

A Physician's Viewpoint on COVID-19: Lessons Learned on the Front Lines at St. Michael's Hospital in Toronto

Canadian Veterinary Medical Association Update

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Outline COVID-19

- Transmission
 - Clinical Presentation
 - Epidemiology
 - Primary Care Frontline Perspective
 - Treatments
 - Vaccine Development
 - The Future
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Transmission of SARS-CoV-2 is largely by close person-to-person transmission.

- By respiratory droplets and by fomite. Virus found in respiratory secretions and saliva.
- Viral shedding by asymptomatic people may represent 25–50% of total infections.
 - Viral shedding may antedate symptoms by 1–2 days.
 - Viral titers are highest in the earliest phases of infection.
 - Aerosol spread could occur; thought to be mostly in hospital settings.
 - To date, there has not been a well-documented outbreak traced to aerosol transmission (e.g., through HVAC ventilatory systems or airplanes).



Transmission can be prevented in healthcare-settings.

Minimize risk of exposure

- Before arrival
- Upon arrival/during visit: implement source control measures immediately
 - Visual alerts
 - Supplies (hand hygiene, masks)
 - Screening for signs/symptoms
 - Physical separation from others
 - Single room with door closed (partitions, distance)
- Limit/restrict visitors, limit staff entering room.

Transmission can be prevented in healthcare-settings

Standard and transmission-based precautions

- Hand hygiene
- Equipment, environment cleaning and disinfection
- Personal protective equipment (PPE) for HCP
 - Droplet precautions (mask with eye protection)
 - Contact precautions (gown and gloves)
 - Aerosol-generating procedures: N95 respirator

Symptoms of Coronavirus (COVID-19)

Know the symptoms of COVID-19, which can include the following:



Symptoms can range from mild to severe illness, and appear 2-14 days after you are exposed to the virus that causes COVID-19.

***Seek medical care immediately if someone has emergency warning signs of COVID-19.**

- Trouble breathing
- Persistent pain or pressure in the chest
- New confusion
- Inability to wake or stay awake
- Bluish lips or face

This list is not all possible symptoms. Please call your medical provider for any other symptoms that are severe or concerning to you.

Who is at Risk?

- Individuals of all ages are at risk for infection and severe disease. However, the probability of fatal disease is highest in people aged ≥ 65 years and those living in a nursing home or long-term care facility.
- Others at highest risk for COVID-19 are people of any age with certain underlying conditions, especially when not well-controlled, including:
 - Hypertension
 - Cardiovascular disease
 - Diabetes
 - Chronic respiratory disease
 - Cancer
 - Renal disease
 - Obesity (especially in younger patients)

Laboratory and imaging findings

Lab/imaging finding	1,099 COVID-19 Cases
Any CXR abnormalities	59.1%
Any CT abnormalities	86.2%
WBC count (median (IQR))	4700 (3500-6000)
WBC count >10,000	5.9%
Lymphocyte count (median (IQR))	1000 (700-1300)
Lymphocytopenia <1500 per mm ³	83.2%
Thrombocytopenia < 150,000	36.2%
LDH >250 U/liter	41%
Procalcitonin elevated >0.5 ng/ml	5.5%
AST/ALT >40 U/liter	21-22%

Complications of COVID-19

80-90% of cases may not be severe-many cases will be asymptomatic

Complication
Septic shock
ARDS
Cytokine storm
Acute kidney injury-renal failure
Hypercoagulable state (DVT/PE/Stroke/MI)
Death



Royal College of
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27 April 2020

Guidance: Paediatric multisystem inflammatory syndrome temporally associated with COVID-19

Case definition:

1. A child presenting with persistent fever, inflammation (neutrophilia, elevated CRP and lymphopaenia) and evidence of single or multi-organ dysfunction (shock, cardiac, respiratory, renal, gastrointestinal or neurological disorder) with additional features (see listed in [Appendix 1](#)). This may include children fulfilling full or partial criteria for Kawasaki disease.
2. Exclusion of any other microbial cause, including bacterial sepsis, staphylococcal or streptococcal shock syndromes, infections associated with myocarditis such as enterovirus (waiting for results of these investigations should not delay seeking expert advice).
3. SARS-CoV-2 PCR testing may be positive or negative

