

Impact of the COVID-19 Pandemic on Emergency Department Presentations & Acuity at Boundary Trails Health Centre

By: Lydia Czegledi, Fredy Mansour, Payam Salimi

Home for the Summer Program – May to August 2020

Winkler/Morden, Manitoba

Supervisor: Dr. Kevin Earl

Impact of the COVID-19 Pandemic on Emergency Department Presentations & Acuity at Boundary Trails Health Centre

ABSTRACT

Background: The first case of Coronavirus Disease 2019 (COVID-19) was reported in December of 2019.¹ Since the first reported case, COVID-19 has become a public health emergency of international concern.¹ Though the number of newly confirmed cases in Manitoba continues to be lower than in other parts of the world, the potential indirect effects of this pandemic on patients' health remains unclear. The aim of this report is to help understand the potential indirect effects of COVID-19 on patients accessing emergency healthcare services by examining trends in Emergency Department (ER) visits at Boundary Trails Health Centre (BTHC) immediately prior to and after the province of Manitoba invoked the Emergency Measures Act. In addition, we hope to use this information to help identify areas that require further exploration to help inform future patient education efforts regarding accessing emergency healthcare services in the event of a second COVID-19 wave. No such reports of COVID-19 in Manitoba have been published to date.

Methods: We performed an observational, cross-sectional study of ER visits at Boundary Trails Health Centre by requesting data regarding volume and acuity level of all patient presentations to the ER during the following time periods: March 1 to June 30, 2020 (early pandemic period) and March 1 to June 30, 2019 (comparative period). This data was generated using IBM® Cognos Analytics and Southern Health's electronic document information system. All data retrieved was categorized by chief presenting complaint and acuity. All analyses were conducted using Microsoft Excel® software.

Results: A total of 5742 ER presentations for the early pandemic period and 7408 ER presentations for the comparison period were analyzed for volume of presentations. Every month in the early pandemic period time interval showed decreases in total number of ER presentations when compared to the comparison period and the decrease in mean number of monthly ER presentations during the pandemic period was determined to be statistically significant using a one-tailed t-test (p -value = 0.02, α = 0.05). The report generated by IBM® Cognos Analytics and Southern Health's electronic document information system grouped these ER presentations into 15 diagnostic categories and each category showed a decrease in total number of ER presentations in the early pandemic period. However, only three diagnostic categories (ENT, Gastrointestinal, and Neurologic,) showed statistically significant decreases in mean number of monthly ER presentations during the pandemic period (α = 0.05 and p -values = 0.03, 0.002, and 0.002, respectively). Lastly, CTAS acuity level designation was available for 5692 ER presentations during the early pandemic period and 7312 ER presentations during the comparison period. Every CTAS acuity level designation showed a decrease in total number of ER presentations during the pandemic period. CTAS Levels 1, 2, and 4 showed no statistically significant change in prevalence among ER presentations during the early pandemic period. However, CTAS Level 3 acuity showed a statistically significant decrease in prevalence while CTAS Level 5 showed a statistically significant increase in prevalence among ER presentations during the pandemic period.

Conclusions: The data demonstrated a decrease in the total volume of presentations to the ER at BTHC, a decrease in presentations within each diagnostic category, as well as a decrease in presentations within each CTAS acuity level when compared to the comparison period. Further studies would need to examine these findings in more detail to ensure that patients are not avoiding or delaying seeking emergency healthcare services during the pandemic and to help guide future patient education efforts regarding when to present for emergency healthcare services.

Impact of the COVID-19 Pandemic on Emergency Department Presentations & Acuity at Boundary Trails Health Centre

INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, now and hereafter referred to as “COVID-19”) was first reported in Wuhan, China in December of 2019.¹ Since the first reported case, COVID-19 has become a global pandemic with over 20 million confirmed cases worldwide and over 120,000 confirmed cases in Canada.² The pandemic sparked nationwide lockdowns, halted economies, and impacted social norms across the globe on a scale never seen before.

The first three presumptive cases in Manitoba were reported on March 12th, 2020.³ Within a week of these reports, on March 20th, the province of Manitoba invoked the Emergency Measures Act.⁴ Public Health measures to contain the spread of COVID-19 included mandatory fourteen-day self-isolation for returning travellers, the suspension of visitors to personal care homes and acute care hospitals and the suspension of all in-person classes at elementary, secondary, and post-secondary institutions.⁴ In addition, both federal and provincial levels of government were advising Canadians to adhere to social distancing protocols and remain at home as much as possible.⁵ Though reports in other parts of the world have already begun to examine the negative indirect effects of COVID-19 on patients accessing healthcare,^{6,7,8} there have been no published reports, to our knowledge, regarding healthcare access during the pandemic in Manitoba.

