Characteristics and outcomes of family practice patients with COVID-19: A case series from Montreal

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Case Report

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Abstract

Background: The clinical history and outcomes of COVID-19 among people not hospitalized is not yet well characterized. To better inform clinical evaluation, we set out to characterize the natural history of COVID-19 in primary health care.

Methods: Case series of all patients rostered to physicians at a university-affiliated Family Medicine clinic. Cases met the Center for Disease Control (CDC) definition of COVID-19 disease.

Results: 89 patients meeting CDC criteria for COVID-19 disease were documented from March 1 to May 21, 2020. Their average age was 55.6 (range 6 to 95) years, and all but one was symptomatic. 57 cases (64%) had a polymerase chain reaction (PCR) test for COVID-19, of whom 77.2% tested positive. 30 cases (33.7%) reported contact with a confirmed or probable case of COVID-19. Based on the Charlson Comorbidity Index, 28 (31.5%) cases had no comorbid conditions. The median number of days from symptom onset to first PCR test was 6 days [Interquartile range 2.3 to 11 days]. The median duration of fever was 3.5 days [Interquartile range 1 to 7 days]. 24 cases (27%) visited the Emergency Department (ED) and 10 were admitted to hospital. The median number of days between symptom onset and first ED visit was 8 days [Interquartile range 3.5 to 27 days].

Conclusions: At the start of this pandemic, the implementation of basic public health measures such as diagnostic testing and contact tracing were delayed. If we are to improve our control over the spread of COVID-19, we will need to substantially reduce the time from symptom onset to diagnostic testing, and subsequent contact tracing. To minimize unnecessary ED visits, we propose a testable strategy for Family Medicine to engage with COVID-19 patients in the acute phase of their illness.

Background

The novel SARS-CoV-2 coronavirus emerged in late 2019, and rapidly became a worldwide threat. As of early-October 2020, the province of Quebec had 81,000 confirmed cases and 5,900 deaths. Montreal had almost half of these cases, making it an epicenter of COVID-19 in Canada.

In Quebec, the COVID-19 Biobank has restricted data collection to more severely ill patients in hospital[1]. However, individuals with COVID-19 who are not severely ill do sometimes present for primary healthcare.

To our knowledge, there is no case series of people presenting to family doctors to describe the course of COVID-19 in the community setting. Hence, we have limited information on the natural history of these cases. We conducted this study to better understand the clinical course of these cases to enable clinicians in primary health care to better evaluate and counsel their patients.

Methods

Study design

Case series of all patients rostered to physicians at the Herzl Family Practice Centre in Montreal. The Herzl Centre is a McGill University-affiliated Family Medicine Group Practice with approximately 31, 000 registered patients.

Aims/Objectives

Our primary aim was to describe the natural history of COVID-19 in patients followed in a family practice outpatient setting. Second, we wished to describe these cases with enough detail to allow others to make comparisons with their own practice.

Inclusion criteria

Our sampling frame was restricted to patients registered to any physician at the Family Practice Centre. For this study, we used the case definition of COVID-19 disease proposed by the CDC[2].

Data collection

We identified cases in a search of the clinics' electronic medical record. Our search was done on May 21, 2020 for keywords in the problem/diagnosis field. Relevant keywords were those related to Coronavirus (Additional File 1). From this search, we generated our case list by following the steps in Figure 1.

We then performed a chart review in which clinical information on each case was extracted and scrutinized. If a patient had reportedly visited the ED, we verified this information in the medical records of the acute care hospital attached to the clinic. No patients were interviewed.

Two of us undertook data extraction independently. This involved a search for information on variables such as comorbid conditions as defined by the Charlson Comorbidity index[3]. We sought inconsistencies in our extracted data during two review meetings. Disagreements were then resolved by discussion.

Data Analysis

We used descriptive statistics to characterize cases based on the following variables: Sex, age, PCR testing, number of days between symptom onset and PCR testing, contact type, number of days between symptom onset and any ED visit, any hospitalization, medication prescribed for COVID-19 in the outpatient setting, and comorbidities based on the Charlson Comorbidity Index. We reported event rates as proportions and described continuous variables using frequency counts and measures of central tendency. No analyses for statistical significance were performed given the descriptive nature of this study.

Results

Demographics: By sex, Table 1 describes the age, presence of symptoms, height and weight of our cases. Symptoms were reported in all but one of our cases. In figure 2, we further describe cases in a frequency distribution of their age.

