

Emergency department use at two Hamilton hospitals

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Summary: This report compares emergency department use at two urban Hamilton hospitals. One mainly serves lower socioeconomic and industrial groups and the other predominantly suburban residents. Although the groups served are different, the patterns of use at both hospitals were found to be similar. Over one third of visits at both are classified as nonurgent. The urban industrial hospital has higher proportions of visits that are nonurgent, by men and due to trauma. However, other parameters such as arrival time, use of ambulance, proportion admitted, percentage of emergencies, percentage of repeat visits, use of radiology and laboratory facilities and proportions of visits in different categories of presenting complaint were similar at the two hospitals. Similarities in use patterns may be due to universal health insurance, for 90% of users have medical insurance and have family doctors.

Résumé: Le recours au service d'urgence dans deux hôpitaux de Hamilton

Le présent rapport compare la fréquentation du service d'urgence dans deux hôpitaux urbains de Hamilton. L'un dessert des personnes appartenant à un milieu socioéconomique défavorisé

et des travailleurs industriels, tandis que l'autre est surtout fréquenté par des résidents de banlieue. Malgré les différences dans les milieux desservis, la fréquentation des services d'urgence dans les deux hôpitaux s'effectuait suivant des modes similaires. Dans les deux cas, plus d'un tiers des visites étaient considérées comme n'ayant pas un caractère d'urgence. On trouvait une plus forte proportion de ces dernières dans l'hôpital urbain desservant le secteur industriel. Il s'agissait surtout d'hommes et ceux qui avaient subi un trauma. Cependant, d'autres paramètres, notamment l'heure d'arrivée, le recours à l'ambulance, la proportion de malades admis, le pourcentage de cas d'urgence, celui des visites de contrôle, les examens radiologiques et de laboratoire et les proportions des visites dans les catégories visées par les symptômes présents, tous ces paramètres étaient semblables dans les deux hôpitaux. Ces similitudes peuvent s'expliquer par l'assurance-maladie universelle, 90% des usagers ayant une assurance médicale et des médecins de famille.

some increase in use was inevitable. However, present patterns of emergency department use on nights and weekends and for conditions classified as nonurgent²⁻⁴ suggest that there are also problems with accessibility of primary care services.

This study was designed to investigate medical, socioeconomic and demographic determinants of emergency department use in Hamilton and to develop recommendations regarding future organization of emergency services. Two full-service hospital emergency departments, serving somewhat different population groups, were studied. At both hospitals, St. Joseph's and Hamilton General, there have been consistent increases in emergency department use. In 1973 Hamilton General Hospital registered 40 000 visits and St. Joseph's Hospital 49 000; together the two accounted for about 70% of Hamilton's emergency department use. Despite the increase in use, Hamilton in 1973 appeared to generate proportionally fewer emergency visits than Saskatoon in 1970.⁵

Methods

During the 3 weeks from Oct. 24 to Nov. 13, 1971, 2608 consecutive emergency department visits were studied at St. Joseph's Hospital. Patient interviews were carried out for a random sample of 1147 (44%) of these visits. At Hamilton General Hospital 1360 consecutive visits made between Nov. 10 and Nov. 24, 1973 were reviewed and 459 (34%) interviews were conducted. The response rate was 98% for St. Joseph's Hospital and 99% for Hamilton General Hospital. This design compensated for seasonal variations in the interhospital comparisons but not for variations in emergency

Emergency department use in Hamilton has increased over 300% since 1961,¹ mirroring increases reported throughout Canada. Given this increased use, the next steps are to identify its causes and to determine whether present patterns of use are appropriate. If use is appropriate, more adequate facilities, programs and staffing may be required, but if some components of use are deemed inappropriate, modifications of the delivery system may be necessary. With population growth, universal insurance and increasing numbers of motor vehicle accidents,

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department use over time or for seasonal variations in general.