Although most cases were concentrated in Winnipeg, the response by the provincial government was applied province-wide to every health region in Manitoba. To gain a better understanding of the impact of COVID-19 on patients accessing emergency healthcare services, we focused our analysis on Boundary Trails Health Centre (BTHC), one of three main hospitals in the Southern Health Region. This report describes trends in Emergency Department visits, specifically examining how the arrival of COVID-19 affected the volume of patient presentations as well as the acuity of patients presenting to the Emergency Department (ER). It is our intention that this information be used to help identify findings in need of further study to help understand the potential negative effects of COVID-19 on patients accessing emergency healthcare services and help inform future patient education efforts regarding accessing emergency healthcare services in the event of a second COVID-19 pandemic wave.

METHODS

An observational study was performed at the Emergency Department (ER) of the Boundary Trails Health Centre (BTHC) by requesting the volume of all patient visits categorized by diagnostic category and acuity level. Acuity is defined by the Canadian Triage and Acuity Scale (CTAS) score assigned initially by triage. Data from two time periods were requested: March 1 to June 30, 2019 (comparison period) and March 1 to June 30, 2020 (early pandemic period). March 1 to June 30, 2020 was chosen to represent the “early pandemic period” in Manitoba as the first cases of COVID-19 were reported on March 12, 2020³ and the Provincial Emergency Measures Act was invoked on March 20th.⁴ Data used in this report was retrieved from an automatically generated report using IBM® Cognos Analytics and Southern Health’s electronic document information system.

Statistical methods used to examine the data include describing the absolute changes in number of ER presentations in March 1 – June 30, 2020 (early pandemic period) in direct comparison to March 1 – June 30, 2019 (comparison period) for both the total number of monthly ER visits as well as for each

Impact of the COVID-19 Pandemic on Emergency Department Presentations & Acuity at Boundary Trails Health Centre

diagnostic category. In addition, one-tailed t-tests were conducted for the same time periods to examine the change in mean number of total monthly ER presentations as well as the change in mean number of ER presentations for each diagnostic category. Lastly, prevalence ratios were used to examine the change in the prevalence of diagnostic categories and acuity levels among individuals who were presenting to the ER at BTHC in the early pandemic period when compared to the comparison period. All analyses were conducted using Microsoft Excel® software.

RESULTS

The data used was retrieved from an automatically generated report using IBM® Cognos Analytics and Southern Health’s electronic document information system. This data report yielded a total of 15 main diagnostic categories under which all Emergency Department (ER) visits at Boundary Trails Health Centre (BTHC) were organized. These diagnostic categories, as well as representative chief complaints, are summarized in Table 1.

TABLE 1. Diagnostic categories, and the corresponding chief complaints included in each diagnostic category, as generated by IBM® Cognos Analytics and Southern Health’s electronic document information system.

Diagnostic Categories	Representative Chief Complaints	
Cardiovascular	Cardiac Arrest (Non-Traumatic) Cardiac Arrest (Traumatic) Chest Pain (Cardiac Features) Chest Pain (Non-Cardiac Features) Edema, Generalized General Weakness	Hypertension Leg Swelling/Edema Palpitations/Irregular Heart Rate Syncope/Pre-syncope Unilateral Reddened Hot Limb
ENT	Ear Discharge/ Injury/ Earache Foreign Body in Ear Loss of Hearing Facial Trauma Nasal Congestion/Hay Fever Nasal Trauma/ Epistaxis	Dental/Gum Problems Difficulty Swallowing/Dysphagia Facial Pain (Non-Traumatic/Non-Dental) Neck Swelling/Pain/ Trauma Foreign Body in Nose Sore Throat
Gastrointestinal	Abdominal Mass/Distention/Pain Anorexia Blood per Anus/Melena Constipation/ Diarrhea Feeding Difficulties in Newborn Vomiting Blood	Groin Pain/Mass Jaundice Nausea/Vomiting Oral/Esophageal Foreign Body Rectal/Perineal Pain Rectum Foreign Body
General and Minor	Direct Referral for Consultation Dressing Change Communicable Diseases Exposure Fever Hyperglycemia/ Hypoglycemia Imaging Test/Blood Test	Inconsolable Crying in Infants Medical Device Problem Medication Request Minor Complains Unspecified Pallor/Anemia Post-Operative Complications
Genitourinary	Flank Pain Genital Trauma Hematuria Oliguria	Penile Swelling Scrotal Pain/Swelling Urinary Retention UTI Complaints/Symptoms
Mental Health	Anxiety/Situational Crisis Bizarre/Paranoid Behaviour Concern for Patient’s Welfare	Hallucinations/Delusions Insomnia Pediatric Disruptive Behaviour