Table 1: Demographics			
	Total (89)	Male (39)	Female (50)
# of cases	89	39	50
Symptoms (any)	88	39	49
Asymptomatic PCR+	1	0	1
Average age (years)	55.6	57.5	54.1
Average Height (m)	1.61	1.69	1.53
Average Weight (kg)	76.5	82.4	71.5
N.B.:			
Height data available for 33 cases			
Weight data available for 68 cases			

PCR Testing: Of the 89 cases, 64% had a PCR test for COVID-19. 77.2% tested positive, 19.3% tested negative, and 3.5% had no PCR test result in the chart (Table 2). Among cases who were tested, we were interested in knowing the following: how soon cases went to get PCR testing following the onset of symptoms, how many days it took for cases to become negative based on a follow up PCR test, and how many days of fever cases experienced during their illness. Given the time from symptom onset to PCR testing was a median 6 days and this variable was not normally distributed, we further describe this distribution in 7-day bands in Figure 3.

Table 2: Diagnostic testing and duration of fever			
	Total (89)	Male (39)	Female (50)
PCR test result (n)	64.0% (57)	66.7% (26)	62.0% (31)
% positive	77.2% (44)	84.6% (22)	71.0% (22)
% negative	19.3% (11)	11.5% (3)	25.8% (8)
% missing result	3.5% (2)	3.9% (1)	3.2% (1)
Symptom onset->PCR (days)			
MIN	1	-	-
25 th %ile	2.25	-	-
Median	6	-	-
75 th %ile	11	-	-
MAX	111	-	-
PCR POS->PCR NEG (days)			
MIN	12	-	-
25 th %ile	18	-	-
Median	29	-	-
75 th %ile	43	-	-
MAX	73	-	-
Fever (days)			
MIN	1	-	-
25 th %ile	1	-	-
Median	3.5	-	-
75 th %ile	7	-	-
MAX	22	-	-
N.B.: Symptom onset->PCR test: Data available for 42 cases POS->NEG test: Data available for 12 cases Fever: Data available for 60 cases			

Hospital-based services: Though our focus was on outpatient family practice, we also wanted to know about the use of hospital-based health services. Of 89 cases, 24 (27%) visited the emergency department (ED), where the median number of days between symptom onset and ED visit was 8 days (Table 3). 10 (11%) of the 89 cases were hospitalized, where one case died (Table 3). Compared to cases who did not obtain diagnostic testing, cases who were PCR tested were also more likely to seek medical care in the ED.

Table 3: Emergency Department Visits and Hospitalization			
	Total (89)	Male (39)	Female (50)
Cases with ED visit % (n)	27.0% (24)	33.3% (13)	22.0% (11)
Cases with ED visit who were PCR tested % (n)	22.5% (20)	25.6% (10)	20.0% (10)
PCR + % (n)	80% (16)	100% (10)	60% (6)
PCR - % (n)	15% (3)	0% (0)	30% (3)
PCR result missing % (n)	5% (1)	0% (0)	10% (1)
Cases with ED visit who were not PCR tested % (n)	4.5% (4)	7.7% (3)	2% (1)
Symptom onset -> ED visit (days)			
25 th %ile	3.5	-	-
Median	8	-	-
75 th %ile	26.5	-	-
Hospitalized cases % (n)	11.2% (10)	15.4% (6)	8.0% (4)
Deaths	1	0	1

Patient contact type: Given the importance of contact tracing, we examined the forms of contact reported by cases with individuals in the community who may have infected them. In figure 4, we describe six forms of contact inspired by CDC epidemiologic criteria for COVID-19.

Treatment: In 38 cases, medications were prescribed. These were antibiotics, hydroxychloroquine, and corticosteroids (oral, inhaled or intravenous) (Table 4).

Table 4: Drug Treatment	
	Prescriptions (N=38 unique patients)
Antibiotics	25*
Hydroxychloroquine	10
Steroids (oral/inh/IV)	9
*21 of 25 received Azithromycin	

Comorbidity: Finally, given how pre-existing health conditions can influence patient outcomes in the context of COVID-19, we characterized cases according to the Charlson Comorbidity Index and plotted the distribution of their Charlson score in Figure 5.

Discussion

We conducted this case series to better understand the clinical course of COVID-19 in the community, and in so doing, to help clinicians better counsel patients and families about what to expect regarding this disease. To our knowledge, as of August 19, 2020, no case series exists on the natural course of COVID-19 in the community setting in the context of family practice. We confirmed this gap in the literature when, aided by an academic librarian, we systematically searched for case series and found no similar study. Other work has revealed associations between comorbid conditions and mortality[4], as well as predictors of ICU admission for COVID-19[5].