Summary of cases of COVID-19: Ontario, January 15, 2020 to May 25, 2020

	Number	Percentage
Number of cases ¹	26,191	N/A
Change from previous report (new cases)	287	1.1% increase
Resolved ²	19,958	76.2
Subset of all cases that are reported to be long-term care residents ^{3,4,5}	4,892	18.7
Subset of all cases that are reported as a health care worker ^{4,5,6} associated with long-term care outbreaks	1,703	6.5
Total number of deaths ⁷	2,123	8.1
Deaths ⁷ reported for residents in long-term care homes ^{4,5,6}	1,335	62.9
Deaths ⁷ reported for health care workers ^{5,6,2} in long-term care homes	4	0.2
Demographics	N/A	N/A
Male	11,286	43.1
Female	14,679	56.0

Table 3. Confirmed cases (n=26,191) of COVID-19 by severity: Ontario, January 15, 2020 to May 25, 2020

	Number	Percentage
Cumulative deaths reported (please note there may be a reporting delay for deaths in iPHIS)	2,123	8.1
Change from previous report	21	1.0% increase
Deaths reported in ages: 19 and under	0	0.0
Deaths reported in ages: 20-39	8	0.1
Deaths reported in ages: 40-59	85	1.1
Deaths reported in ages: 60-79	553	10.3
Deaths reported in ages: 80 and over	1,477	27.9
Cumulative intensive care ¹	714	2.7
Cumulative hospitalized ¹	3,291	12.6
Number of resolved ² cases	19,958	76.2

¹ These refer to all hospitalized or ICU admitted cases, not cases that are currently hospitalized or in ICU.

² Cases that are 14 days past symptom onset (if available) or 14 days past the episode date are classified as resolved for non-fatal cases that are not currently listed as hospitalized. Cases are also classified as resolved if the case is reported as “recovered” in iPHIS.

Data Source: integrated Public Health Information System (iPHIS) database, Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).

The Primary Care Frontline experience at St. Michael's Hospital

- Avoidance of in person patient visits unless medically essential (10% of usual capacity), elective surgeries/procedures cancelled
 - Reduction in ER visits
 - Management on phone/telemedicine (OTN)-limitations
 - Redeployment: COVID Assessment Centre/Low acuity ER/Shelters/LTC
 - The limitations of PPE, testing, isolation
 - Patients fear of coming to clinic/ER-late presentations of medical issues such as stroke, MI, ruptured appendix
 - Fall out of undiagnosed/poorly managed issues such as cancer, heart disease, psychological issues (job loss, economic loss, isolation)
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Coronavirus Treatment Summary

- To date no specific drug/drug combo with proven efficacy against coronavirus
 - Mainstay is supportive management including advanced organ support for patients with severe disease
 - Both novel and repurposed therapies under investigation
 - Different therapies may be beneficial for different phases and presentations of COVID-19 illness
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Antivirals

- On the basis of preliminary clinical trial data, the COVID-19 Treatment Guidelines Panel (the Panel) recommends the investigational antiviral agent **remdesivir** for the treatment of COVID-19 in hospitalized patients with severe disease defined as SpO₂ ≤94% on ambient air (at sea level), requiring supplemental oxygen, mechanical ventilation, or extracorporeal membrane oxygenation (**BI**).
 - Remdesivir is not approved by the FDA. It is available through an FDA emergency use authorization, in clinical trials, or through an emergency access program for children and pregnant patients.
- The Panel **does not recommend remdesivir** for the treatment of mild or moderate COVID-19 outside of a clinical trial (**AIII**).
- The FDA advises against using **chloroquine** or **hydroxychloroquine** for the treatment of COVID-19 outside hospital setting/clinical trial (**AIII**)
- The Panel **recommends against** using high-dose chloroquine (600 mg twice daily for 10 days) for the treatment of COVID-19 (**AI**).
- Except in the context of a clinical trial, the Panel **recommends against** the use of the following drugs for the treatment of COVID-19:
 - The combination of **hydroxychloroquine plus azithromycin (AIII)** because of the potential for toxicities.
 - **Lopinavir/ritonavir (AI)** or **other HIV protease inhibitors (AIII)** because of unfavorable pharmacodynamics and negative clinical trial data.