Impact of the COVID-19 Pandemic on Emergency Department Presentations & Acuity at Boundary Trails Health Centre

Neurologic	Depression	Social Problem
	Suicide/Deliberate Self Harm	Violent Behavior
	Altered Level of Consciousness	Head Injury
	Confusion	Headache
	Extremity Weakness	Seizures
	Symptoms of CVA or TIA	Sensory Loss/Paresthesia
	Floppy Child	Tremor
OB/GYN	Gait Disturbance/Ataxia	Vertigo
	Vaginal Foreign Body	Vaginal Discharge
	Labial Swelling	Vaginal Pain/Itch/Bleed
	Menstrual Problems	Pregnancy Issues (<20 weeks gestation)
Ophthalmology	Sexual Assault	Pregnancy Issues (>20 weeks gestation)
	Eye Chemical Exposure	Periorbital Swelling
	Eye Pain	Re-Check Eye
	Eye Trauma	Red Eye/Discharge from Eye
	Eye Foreign Body	Visual Disturbance
Orthopedic	Amputation	Joint Swelling
	Back Pain	Pediatric Gait Disorder/Painful Walk
	Cast Check	Traumatic Back/Spine Injury
	Lower Extremity Injury/Pain	Upper Extremity Injury/Pain
	Respiratory	Allergic Reaction
Apneic Spells in Infants		Shortness of Breath
Cough/Congestion		Stridor
Foreign Body		Wheezing – No other Complaints
Hemoptysis		Hyperventilation
Skin		Abrasion/ Bite/ Burn
	Blood and Body Fluid Exposure	Breast Redness/Tenderness
	Foreign Body	Removal Staples/Sutures
	Laceration/Puncture	Rule Out Infection
	Localized Swelling/Redness	Spontaneous Bruising
	Lumps, Bumps, Calluses	Wound Check
	Other Skin Conditions	
	Substance Misuse	Substance Withdrawal
Overdose Ingestion		
Trauma	Isolated Abdominal Trauma – Blunt	Isolated Chest Trauma – Penetrating
	Isolated Abdominal Trauma – Penetrating	Major Trauma – Blunt
	Isolated Chest Trauma – Blunt	Major Trauma – Penetrating
UNKNOWN/Environmental	UNKNOWN	Frostbite/Cold Injury
	Chemical Exposure	Noxious Inhalation
	Electrical Injury	

A total of 5742 ER presentations were analyzed for March 1- June 30, 2020 (early pandemic period) in comparison to 7408 ER presentations for March 1- June 30, 2019 (comparison period). Figure 1 shows monthly ER presentations for both the early pandemic period and the comparison period. Overall, all months in the early pandemic period showed a decrease in the total number of ER presentations when compared to the comparison period with the month of April 2020 showing the greatest decrease (see Table 2.).

Impact of the COVID-19 Pandemic on Emergency Department Presentations & Acuity at Boundary Trails Health Centre

FIGURE 1. Monthly total number of ER visits at BTHC, during March 1 – June 30 of 2019 (comparison period) and March 1 – June 30 of 2020 (early pandemic period).

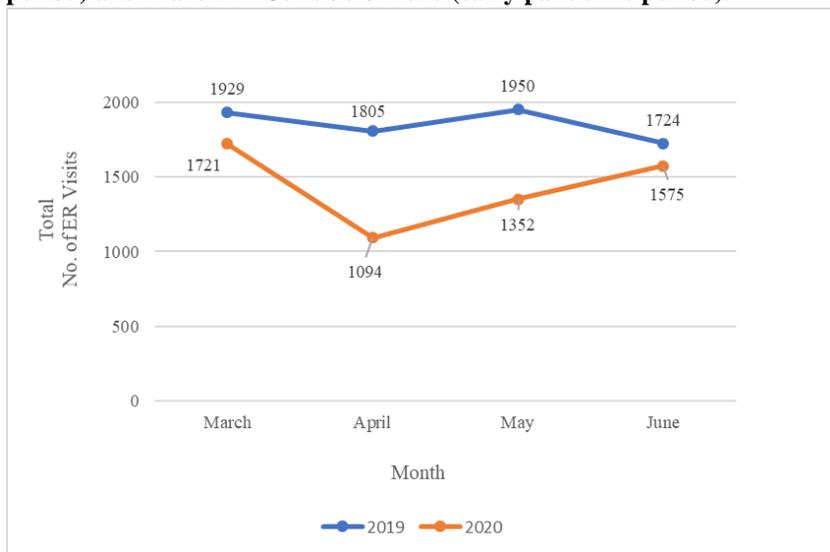


TABLE 2. Monthly total number of ER visits at BTHC and percent change, during March 1 – June 30 of 2019 (comparison period) and March 1 – June 30 of 2020 (early pandemic period). Negative numbers reported in the ‘Change in Total No. of Visits’ row indicate a decrease in total number of visits.

