1	28.8	23.6	22.5
Respiratory	32.0*	25.3	15.5*	27.3*
Gastrointestinal	21.0	29.0	26.0	24.0
Genitourinary	15.9	34.1	29.5	20.5
Musculoskeletal	28.8*	21.6	22.4	27.2*
Endocrine	20.1	30.4	29.4	20.1
Hematologic	35.4	16.7	27.1	20.8
Pharmacologic	34.5*	10.3	20.7	34.5*
Other	26.5	24.9	23.9	24.7

*Statistically significant ($P=.012$).

musculoskeletal emergencies in the winter and fall. This might reflect falls on the ice or snow.

Limitations

The study is limited in its generalizability because it contains the data from only 1 EMS database. We used an administrative definition of community clinics and have assumed that most are FP clinics, but these calls could also have originated from specialist offices. This does not diminish the relevance of the results, though, as it is important for any community-based physician to have basic emergency medical supplies on hand.

In addition, our results likely underestimate the number of emergencies that FPs deal with, as we have analyzed only the most emergent situation calls. Our analysis does not include urgent situations that might require immediate reaction from the physician, but which do not require immediate response from EMS. Our findings also do not account for any cases in which patients choose to drive themselves to the emergency department for further treatment.

The results cannot be applied to health care systems different from the Canadian system, because insurance coverage and access to care might dictate the frequency and types of in-office emergencies presenting to FPs. Data are also limited in the specificity of the type of emergency being seen. Among the 737 ischemic chest pain complaints, we do not know how many were early myocardial infarctions versus how many were ischemia that was resolved without any further damage to the heart. A study analyzing the outcomes of patients seen at emergency departments from FP offices would help to assess the outcome and the management that FPs need to employ to optimize outcomes.

Conclusion

The fact that 3000 life-threatening emergencies presented to medical clinics in Ottawa between 2004 and 2006 demonstrates the risks of remaining unprepared. Repeatedly, past studies have shown that although guidelines for preparedness have been developed, implementation of guidelines has been minimal. More detailed knowledge of the most likely types of emergencies as linked to the specific patient populations should assist FPs in implementing some simple protocols to reduce the risks to their patients.

Doctors could also educate their patients about the appropriateness of urgent visits. A simple in-office poster and patient information sheet (go to www.aafp.org/afp/20070601/1686ph.html for an example)¹⁵ outlining what types of urgent and emergent care can be accessed at the clinic versus an emergency department visit could streamline visits. For example, those with sudden-onset chest pain or symptoms of stroke should be educated to go directly to an emergency department and not to the medical clinic in order to receive access

to potentially time-sensitive treatment, such as thrombolysis therapy.¹⁵

For the safety of patients presenting with emergencies to FPs' offices, further research needs to include dissemination strategies for the guidelines that have been developed. Dissemination strategies with a risk-stratification system for offices will allow physicians to become prepared appropriately for the demographics of the patient populations they serve. Risk stratification requires further research into the exact types of emergencies being seen by FPs. Guidelines also must be rooted in evidence to suggest which effective management by FPs will most improve patient outcomes. With successful dissemination of guidelines that result in increased preparedness, the risks to patients presenting to FPs with emergencies will decrease. ❁

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Contributors

All the authors contributed to the concept and design of the study; data gathering, analysis, and interpretation; and preparing the manuscript for submission.

Competing interests

None declared

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