



A system in crisis: exploring how recent emergency department closures influence potential access to emergency care in Ontario

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Abstract

Objectives Access to emergency medical care in Ontario has been under stress, mainly due to a lack of human resources (staffing of nurses and doctors). Over the past year, several emergency departments in Ontario have closed. Some of these closures are nightly, while others have closed for weeks at a time, leaving Ontario residents without access to emergency medical care which can lead to poor or more severe outcomes. The purpose of this paper was to examine how closures of ED's in Ontario have influenced potential access to emergency medical care.

Methods We performed population-level geographic information systems (GIS)-based analysis of potential access to ED hospitals in Ontario. The number of people with access to an ED was calculated when all ED's in Ontario were open, then recalculated with the 14 ED closures. Access was defined by ground travel with 30 min, 45 min, and 60 min travel times used for analysis. Differences in the number of people at the census block level who potentially lost access were compiled and examined by census subdivision.

Results If all 14 ED's had closed at the same time, there would be 35,808 people at 30 min, 15,018 at 45 min, and 12,131 at 60 min travel times in Ontario who lost access to ED care. Certain areas of the province saw more significant decreases in ED access. At 45 min travel times, nearly 2000 people in Central Frontenac lost access (44% of population), while 7298 people in Cochrane (North Part) lost access (20% of population).

Conclusions ED closures have led to decreases in potential access to emergency care for predominantly rural populations. Health human resource recovery strategies must focus on areas where lack of overlap exists.

Keywords Emergency medicine · Health care access · Hospital closures · Inequalities

Résumé

Objectifs L'accès aux soins médicaux d'urgence en Ontario a été mis à mal, principalement en raison d'un manque de ressources humaines (dotation en personnel infirmier et en médecins). Au cours de la dernière année, plusieurs services d'urgence de l'Ontario ont fermé leurs portes. Certaines de ces fermetures ont lieu chaque nuit, tandis que d'autres sont fermées pendant des semaines, laissant les résidents de l'Ontario sans accès aux soins médicaux d'urgence, ce qui peut

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entraîner des résultats médiocres ou plus graves. L'objectif de ce document est d'examiner comment les fermetures de services d'urgence en Ontario ont influencé l'accès potentiel aux soins médicaux d'urgence.

Méthodes Nous avons effectué une analyse des systèmes d'information géographique (SIG) à l'échelle de la population sur l'accès potentiel aux urgences hospitalières en Ontario. Le nombre de personnes ayant accès à un service d'urgence a été calculé lorsque tous les services d'urgence de l'Ontario étaient ouverts, puis recalculé en fonction des 14 fermetures de services d'urgence. L'accès a été défini par les déplacements terrestres, les temps de trajet de 30, 45 et 60 min étant utilisés pour l'analyse. Les différences dans le nombre de personnes au niveau de l'îlot de recensement qui ont potentiellement perdu l'accès ont été compilées et examinées par subdivision de recensement.

Résultats Si les 14 urgences avaient fermé en même temps, 35 808 personnes à 30 min, 15 018 à 45 min et 12 131 à 60 min de déplacement en Ontario auraient perdu l'accès aux soins d'urgence. Certaines régions de la province ont connu des baisses plus importantes de l'accès aux urgences. À un temps de déplacement de 45 min, près de 2 000 personnes dans le centre de Frontenac ont perdu l'accès (44% de la population), tandis que 7 298 personnes à Cochrane (partie nord) ont perdu l'accès (20% de la population).

Conclusions : Les fermetures de services d'urgence ont entraîné une diminution de l'accès potentiel aux soins d'urgence pour les populations principalement rurales. Les stratégies de rétablissement des ressources humaines dans le secteur de la santé doivent se concentrer sur les domaines où il n'y a pas de chevauchement

Mots clés Médecine d'urgence · Accès aux soins de santé · Fermetures d'hôpitaux · Inégalités

Abbreviation

CSD Census subdivision

Clinician's capsule

What is already known on this subject?

Health human resources are at an all-time low, resulting in unprecedented closures of local emergency departments (EDs)

What did the study ask?

How have the recent closures of EDs influenced potential access to emergency medical care in Ontario?

What did this study find?

14 ED closures during the study period resulted in 15,018 people losing potential access to an ED within a 45-min timeframe

What does this study matter to clinicians?