Month	March	April	May	June
Total No. of Visits in 2020	1721	1094	1352	1575
Total No. of Visits in 2019	1929	1805	1950	1724
Change in Total No. of Visits	-208	-711	-598	-149
Percent Change in No. of Visits	-10.8	-39.4	-30.7	-8.6

A one-tailed t-test was conducted to examine the difference in mean number of monthly ER presentations in March 1- June 30, 2020 (early pandemic period) when compared to March 1-June 30, 2019 (comparison period). The null hypothesis was that there was no statistically significant difference in the mean number of monthly ER presentations at BTHC for the two time periods. A one-tailed t-test was chosen as we already knew there was a decrease in mean number of monthly presentations in the early pandemic period and were only concerned with determining if this difference was statistically significant. The results of this test, summarized in Table 3, showed a p-value of 0.02 (less than $\alpha=0.05$) for the difference in mean number of monthly ER presentations in the early pandemic period when compared to the comparison period. Therefore, the null hypothesis was rejected.

TABLE 3. One-tailed t-test results comparing mean total number of monthly ER visits at BTHC in March 1-June 30, 2019 (comparison period) and March 1-June 30, 2020 (early pandemic period). (Null Hypothesis: There is no difference in the mean number of monthly ER visits for the comparison and early pandemic period.) The sample size was 4 and $\alpha=0.05$.

Time Period	Mean Monthly No. of ER Visits	t-cal	t-crit	df	p
March 1 – June 30, 2019	1852	2.837	2.132	4	0.02
March 1 – June 30, 2020	1435.5				

Impact of the COVID-19 Pandemic on Emergency Department Presentations & Acuity at Boundary Trails Health Centre

Similarly, a one-tailed t-test was also conducted to compare the mean number of monthly ER visits for each diagnostic category for the early pandemic period and comparison period. The null hypothesis was that there was no statistically significant difference in the mean number of monthly presentations for the early pandemic and comparison time periods. A one-tailed t-test was chosen as we already knew there was a decrease in mean number of monthly presentations for each diagnostic category in the early pandemic period and were only concerned with determining if this difference was statistically significant. The results of this test are shown in Table 4. Though most of the diagnostic categories did not show a significant difference in mean number of monthly ER presentations in the early pandemic period, the following three diagnostic categories showed a statistically significant decrease in mean number of monthly ER presentations in the early pandemic period: ENT, Gastrointestinal, and Neurologic.

TABLE 4. One-tailed t-test results comparing mean number of monthly ER visits for each diagnostic category in 1-June 30, 2020 (early pandemic period) and March 1- June 30, 2019 (comparison period) and March. (Null Hypothesis: There is no difference in the mean number of monthly ER visits for each diagnostic category for the comparison and early pandemic period.) For test, sample size was 4 and $\alpha=0.05$. Tests in which the difference in means was statistically significant have been highlighted in yellow.

Diagnostic Category	Mean Monthly No. of ER Visits 2019	Mean Monthly No. of ER Visits 2020	t-cal	t-crit	df	p	Decision
Cardiovascular	154.25	129	1.701	1.943	6	0.07	Fail to Reject H_0
ENT	111.5	71.5	2.690	2.132	4	0.03	Reject H_0
Gastrointestinal	266.5	182.25	8.769	2.015	5	0.0002	Reject H_0
General & Minor	239.25	208.5	0.950	2.132	4	0.20	Fail to Reject H_0
Genitourinary	65.25	60.25	0.492	1.943	6	0.32	Fail to Reject H_0
Mental Health	49.25	43.75	0.889	2.015	5	0.21	Fail to Reject H_0
Neurologic	138.25	98.5	4.440	1.943	6	0.002	Reject H_0
OB/GYN	44.75	42	0.438	1.943	6	0.34	Fail to Reject H_0
Ophthalmology	33.75	25.25	1.787	1.943	6	0.06	Fail to Reject H_0
Orthopedic	334.5	273.5	2.201	2.132	4	0.05	Fail to Reject H_0
Respiratory	165.75	110.25	1.116	2.132	4	0.16	Fail to Reject H_0
Skin	192.75	154.5	1.447	2.132	4	0.11	Fail to Reject H_0
Substance Misuse	16.75	11.75	1.736	2.353	3	0.09	Fail to Reject H_0
Trauma	15.5	12.25	0.966	2.132	4	0.19	Fail to Reject H_0
UNKNOWN/ Environmental	24	12.5	1.205	2.132	4	0.15	Fail to Reject H_0