At both hospitals those interviewed were randomly selected after stratification for day of the week and time of the day. At neither hospital did the interviewed patients differ significantly from those who were not interviewed when age, sex, urgency, trauma, family physician and insurance were compared. Interviews were done by trained interviewers from the McMaster field survey unit and, with minor modifications, the questionnaire used was the same at both hospitals.

Identical criteria were used for urgency and trauma classifications, and independent validation of a 10% random sample of these ratings was done at both hospitals. Urgency and trauma criteria were jointly determined by the investigators and casualty officers; examples were listed in all categories and copies of criteria and examples were left in both emergency departments and mailed to all medical staff members. The urgency criteria were:

- **Emergency:** Condition requires immediate medical attention; time delay is harmful to patient; disorder is acute and potentially threatening to life or function.

- **Urgent:** Condition requires medical attention within a period of a few hours; there is possible danger to patient or to ultimate outcome if there is not prompt medical attention; disorder is of acute onset but not necessarily severe or life-threatening. Will usually not, but may, require hospitalization.

- **Nonurgent:** Condition does not require the resources of an emergency service; symptoms are of long duration without sudden change in severity; referral for routine medical care is all that is needed; disorder is minor and not acute. Routine care in a physician's office or no medical care is required.

Findings

Geographic distribution

Although both hospitals are in downtown Hamilton, Hamilton General Hospital is in the economically less favourable north end of the city⁶ and mainly serves those who live in its residential catchment area and workers from nearby industrial plants (one third of patients came from its immediate district and 8% were referred from work) (Fig. 1). St. Joseph's Hospital is located at the foot of the Niagara escarpment and serves twice as many mountain residents as the Hamilton General Hospital (31% v. 16%) (Fig. 2). Only 2% of its patients were referred directly from work.

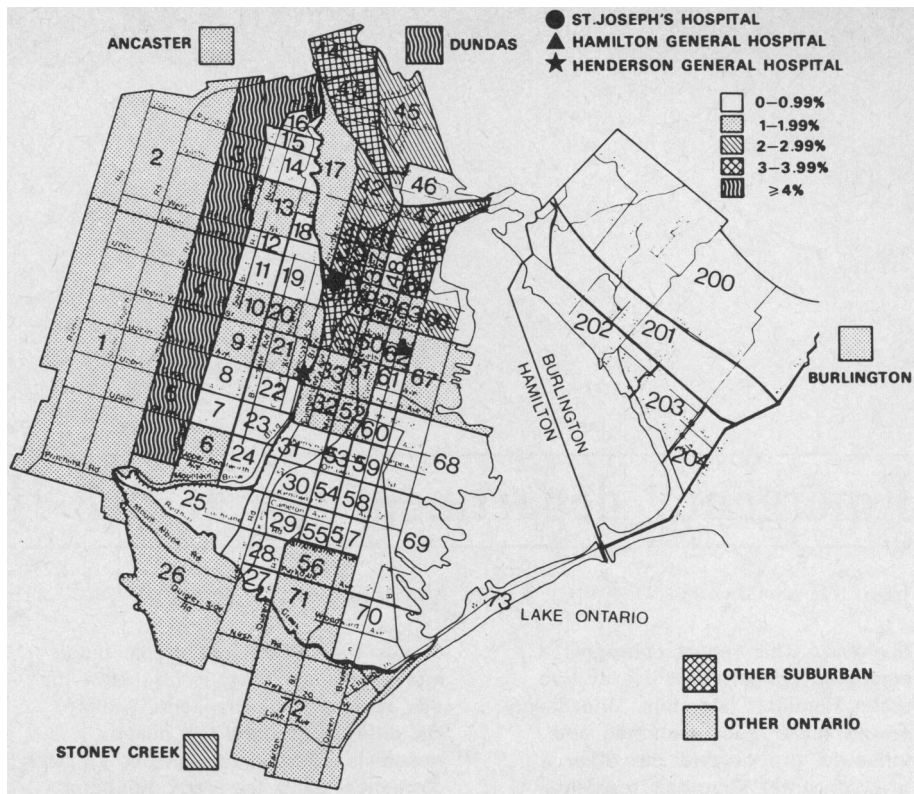


FIG. 1—Percentage of visits to Hamilton General Hospital emergency department from each census tract.