Among 89 cases of COVID-19 who were known to a family physician team, almost all were symptomatic. This finding is expected, as acutely infected but asymptomatic people do not typically seek medical attention. 64% of cases had a PCR test for COVID-19 and 77.2% tested positive. The median number of days from symptom onset to obtaining a PCR test was 6 days. When it takes 6 days to get a COVID-19 test, patients may already be well past their peak infectiousness. In a study by Lavezzo et al., COVID-19 cases had an infectious period, as measured by viral load, of 3.6 days to 6.5 days, with infectiousness peaking on the day of symptom onset[6]. An urgent need exists for innovative testing strategies such as saliva collection to enable earlier identification of cases[7].

The COVID-19 infection is often compared to influenza-like illness. In one review of the clinical course of influenza, fever was observed in 34.9% of individuals[8]. By comparison, in our study of COVID-19 cases, fever was observed in 67.4% of individuals. Whereas this aforementioned review included studies of healthy volunteers with objectively measured fever, our series focused on a chart review of patients in family practice whose fever was not objectively measured[8]. A second review looked at the natural history of human influenza and found that fever was reported in 84.7% of confirmed cases of A(H1N1)[9].

In this review, fever was “reported to last approximately 5 days”[10]. In comparison, among our 60 cases who were symptomatic with fever, this symptom lasted for a median of 3.5 days [Interquartile range 1-7].

A response strategy in Family Medicine? About one quarter of our cases visited the ED, which was objectively verified through scrutiny of medical records early in the pandemic. Cases presented to the ED after a median of 8 days following symptom onset. Cases who underwent PCR testing were also more likely to visit the ED. This can be understood given that at the time of this study, in-person office visits were not available for people with suspected or confirmed COVID-19.

To minimize unnecessary ED visits for this disease, we encourage further research on the effect of more intensive care in the primary care setting. Imagine if early in the disease, a family physician referred their patient for testing to reduce the chance of community spread. Then, for confirmed or suspected cases, follow up could be provided for example at days 3, 5 and 7 days from symptom onset and remote monitoring could be done as per the adult primary care COVID-19 assessment pathway[11]. The purpose of closer follow up would be to assess for symptoms such as dyspnea at rest, as well as to obtain a measurement of oxygen saturation with a pulse oximeter that could be delivered to patients’ homes. For patients without hypoxia, reassurance to remain at home would be indicated. For those with an oxygen saturation of ≤ 94 percent on room air, an in-person evaluation or admission through the ED would then be warranted[12].

Limitations. A CDC study found about 10 times as many people have been exposed to the novel coronavirus than are reported as cases[13]. While we set out to describe the natural history of COVID-19 disease in patients followed in family practice, asymptomatic cases were not included as well as cases who sought urgent care at other sites and did not inform their family doctor. Consequently, we likely underestimated the extent of ED use and hospitalization. Although we observed one death, we do not know how many cases eventually succumbed to their illness, as charts were reviewed in a cross-sectional manner.

Conclusion

At present, we know little about the illness experiences of people with COVID-19 in community settings. If we are to improve our performance with respect to basic public health interventions such as contact tracing, the time from symptom onset to PCR testing will need to be substantially reduced. An urgent need exists for innovative strategies for COVID-19 diagnostic testing, and for primary care interventions that are proven to enhance patient care.

List Of Abbreviations

COVID-19 = Coronavirus disease 2019

ED = Emergency Department

CDC = Center for Disease Control

PCR = Polymerase chain reaction

MIN = minimum

MAX = maximum

POS = positive

NEG = negative

Declarations

Ethics approval and consent to participate

Prior to data collection, our study protocol received approval from the Medical/Biomedical Research Ethics Committee of CIUSSS West-Central Montreal Research Ethics Board. We followed procedures for the respect and privacy of research participants. Under these conditions, no consent statement is required from de-identified patients for the publication of this manuscript. The document of approval from the Medical/Biomedical Research Ethics Committee (REC) of CIUSSS West-Central Montreal Research Ethics Board (REB) can be shared upon request.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request. If other case series come to our attention, we will attempt to pool our results in a systematic review or meta-analysis of case series. Prior to undertaking such additional work, we will recontact our Research Ethics Board to discuss a submission of an amendment, and any need for a Data Transfer Agreement.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

S.D. and O.R. performed data collection, chart reviews and drafted this manuscript with oversight from senior author (R.G.) who conceived of this study, drafted the protocol and obtained ethics approval.

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Figures

Figure 1

Case Identification

Figure 2

Age Distribution.

Figure 3

Distribution of days from symptom onset to PCR test

Figure 4

Case contact type

Figure 5

Distribution of Charlson Score

Supplementary Files

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- [AdditionalFile1covidkeywordssearch.jpg](#)
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