Abbreviations: df = degrees of freedom

In addition, the change in total number of ER presentations in the early pandemic period compared to the comparison period was calculated for each diagnostic category. The results of this calculation showed decreases in total number of ER presentations for every diagnostic category (Table 3). The prevalence ratio for each diagnostic category was calculated to determine if the change in prevalence of each diagnostic category among ER presentations at BTHC was statistically significant. The null hypothesis was that there is no difference in the prevalence of each diagnostic category among presentations to the ER in the early pandemic period when compared to the comparison period. The confidence interval chosen was 95%. The results of the prevalence ratio calculations are summarized in Table 3. A total of five out of 15 diagnostic categories showed a statistically significant difference in

Impact of the COVID-19 Pandemic on Emergency Department Presentations & Acuity at Boundary Trails Health Centre

prevalence among ER presentations in the early pandemic period: ENT, Gastrointestinal, General & Minor, Genitourinary, and Respiratory.

TABLE 3. Change in total number of ER visits at BTHC for each diagnostic category and prevalence ratios comparing the proportion of ER visits in each diagnostic category for March 1- June 30, 2020 (early pandemic period) when compared to March 1-June 30, 2019 (comparison period).

Diagnostic Category*	Change in No. of ER Visits ^A	Prevalence Ratio (95% CI) [¶]	Outcome
Cardiovascular	-101	1.08 (0.97 – 1.19)	Not Significant
ENT	-160	0.83 (0.68 – 0.97)	Statistically significant
Gastrointestinal	-337	0.88 (0.79 – 0.97)	Statistically significant
General & Minor	-123	1.12 (1.04 – 1.21)	Statistically significant
Genitourinary	-20	1.19 (1.02 – 1.36)	Statistically significant
Mental Health	-22	1.15 (0.95 – 1.37)	Not Significant
Neurologic	-159	0.92 (0.79 – 1.04)	Not Significant
OB/GYN	-11	1.21 (1.00 – 1.42)	Not Significant
Ophthalmology	-34	0.97 (0.71 – 1.22)	Not Significant
Orthopedic	-244	1.05 (0.98 – 1.13)	Not Significant
Respiratory	-222	0.86 (0.74 – 0.97)	Statistically significant
Skin	-153	1.03 (0.93 – 1.13)	Not Significant
Substance Misuse	-20	0.91 (0.53 – 1.28)	Not Significant
Trauma	-13	1.02 (0.64 – 1.39)	Not Significant
UNKNOWN/Environmental	-47	0.66 (0.32 – 1.00)	Not Significant

Abbreviations: CI = confidence interval.

*Analysis was limited to the diagnostic categories generated automatically by IBM® Cognos Analytics and Southern Health's electronic document information system.

^AChange in number of ER visits calculated as the following: [visits in diagnostic category {early pandemic period}] – [visits in diagnostic category {comparison period}]. Negative results indicate a decrease in total number of visits in the early pandemic period for the corresponding diagnostic category when compared to the comparison period.

[¶]Ratio calculated as the following: [visits in diagnostic category {early pandemic period}/all ER visits {early pandemic period}] / [visits in diagnostic category {comparison period} /all ER visits {comparison period}]. Highlighted diagnostic categories include statistically significant prevalence ratio findings since the null (PR = 1) is not included.

Lastly, the total number of ER presentations at BTHC for which acuity level was available, were examined. A total of 5692 ER presentations during the early pandemic period and 7312 ER presentations during the comparison period fit this criterion. As shown in Figure 2, there was a decrease in the total number of ER presentations in each acuity level designation during the early pandemic period. The prevalence ratio for each acuity level designation was calculated to determine if the change in prevalence of ER presentation acuity during the pandemic period was statistically significant. The null hypothesis was there is no difference in the prevalence of each acuity level designation among presentations to the ER in the early pandemic period when compared to the comparison period. The confidence interval chosen was 95%. The results of the prevalence ratio calculations are summarized in Table 4. CTAS Levels 1, 2, and 4 did not show statistically significant differences in prevalence during the pandemic period compared to the comparison period. However, CTAS Level 3 showed statistically significant decrease in prevalence among ER presentations during the pandemic period. In addition, CTAS Level 5 showed statistically significant increase in prevalence among ER presentations during the pandemic period.