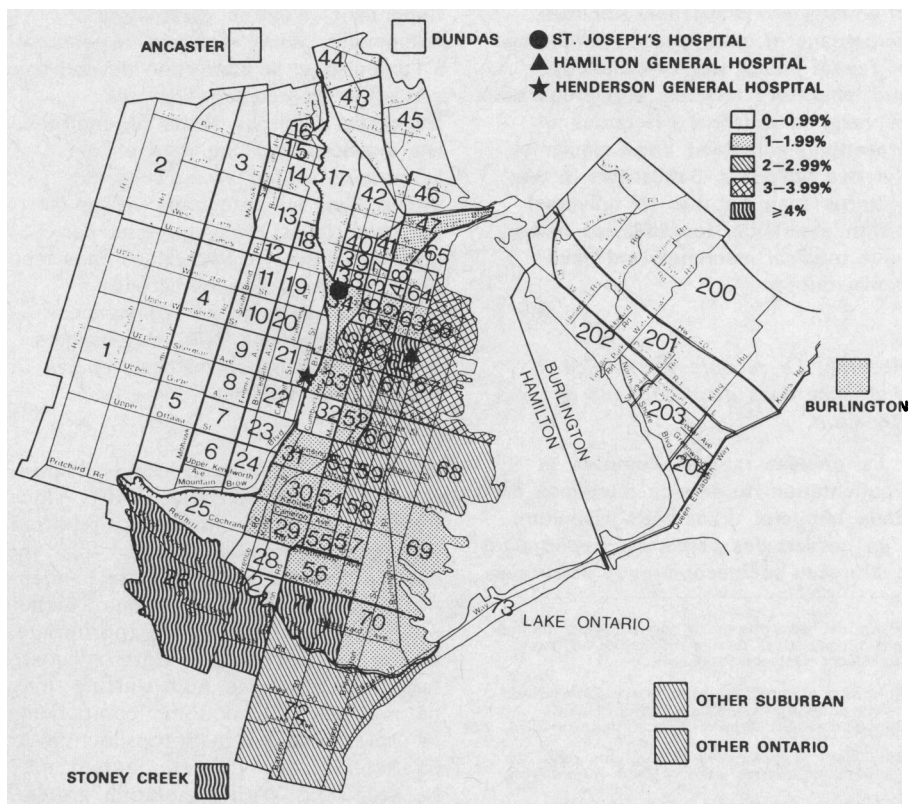


FIG. 2—Percentage of visits to St. Joseph's Hospital emergency department from each census tract.

Sex and age

There was a preponderance of males among those attending the emergency department at both hospitals but there was a greater proportion of males at Hamilton General Hospital (67%) than at St. Joseph's Hospital (59%). Although the median age of emergency department users was similar at the two hospitals (Hamilton General Hospital, 27 years; St. Joseph's Hospital, 24 years), Hamilton General Hospital registered a significantly ($P < 0.01$) greater proportion of patients in the 30- to 49-years age group (29.0% v. 21.9%) and St. Joseph's Hospital recorded significantly ($P < 0.01$) more in the 10- to 29-years age group (44.1% v. 39.6%). Thus, Hamilton General Hospital's emergency department serves more men and its users are somewhat older than those at St. Joseph's Hospital.

Socioeconomic characteristics

Substantial differences were identified in the socioeconomic characteristics of users of the two emergency departments (Table I). Three times as many St. Joseph's Hospital users were in social classes I to III (Hollingshead's Two Factor Index of Social Position⁷). The 1973 median annual income of Hamilton General Hospital users, converted to 1971 dollars, was \$1400 less than the median annual income of St. Joseph's Hospital users in 1971. There were 25% more high school graduates and twice as many university graduates among St. Joseph's Hospital users than at Hamilton General Hospital. However, residential stability, the unemployment rate (8 to 9%) and the proportion of native-born Canadians (75%) were the same among users at each hospital.