ED closures likely cause patient harm. Healthcare workers, hospital leadership, and government must work together to prevent further closures particularly in areas without overlapping coverage

pandemic, healthcare workers have faced unprecedented levels of distress, fatigue, and difficult clinical practices, leading to burnout [2–4]. Recently in Ontario, several hospitals have simply not had the human resources to keep certain patient care areas of the hospital open. Most notable, emergency departments (ED) have been forced to close. Closures can lead to worsening capacity issues at nearby hospitals [5] as well as longer out-of-hospital transport times for patients which increases mortality for life-threatening illnesses [5, 12] [6–11]. We examined how the recent or planned closures of ED's have influenced potential access to emergency medical care in Ontario.

Methods

We performed population-level geographic information systems (GIS)-based analysis of potential access to ED hospitals in Ontario. We obtained the addresses of all hospitals with an ED ($n = 164$) from local health integration network websites. Location of all hospitals with an ED were geocoded to their exact address with 100% accuracy. Hospitals were used as the starting point for all travel times.

To understand which hospitals had ED closures, we searched all relevant news articles on ED closures since December 2021 due to a lack of publically available reporting of closures by governmental sources. We followed a previously used approach on media analysis [12] and continued to monitor other closures and updated the dataset as of August 8, 2022. We identified 14 hospitals with either partial (nightly), complete, or planned closures and are confident that our search identified all closures to date (Supplementary Table).

Introduction

Access to healthcare is more complex than merely having a hospital. There must be adequate supply of services or resources and they must meet the needs patients to obtain satisfactory health outcomes [1]. But what happens when those resources are not available? During the COVID-19

Potential access was measured using a 2020 road network analysis, which examined travel times based on land catchment areas from each hospital. We created separate land catchment areas for 30, 45, and 60 min travel times using non-overlapping polygons (meaning access is only given to one hospital) [13]. Travel times were selected based on previous usage within the literature [13, 14], but they also represent a reasonable travel time to emergency care. Catchment areas account for data on speed limits and driving restrictions. The impedance applied for calculation was travel time, meaning the fastest route (not necessarily the shortest) would be selected.

The 2016 census block level population dataset was utilized to assess population with access. This is the smallest spatial unit where population-level data are released in Canada. First, the block polygon file was converted to points at the geographic centroid of the block and represents the population living within each block [14]. Once all the network catchment areas were calculated, the sum of all population block centroids were calculated and summed for each CSD. This process was completed with all ED's open, as baseline data, then all steps were repeated for the 150 hospitals where ED's remained open to account for the 14 closures. Analysis was then repeated by each month from March 2022 until August 2022. Monthly analysis only accounts for closures during the month, to account for not all closures happening at once.

To examine how potential access has changed in each CSD, we took the baseline population with access in each CSD, then subtracted the number of people in each CSD with potential access after the ED closures. This assumes that all hospitals were closed at the same time or same month, which was not always the case, but findings will identify areas where closures may be more problematic. The total number of people in each CSD was also compiled and used to calculate the percentage of population within the CSD that lost potential access.

Results

If all 14 ED's had closed simultaneously, there would be 35,808 people who potentially lose access to ED care at 30 min, 15,018 at 45 min, and 12,131 at 60 min travel times. While the overall numbers at the provincial level are quite low, the percentage of people in some CSD's who lose access to ED care was more significant (Table 1). Overall, the number of people who lose potential access is most striking at 30 min travel times, with rural areas most impacted. Nearly 60% of the population in North Huron and North Glengarry would not have potential access within 30 min. While at 45 min travel times, which may be more representative, Central Frontenac reported that nearly 2000 people or

44% of the population lost potential access to ED care. In Cochrane (North Part) 7,298 people or nearly 20% of their population lost potential access to ED care.

Figure 1 illustrates the percentage of the population in Ontario by CSD that loses potential access based on 45-min travel times. As displayed, there are several closures in Southwestern Ontario, but few people lose potential access due to overlapping hospital catchment areas. In Northern Ontario, or Eastern Ontario there were fewer closures, but there was a much larger influence on the population who lost potential access which was attributed to one hospital closure. In the monthly analysis, it become evident that certain hospital closures may influence overall access more so than others and inequalities in access exist with certain hospital closures (Table 2—supplemental). The month of July reported the largest number of people who would lose access to emergency care.

Discussion

Previous studies: inequitable impact of ED closures

The fact that rural residents had lower access to care is not new in Canada or the United States and has been reported in previous work [14, 15]. What was interesting here was that rural areas had more ED closures, and no overlap in health care access, so the impact of these closures is not equitably spread across the province. Closures to hospitals in Eastern and Northern Ontario led to much larger decreases in the proportion of people with potential access, which is highlighted in both the overall and monthly analysis. This is further complicated as much of Northern Ontario relies on air ambulance to provide transport to the closest ED with transport times of multiple hours for some communities [16, 17].