Impact of the COVID-19 Pandemic on Emergency Department Presentations & Acuity at Boundary Trails Health Centre

FIGURE 2. Total number of ER presentations at BTHC by Canadian Triage and Acuity Scale (CTAS) Acuity Level during March 1 to June 30, 2020 (early pandemic period) and March 1 to June 30, 2019 (comparison period).

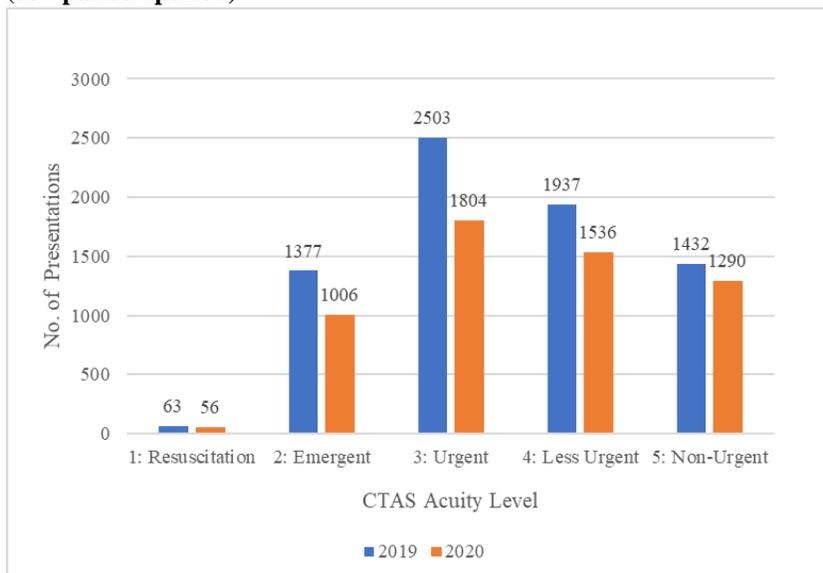


TABLE 4. Change in total number of ER presentations classified under each CTAS Acuity Level and prevalence ratios comparing the proportion of ER visits in each acuity level for March 1- June 30, 2020 (early pandemic period) when compared to March 1-June 30., 2019 (comparison period).

CTAS Acuity Level*	Change in Total No. ^A	Prevalence Ratio (95% CI) [†]	Outcome
1: Resuscitation	-7	1.14 (0.78 – 1.50)	Not Significant
2: Emergent	-371	0.94 (0.86 – 1.01)	Not Significant
3: Urgent	-699	0.92 (0.88 – 0.98)	Statistically Significant
4: Less Urgent	-401	1.02 (0.96 – 1.08)	Not Significant
5: Non-Urgent	-142	1.16 (1.09 – 1.16)	Statistically Significant

*Analysis was limited to the ER presentations for which CTAS acuity was available. The total number of ER presentations analyzed were 5692 for March 1-June 30, 2020 (early pandemic period) and 7312 for March 1- June 30, 2019 (comparison period).

^AChange in total number of ER visits for each acuity level were calculated as the following: [visits in acuity level {early pandemic period}] – [visits in acuity level {comparison period}]. Negative results indicate a decrease in total number of visits classified under the corresponding acuity level in the early pandemic period when compared to the comparison period.

[†]Ratio calculated as the following: [number of presentation in acuity level {early pandemic period}/all visits with designated acuity level {early pandemic period}] / [number of presentation in acuity level {comparison period} / all visits with designated acuity level {comparison period}]. Highlighted acuity levels include statistically significant prevalence ratio findings since the null (PR = 1) is not included.

Impact of the COVID-19 Pandemic on Emergency Department Presentations & Acuity at Boundary Trails Health Centre

DISCUSSION

Overall, during the early pandemic period, there was a statistically significant decrease in ER presentations during each month of the early pandemic period when compared to the comparison period. Across these four months, April 2020, the month following the declaration of the Emergency Measures Act, showed the largest relative decrease in presentations of 39.4%. These findings are consistent with the results of other preliminary studies examining the possible indirect effects of COVID-19 on ER volumes. For example, multiple studies conducted in the United States of America have demonstrated 42% decreases in the number of ER visits when compared to 2019.^{7,8} However, although the results of our study are statistically significant, we can not conclude that the changes in ER presentation volumes are attributable to the pandemic, due to lack of data spanning multiple years and healthcare facilities which would account for broader trends and inter-year variability in the region the hospital serves. Nonetheless, the short time interval between the confirmation of the first cases of COVID-19 in Manitoba on March 12th 2020,³ as well as the enactment of the Emergency Measures Act on March 20th 2020,⁴ correlate quite well to the significant relative decrease in the volume of ER presentations observed during the early pandemic period. Therefore, it is not unreasonable to speculate that the public might have been more reluctant to access emergency health care services during the global pandemic. Further study would need to be conducted to truly appreciate the impact of COVID-19 related factors, including the fear of virus exposure and public health recommendations to stay home, on ER volumes.