Characteristics of use

Despite socioeconomic differences among users, some characteristics of use, such as time of arrival, ambulance use, percentage admitted, use of radiology and laboratory facilities and percentage of repeat visits, were similar at the two hospitals (Table II). Median duration of visits was much greater at Hamilton General Hospital (100 v. 80 minutes) and a greater proportion of its visits represented direct referrals from work. Sunday was the busiest day at St. Joseph's Hospital but the least busy at Hamilton General Hospital. Saturday, however, was among the busiest days at both hospitals.

Approximately one sixth of visits were made between midnight and 8 am at both hospitals, and the proportions of emergency, urgency and non-urgency visits at each hospital were approximately the same regardless of the time of day at which the visit was made. A total of 40 visits per night was registered at both hospitals combined. Since these two hospitals receive almost 70% of all emergency visits in Hamilton, it may be assumed, by extrapolation, that about 60 emergency department visits are made in the city between midnight and 8 am on any day, of which approximately three are emergencies.

Insurance and family doctor

Other similarities are apparent when family doctor and insurance coverage are compared. Approximately 90% of users at both hospitals had both insurance (Hamilton General, 93%; St. Joseph's, 89%) and family doctors (each 90%). However, more at St. Joseph's Hospital first tried to contact their family physician (38% v. 28%) and more at Hamilton General Hospital came directly to the emergency department without contacting a physician or any other source of medical care (58% v. 53%). At each hospital about two thirds (Hamilton General, 68%; St. Joseph's, 60%) of those who tried to reach their physician before coming were successful. Those who had tried to contact their doctors were more likely to be classified as having an emergency or urgent condition than a nonurgent condition. Less than one quarter (Hamilton General, 22%; St. Joseph's, 24%) had spoken with their family doctor in the 2 days before the emergency visit.

Urgency and trauma

At both hospitals only 1 visit in 20 (Hamilton General, 4%; St. Joseph's, 6%) was designated as an emergency.

Table I—Socioeconomic characteristics of emergency department users

Characteristic	Hospital	
	Hamilton General	St. Joseph's
Social class (%)		
I	1.2	3.2
II	1.2	5.7
III	5.5	13.4
(Total I-III)	(7.9)	(22.3)
IV	45.3	43.7
V	46.8	34.0
Median annual family income (\$)	5900*	7500
Education		
Years of school (median)	10	10
High school graduates (%)	26	36
University graduates (%)	4	9
Residence		
In Hamilton 10 years or more (%)	67	68
At present address < 1 year (%)	34	30
Country of birth		
Canada (%)	75	75
United Kingdom (%)	7	8
Italy (%)	4	6
Unemployed head of household (%)	8	9

*Corrected from 1973 to 1971.

Table II—Characteristics of use

Characteristic	Hospital	
	Hamilton General	St. Joseph's
Arrival time		
12 am to 7:59 am (%)	18	15
8 am to 3:59 pm (%)	40	41
4 pm to 11:59 pm (%)	42	44
Ambulance used (%)	12	9
Admitted (%)	13	16
Median duration of visit (min)	100	80
Radiography (%)	37	38
Laboratory tests (%)	20	27
Other visits to any emergency department in past 12 months (%)	42	38
1 other visit (%)	58	59
2 or more other visits (%)	42	41
"Off hours" use (%)		
(5 pm to 8 am weekdays, Saturday and Sunday)	66	68
Referred directly from work (%)	8	2

However, the proportion of nonurgent visits was significantly greater ($P < 0.01$) at Hamilton General Hospital (44%) than at St. Joseph's Hospital (34%). Among those who came by ambulance to either hospital 20% had nonurgent conditions. At St. Joseph's Hospital 50% of the visits were the result of trauma and at Hamilton General Hospital 55%. This last difference was probably due to the larger proportion of patients referred directly from work to Hamilton General Hospital. Validation of trauma ratings was the same at both hospitals (97%) and urgency validation almost the same (St. Joseph's, 80%; Hamilton General, 84%).