Interpretation

The Ontario Ministry of Health previously created a Provincial Framework and Plan to support improved access to health care in rural communities [18]. This Panel recognized the “golden hour” principle of emergency care, understanding that timely clinical interventions associate with better outcomes. Part of this plan was to ensure 90% of residents in a community could receive emergency services within 30 min travel time from their place of residence [18]. The justification of this shorter 30-min travel time was in anticipation that an additional 30 min would be required for patients to call for an ambulance and paramedics to arrive, assess, begin treatment and load the patient into the ambulance. ED closures in these rural

Table 1 Changes in access to care by CSD in Ontario using all three travel times

CCSNAME	Total Population	Percentage of population who lost access		
		30 min (%)	45 min (%)	60 min (%)
Central Frontenac	4373	6.6	44.9	1.2
Cochrane, North Part	37,894	17.5	19.3	17.8
North Frontenac	1898	0.0	7.2	4.8
Kenora, Unorganized	64,263	6.4	6.4	7.9
South Frontenac	18646	0.2	5.3	0.0
North Glengarry	10,109	61.6	2.4	0.0
Lanark Highlands	5338	22.5	1.9	0.0
Morris-Turnberry	3671	47.8	0.6	0.6
The Nation / La Nation	16,469	10.0	0.4	0.0
North Huron	4757	63.8	0.0	0.0
Tay Valley	5,665	27.8	0.0	0.0
Huron East	9138	21.8	0.0	0.0
Rideau Lakes	10,916	19.0	0.0	0.0
South Glengarry	14,357	9.5	0.0	0.0
Huron-Kinloss	7069	7.2	0.0	0.0
North Stormont	6760	7.0	0.0	0.0
South Bruce	5639	5.6	0.0	0.0
Clarence-Rockland	24,512	3.9	0.0	0.0
Howick	3873	3.2	0.0	0.0
Wellesley	11,260	2.1	0.0	0.0
Perth East	12,261	2.0	0.0	0.0
Alfred and Plantagenet	9680	1.9	0.0	0.0
West Perth	8865	1.8	0.0	0.0
Russell	16,520	1.3	0.0	0.0
Drummond/North Elmsley	13,703	0.8	0.0	0.0
North Perth	13,130	0.8	0.0	0.0
Stirling-Rawdon	4882	0.6	0.0	0.0
Chatsworth	6630	0.3	0.0	0.0
Elizabethtown-Kitley	30,998	0.2	0.0	0.0
Perth South	42,540	0.1	0.0	0.0
Algoma, North Part	29,065	0.0	0.0	0.1
Ottawa	934,454	0.0	0.0	0.0