When expanding the ER presentations into different diagnostic categories, the results showed a decrease in the mean monthly number of ER visits during the early pandemic period in every diagnostic category. However, only ENT, Gastrointestinal, and Neurologic presentations showed statistically significant decreases in mean monthly number of ER visits following the conduction of a one-tailed t-test. The statistically significant decrease in mean monthly number of ER visits for Neurologic presentations was of particular interest as this diagnostic category included presentations of cerebral vascular accidents and transient ischemic attacks. Other studies in the United States of America have shown statistically significant decreases in ER visits for life-threatening conditions, including stroke and myocardial infarction, and have determined this short-term decline to be biologically implausible.^{7,8} However, we are unable to draw conclusions regarding the causes of the observed statistically significant decrease in mean number of monthly Neurologic presentations during the early pandemic period due to our limited sample size and study time interval. Further study would be needed to determine if this decrease may be the result of an inability to access or the avoidance to seek emergency healthcare services during the pandemic.

Analysis of the prevalence of the different diagnostic categories revealed a statistically significant decrease during the early pandemic period compared to the comparison period in three categories: ENT, Gastrointestinal, and Respiratory. This result was surprising as many of the COVID-19 symptoms, including cough, fever, sore throat, and diarrhea,⁹ would be categorized under the ENT, Gastrointestinal, and Respiratory diagnostic categories. As the COVID-19 community screening site in Winkler was only opened on March 25th 2020,¹⁰ we would have expected the emergency department at BTHC to have an increase in the prevalence of these three diagnostic categories as there would have been no other formal testing site available during the first few weeks of the early pandemic period. Further study would need to examine the volume of presentations falling under these diagnostic categories at the Urgent Care Centre in Winkler to determine if changes observed at that facility could help explain the decreases observed in the emergency department at BTHC.

While three diagnostic categories demonstrated statistically significant decreases in prevalence, two diagnostic categories demonstrated statistically significant increases in prevalence: General & Minor

Impact of the COVID-19 Pandemic on Emergency Department Presentations & Acuity at Boundary Trails Health Centre

and Genitourinary. Since the General & Minor diagnostic category includes presentations for fever and communicable disease exposure, it is possible the slight increase in prevalence observed during the early pandemic period can be explained by patients presenting to the ER for COVID-19 testing. Further study would be needed to determine this more accurately.

When analysing ER presentations by CTAS acuity level, there was an overall absolute decrease in the five acuity levels during the early pandemic period compared to the comparison period. Calculating prevalence ratios only showed a statistically significant change in 'Level 3: Urgent' and 'Level 5: Non-Urgent'. 'Level 3: Urgent' presentations were 0.92 times less prevalent and 'Level 5: Non-Urgent' presentations were 1.16 times more prevalent during the early pandemic period. This is a surprising finding, as it would be reasonable to expect non-urgent presentations to decrease in prevalence as the public would reconsider accessing ER services for non-urgent complaints during a global pandemic while more urgent complaints would increase in prevalence. Further study would be needed to determine if the statistically significant, albeit small, decrease in 'Level 3: Urgent' presentations may be the result of an inability to access or the avoidance to seek emergency healthcare services during the pandemic. In addition, further study would be needed to determine the cause of the statistically significant, albeit small, increase in prevalence of 'Level 5: Non-Urgent' presentations.

The analyses performed in this study were limited by a lack of data from the emergency department at BTHC spanning several years. Only having access to data from two different time periods to make comparisons limits the conclusions that we are able to draw, as it is not possible to analyze underlying trends or inter-year variability from such a small pool of data. Having data spanning the same time period across 5 or more years for example would allow us to have a more in depth look at the year to year change in the ER and thus truly demonstrate if the early pandemic period was an outlier in terms of volume, prevalence of different categories, and acuity of presentations.

CONCLUSIONS/RECOMMENDATIONS

As the data demonstrates, the volume of ER presentations at BTHC decreased during the early pandemic period when compared to the comparison period. As an extension of this decrease in total ER presentation volume, the presentation volume within each diagnostic category as well as each acuity level saw a decrease when compared to the same time period in 2019.