Duration and severity of symptoms

Despite differences in the proportion of nonurgent visits at the two hospitals the proportion of users with symptoms of more than 1 day's duration and with minimal or no pain or worry was the same at both hospitals (Table III). Non-urgency rating was associated with longer duration of symptoms but not with minimal or absent pain or worry.

Additional similarities are apparent when categories of presenting complaint are examined (Table IV). There were more visits proportionally in the nervousness category at St. Joseph's Hospital, probably because it housed Hamilton's Crisis Intervention Service. On the other hand, lacerations and injuries were somewhat more common at Hamilton General Hospital because of its proximity to the industrial area. Almost three times as many patients with lacerations and injuries were referred directly from work to Hamilton General Hospital than to St. Joseph's Hospital (11% v. 4%). At both hospitals 70% of patients with lacerations and injuries visited the hospital without first contacting any source of medical care — evidence that patients with these complaints usually bypass their regular sources of primary care and come directly to the emergency department. In the other categories of presenting complaint, similarities in proportions of presenting complaints in the two hospitals outnumbered differences.

Discussion

Although there were socioeconomic differences between emergency department users at the two hospitals, related to the populations served by each, patterns of use were generally similar. Universal medical insurance appears to have decreased, but not eliminated, differences in the patterns of use that have been reported^{3,4} in different socioeconomic groups. Beck⁸ demonstrated that differences in emergency depart-

ment use among different income groups have narrowed but not disappeared during the first 5 years of universal medical insurance in Saskatchewan.

Torrens and Yedvab,⁹ in an effort to explain differing patterns of emergency department use at different hospitals in the United States, have divided emergency departments into three general role categories (Table V):

1. Family physician for those who have none.
2. Trauma centre.

3. Physician surrogate at "off hours".

When this model is applied to Hamilton General and St. Joseph's hospitals, both appear to function largely as trauma centres and "off hours" physician surrogates — further evidence that universal insurance decreases differences in emergency department use that might have been expected in differing socioeconomic groups. A hospital emergency department in the economically "least favourable" north end of Hamilton resembled its more sub-

Table III—Duration and severity of symptoms

Variable	Hospital	
	Hamilton General (%)	St. Joseph's (%)
Duration of symptoms \geq 1 day	25	27
Hurt or pain		
Hardly or not at all †	33	30
Worry		
Hardly or not at all †	25	21

*Statistically associated with nonurgency.

†Not statistically associated with nonurgency.

Table IV—Categories of presenting complaint

Category	Hospital	
	Hamilton General (%)	St. Joseph's (%)
Lacerations, total	17.3	15.6
Head and face	7.3	6.6
Other	10.0	9.0
Injury	27.3	24.9
Pain and soreness (nontraumatic, extremities)	2.1	1.9
Nervousness	2.7	5.9
Eyes, ears, nose and throat	7.8	6.1
Upper respiratory illness, fever of unknown origin, "flu", diarrhea	7.2	7.2
Abdomen, total	5.7	8.6
Pain	5.6	8.2
Other	0.1	0.4
Chest, total	6.0	5.6
Pain	4.6	4.1
Other	1.4	1.5
Head, total	3.6	3.4
Injury	3.5	3.2
Other	0.1	0.2
Back (including ache and injury)	3.7	2.6
Central nervous system (epilepsy, dizziness, cerebrovascular accident, etc.)	3.8	2.6
Skin	2.8	3.0
Genitourinary	2.7	3.6
Respiratory and cardiovascular	2.1	2.6
Gastrointestinal tract, including hematemesis and melena	1.6	2.3
Drug overdose, ingestion, suicide attempt	1.4	3.2
Dental complaints	1.2	0.8
Not otherwise classified	1.0	1.0

Table V—Role of emergency department*

Role	Hospital			
	Hamilton General (%)	St. Joseph's (%)	US suburban† (%)	US urban† (%)
Family physician for those who have none	10	10	14	50
Trauma centre	55	50	64	43
Physician surrogate at "off hours"	66	68	70	66

*Adapted from Torrens and Yedvab.⁹

†Gibson.³

urban Hamilton partner and suburban hospitals in the United States, not emergency departments in urban US hospitals.