All other CSD's had no change in access

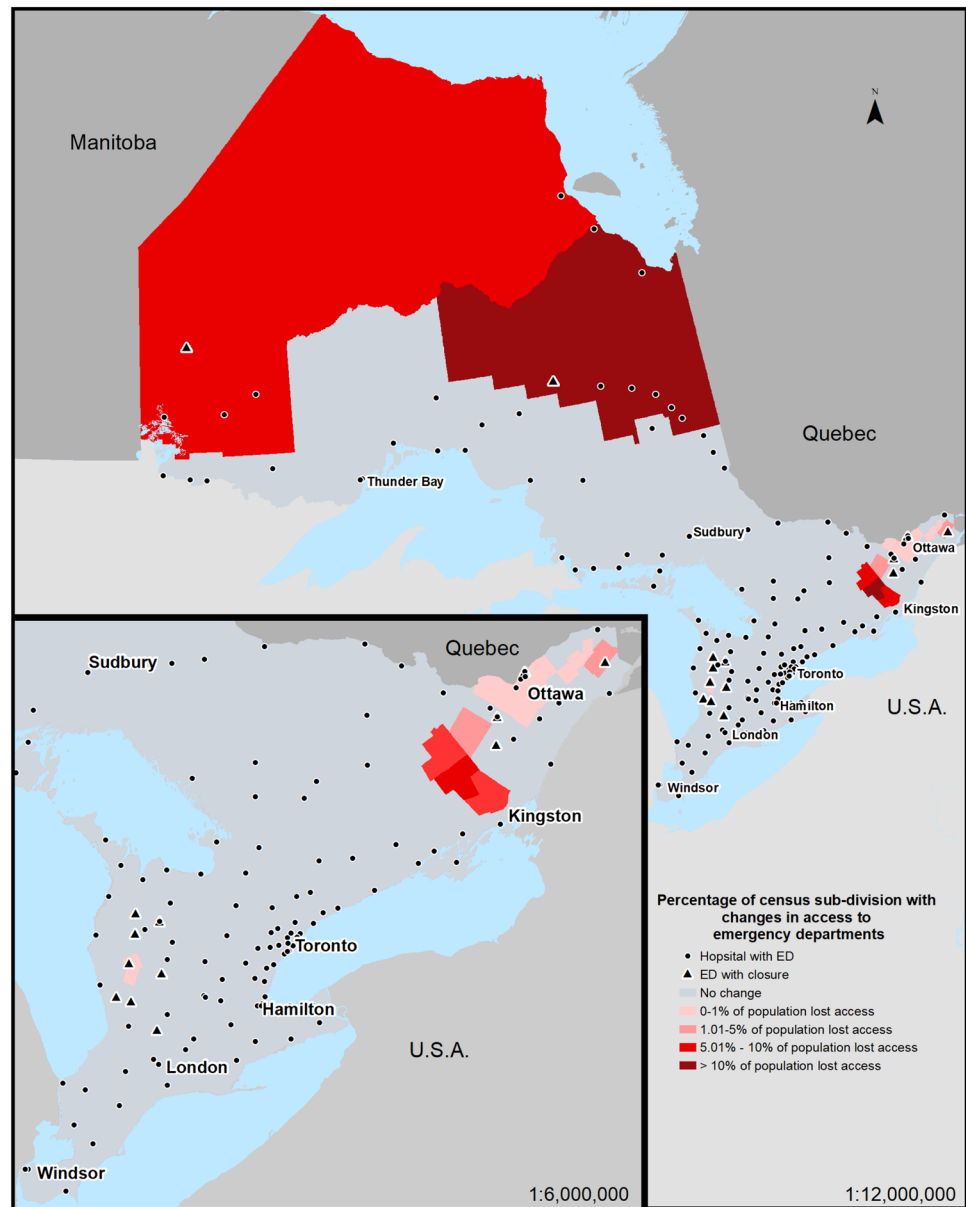
communities significantly impair or even make it impossible to meet these Ministry targets.

Even though there were more hospitals with closures in Southwestern Ontario, the region still had the ability to provide potential access due to overlapping hospital catchment areas. Furthermore, it is important to note that the closure in Eastern Ontario (Perth) was a long closure that lasted several weeks. Since the Perth closure, several others in Eastern Ontario have been forced to close, further limiting access in this area. In the month of July when this hospital was closed, over 3,000 people in the area lost access.

Research implications: future research

While the focus here was to examine closures to ED's, which mainly affected rural communities, this does not mean healthcare in urban areas was unharmed. To date there has only been one ED closure in a larger city (Ottawa), but many other larger cities have had to close urgent care centres or reduce hours to keep ED's open. This was beyond the scope of this research, but it is important to highlight the challenges that all communities in Ontario have been facing.

Fig. 1 Percentage of people who lost access to an emergency department by census subdivision in Ontario based on 45 min travel times as of August 8, 2022



Clinical implications: potential patient impact of ED closures

Short delays have been associated with increased mortality for severely injured patients [19] or effect patient eligibility for specialized stroke and cardiac interventions [20]. Therefore, although not examined in this study, our results suggest these ED closures may result in patient harm. Additionally, extended transport times for both land and air ambulances increases time to definitive care for patients and reduces the paramedic crew's ability to respond to further emergent transports in that community [17]. Not surprisingly, when one ED closes, the nearest ED then sees an increase in their patient volume [21], putting further strain on that hospital.

Strengths and limitations

This paper highlights the number of people who may lose access to emergency care with recent ED closures in Ontario. We analyzed the closures as if all EDs were closed simultaneously, but also examined a monthly breakdown. While a limitation, as the monthly results illustrated this did not influence the major findings of this study, as the decreases in potential access were typically related to only one ED being closed in each region. In areas where multiple EDs were closed at once, many residents still had access to other hospitals, but other issues such as hospital capacity may become an issue. Another limitation relates to the fact that we had to rely on media reporting ED closures as this data is not publicly available. The Ministry of Health should

create a standardized reporting system to identify and track closures throughout the healthcare system.

Conclusion

There were inequities with rural areas of Northern and Eastern Ontario seeing the greatest impacts of these closures and potentially greater patient harm. These closures also put additional stresses, capacity issues, and longer wait times for nearby ED's. Health human resource recovery strategies must focus on areas where lack of overlap exists, while governments and hospitals must work together to address staffing issues and prevent further closures.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s43678-023-00460-y>.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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