Upon further statistical analysis, only ENT, Gastrointestinal, and Neurologic complaints had a statistically significant decrease in mean monthly number of ED visits during the early pandemic period. The prevalence of ENT, Gastrointestinal, Respiratory visits had a statistically significant decrease in the early pandemic period. Meanwhile, Genitourinary and General & Minor complaints increased in prevalence during the early pandemic period. Therefore, although the absolute number of monthly visits within each diagnostic category decreased, the number of visits falling under the ENT, Gastrointestinal, and Respiratory categories decreased by a higher degree in proportion to other categories while the number of visits falling under the categories of General & Minor and Genitourinary decreased by a lesser degree in proportion to other categories, resulting in an overall increase in prevalence.

'Level 3: Urgent' presentations had a statistically significant decrease in prevalence, while 'Level 5: Non-Urgent' presentations had a statistically significant increase in prevalence. Further studies would need to examine this finding in more detail to ensure that patients are not avoiding or delaying

Impact of the COVID-19 Pandemic on Emergency Department Presentations & Acuity at Boundary Trails Health Centre

seeking emergency healthcare services during the pandemic and to help guide future patient education efforts regarding when to present for emergency healthcare services.

We can speculate that these findings are in part due to the COVID-19 pandemic inflicting a reluctance on the general public from accessing emergency healthcare services. However, as stated before, due to the lack of data accounting for overall ER trends and inter-year variability at the emergency department of BTHC, we are unable to completely attribute these findings to the COVID-19 pandemic specifically.

ACKNOWLEDGEMENTS

We would like to thank Dr. Kevin Earl from Agassiz Medical Centre for his advice, consultation, and editorial input. We would also like to thank Chevonne Bell, Charlene Klassen, and Shelley Emerson from Southern Health-Sante Sud for their help in data compilation and acquisition. We would also like to thank Dr. Robert Chase from the University of Manitoba's Department of Community Health Sciences for his guidance during the data analysis process. Lastly, we would like to thank all of the staff at C. W. Wiebe Medical Centre and Agassiz Medical Centre for their involvement with the Home for the Summer Program and in their continued dedication to student mentorship.

REFERENCES

1. Ahn D-G, Shin H-J, Kim M-H, et al. Current Status of Epidemiology, Diagnosis, Therapeutics, and Vaccines for Novel Coronavirus Disease 2019 (COVID-19). *J Microbiol Biotechnol*. 2020;30(3):313-324. doi:10.4014/jmb.2003.03011
2. Boynton S. Canada's coronavirus cases pass 120,000 as global total reaches 20 million. *Global News*. <https://globalnews.ca/news/7264520/canada-coronavirus-august-20/>. Published August 11, 2020.
3. Government of Manitoba. *NOVEL CORONAVIRUS (COVID-19) BULLETIN #8*. Winnipeg; 2020. <https://news.gov.mb.ca/news/?archive=&item=46930>.
4. Government of Manitoba. State of Emergency. COVID-19 Novel Coronavirus. <https://www.gov.mb.ca/covid19/soe.html>. Published 2020. Accessed July 15, 2020.
5. Kives B. Manitobans quickly got the message to go home. Now, prepare to stay there. *CBC News*. <https://www.cbc.ca/news/canada/manitoba/manitoba-covid19-analysis-pandemic-1.5506183>. Published March 23, 2020.
6. Masroor S. Collateral damage of COVID-19 pandemic: Delayed medical care. *J Card Surg*. 2020;35(6):1345-1347. doi:10.1111/jocs.14638
7. Lange SJ, Ritchey MD, Goodman AB, et al. Potential Indirect Effects of the COVID-19 Pandemic on Use of Emergency Departments for Acute Life-Threatening Conditions - United States, January-May 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(25):795-800. doi:10.15585/mmwr.mm6925e2
8. Hartnett KP, Kite-Powell A, DeVies J, et al. Impact of the COVID-19 Pandemic on

Impact of the COVID-19 Pandemic on Emergency Department Presentations & Acuity at Boundary Trails Health Centre

Emergency Department Visits - United States, January 1, 2019-May 30, 2020. *MMWR Morb Mortal Wkly Rep.* 2020;69(23):699-704. doi:10.15585/mmwr.mm6923e1

9. Rodriguez-Morales AJ, Cardona-Ospina JA, Gutiérrez-Ocampo E, et al. Clinical, laboratory and imaging features of COVID-19: A systematic review and meta-analysis. *Travel Med Infect Dis.* 2020;34:101623. doi:10.1016/j.tmaid.2020.101623
10. Lefebvre C. Winkler to get COVID-19 testing site. *CTV News Winnipeg.* <https://winnipeg.ctvnews.ca/winkler-to-get-covid-19-testing-site-1.4866653>. Published March 24, 2020.