As Baltzan⁵ has pointed out, daytime emergency department use is probably a result of the difficulty of fitting patients with short-term illnesses into physicians' appointment schedules. Approximately 10% of St. Joseph's Hospital emergency department users said they "couldn't get an appointment" or "had to wait too long for an appointment".² On the other hand, "off hours" nonurgent emergency department use is an indication of demand for medical services during evenings and weekends. In this study the commonest reason for such use was that the time was "out of doctor's practice hours". There are adequate numbers of primary care physicians in Hamilton (41% of the city's 676 physicians were family doctors in 1973, a ratio of 1 for every 1467 residents). Two thirds of persons who tried to reach their physicians were successful, but less than half tried. Thus, perceived lack of availability and accessibility of primary care services in evenings and on weekends and convenience appear to be the major reasons for "off hours" emergency department use.

Individual hospitals in Hamilton and elsewhere can and have dealt with the problem of increased emergency department use by updating and redesigning facilities, by instituting triage,^{10,11} by engaging casualty officers, by establishing rotation systems for their staff members, or by exerting pressure on their medical staffs to increase their availability and accessibility at "off hours".

However, long-term solutions for Hamilton may require regionalization of emergency services and increased organization of primary care services. Hamilton's five hospitals* all have 24-hour emergency departments, although only 60 emergency department visits are registered between midnight and 8 am on any night in the entire city. This volume of work could be handled by two hospitals rather than five; thus three hospital emergency departments could be closed between midnight and 8 am. Each of the two that remained open would still deal with fewer patients during the night shift than they now care for during either of the other two shifts. Similar arrangements may be feasible and desirable in comparable communities. Attending physicians should, of course, be able to meet their patients at any hour at all hospitals,

but this would not entail operating fully staffed emergency departments.

Further extrapolation of the Hamilton data indicates that there are approximately 10 serious accident or trauma cases in each 24-hour period in Hamilton. A single trauma centre, by mobilizing personnel and resources in one hospital, could better manage life-threatening injuries because skilled trauma specialists could be coordinated and on site 24 hours a day in one centre rather than scattered and on call in several hospitals.

Reorganization of a community's emergency services cannot be arbitrarily imposed. The community, its hospitals and its physicians must share jointly in the discussions and decision-making. This study of users and use patterns has provided a data base to assist in the planning of one city's emergency services.

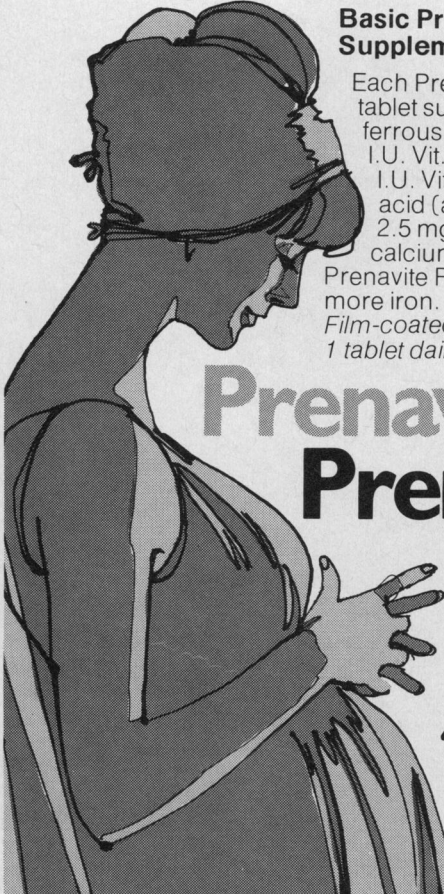
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*Hamilton General, St. Joseph's, Henderson General and Chedoke hospitals and McMaster University Medical Centre



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