Immune-Based Therapy

- There are insufficient data to recommend either for or against the use of **COVID-19 convalescent plasma** or **SARS-CoV-2 immune globulins** for the treatment of COVID-19 (**AIII**).
- The COVID-19 Treatment Guidelines Panel (the Panel) **recommends against** the use of **non-SARS-CoV-2-specific intravenous immune globulin (IVIG)** for the treatment of COVID-19, except in the context of a clinical trial (**AIII**). This should not preclude the use of IVIG when it is otherwise indicated for the treatment of complications that arise during the course of COVID-19.
- There are insufficient data to recommend either for or against the use of the following agents for the treatment of COVID-19 (**AIII**):
 - **Interleukin-1 inhibitors** (e.g., **anakinra**)
 - **Interleukin-6 inhibitors** (e.g., **sarilumab, siltuximab, tocilizumab**)
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Vaccines

- Over 100 candidates in development
 - Manufacturing and Distribution challenges
 - How will we prioritize?.... Front line workers, Elderly, Chronic conditions
 - Will they offer full protective immunity or more similar to Influenza vaccine?
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10 candidate vaccines in clinical evaluation

Platform	Type of candidate vaccine	Developer	Coronavirus target	Current stage of clinical evaluation/regulatory status-Coronavirus candidate	Same platform for non-Coronavirus candidates
Non-Replicating Viral Vector	Adenovirus Type 5 Vector	CanSino Biological Inc./Beijing Institute of Biotechnology	SARS-CoV2	Phase 2 ChiCTR2000031781 Phase 1 ChiCTR2000030906	Ebola
RNA	LNP-encapsulated mRNA	Moderna/NIAID	SARS-CoV2	Phase 2 (IND accepted) Phase 1 NCT04283461	multiple candidates
Inactivated	Inactivated	Wuhan Institute of Biological Products/Sinopharm	SARS-CoV2	Phase 1/2 ChiCTR2000031809	
Inactivated	Inactivated	Beijing Institute of Biological Products/Sinopharm	SARS-CoV2	Phase 1/2 ChiCTR2000032459	
Inactivated	Inactivated + alum	Sinovac	SARS-CoV2	Phase 1/2 NCT04383574 NCT04352608	SARS
Inactivated	Inactivated	Institute of Medical Biology , Chinese Academy of Medical Sciences	SARS-CoV2	Phase 1	
Non-Replicating Viral Vector	ChAdOx1-S	University of Oxford/AstraZeneca/Serum Institute of India	SARS-CoV2	Phase 1/2 NCT04324606	MERS, influenza, TB, Chikungunya, Zika, MenB, plague
Protein Subunit	Full length recombinant SARs CoV-2 glycoprotein nanoparticle vaccine adjuvanted with Matrix M	Novavax	SARS-CoV2	Phase 1/2 NCT04368988	RSV; CCHF, HPV, VZV, EBOV
RNA	3 LNP-mRNAs	BioNTech/Fosun Pharma/Pfizer	SARS-CoV2	Phase 1/2 2020-001038-36 NCT04368728	
DNA	DNA plasmid vaccine with electroporation	Inovio Pharmaceuticals	SARS-CoV2	Phase 1 NCT04336410	multiple candidates

Ford slams actions of 'reckless' people who packed into Trinity Bellwoods Park



Large crowds seen at Trinity Bellwoods Park on Saturday. (Beatrice Vaisman)

Ontario's COVID-19 test numbers continue to plummet as case count rises



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LOWEST RISK



HOME ALONE OR WITH HOUSEMATES

- Stay home as much as possible.
- Try to allow only people you live with into your home.
- Wash your hands.
- If you're sick, stay home and isolate from housemates.

MODERATE RISK



OUTDOOR ACTIVITIES

- Wash your hands and don't touch your face.
- Stay at least 6 feet from people you don't live with.
- Wear a mask.
- Avoid shared surfaces, like swings or benches.

HIGHER RISK



OUTDOOR GATHERINGS

- Wash your hands and don't touch your face.
- Stay at least 6 feet from people you don't live with.
- Wear a mask.
- Don't share food, toys, and other items, and avoid shared surfaces.
- Participate in events like these infrequently.

HIGHEST RISK



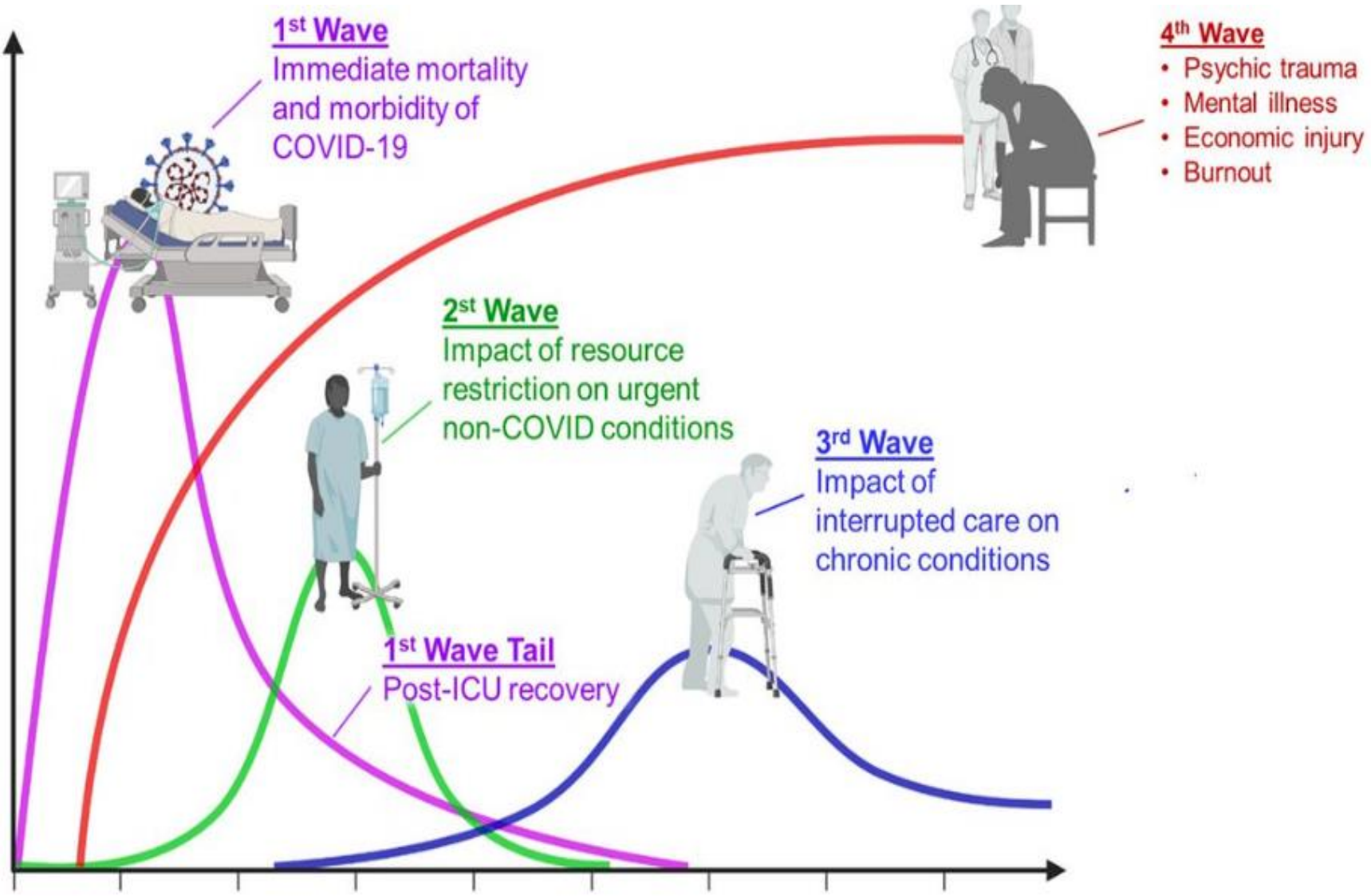
INDOOR GATHERINGS

- Wash your hands and don't touch your face.
- Stay at least 6 feet from people you don't live with.
- Wear a mask.
- Don't share food, toys, and other items, and avoid shared surfaces.
- Open windows for better ventilation.
- Try to avoid gathering indoors as much as possible.

Adapted from Julia Marcus, Harvard, and Eleanor Murray, Boston University

Vox

Health Footprint
of Pandemic



The Future

- More flexible work shifts/hours to allow fewer people working at once/patients in health care waiting rooms
 - Emphasis on Telemedicine/Phone Visits
 - Need to ensure adequate ongoing supply of PPE
 - Need for more aggressive testing/?role for antibody/serology testing
 - More employees will be working from home
 - Fewer large in person meetings/conferences/conventions/events
 - Less emphasis on work travel
 - Need to plan for future pandemics
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<https://www.who.int/emergencies/diseases/novel-coronavirus-2019>

<https://www.nih.gov/health-information/coronavirus>

<https://www.cdc.gov/coronavirus/2019-ncov/index.html>

<https://www.ontario.ca/page/how-ontario-is-responding-covid-19>

<https://www.toronto.ca/home/covid-19/>



Thank You!

