

Family Medicine Grand Rounds

November 4, 2020

COVID-19: Review of Current Epidemiology and Community Practice Management

Grand Rounds

Department of Family Medicine

Western University

November 4th, 2020

Scientific Planning Committee Disclosure

- **Faculty:** Dr. Stephen Wetmore
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- **Relationships with commercial interests:**
No conflicts of interest.

Disclosure of Commercial Support

- This program has received no in-kind support.
- This program has no financial support.

Potential for conflict(s) of interest:

No member of the planning committee has disclosed a potential conflict of interest.

Faculty/Presenter Disclosure

Faculty: Michael Payne, MD FRCPC

Relationships with commercial interests:

Grants/Research Support: N/A

Speakers Bureau/Honoraria: N/A

Consulting Fees: N/A

Other: N/A

Faculty/Presenter Disclosure

Faculty: Alexander Summers, MD MPH CCFP FRCPC

Relationships with commercial interests:

Grants/Research Support: N/A

Speakers Bureau/Honoraria: N/A

Consulting Fees: N/A

Other: N/A

Objectives

- Comprehend current epidemiology of COVID-19;
- Comprehend current evidence regarding COVID-19 transmission and infection control practices; and
- Comprehend the public health approach to Wave 2 of COVID-19 and implications for community practice.

The last time we did rounds was
8 months ago, to the day....

Mike and Alex on March 4...



Mike and Alex on November 4...

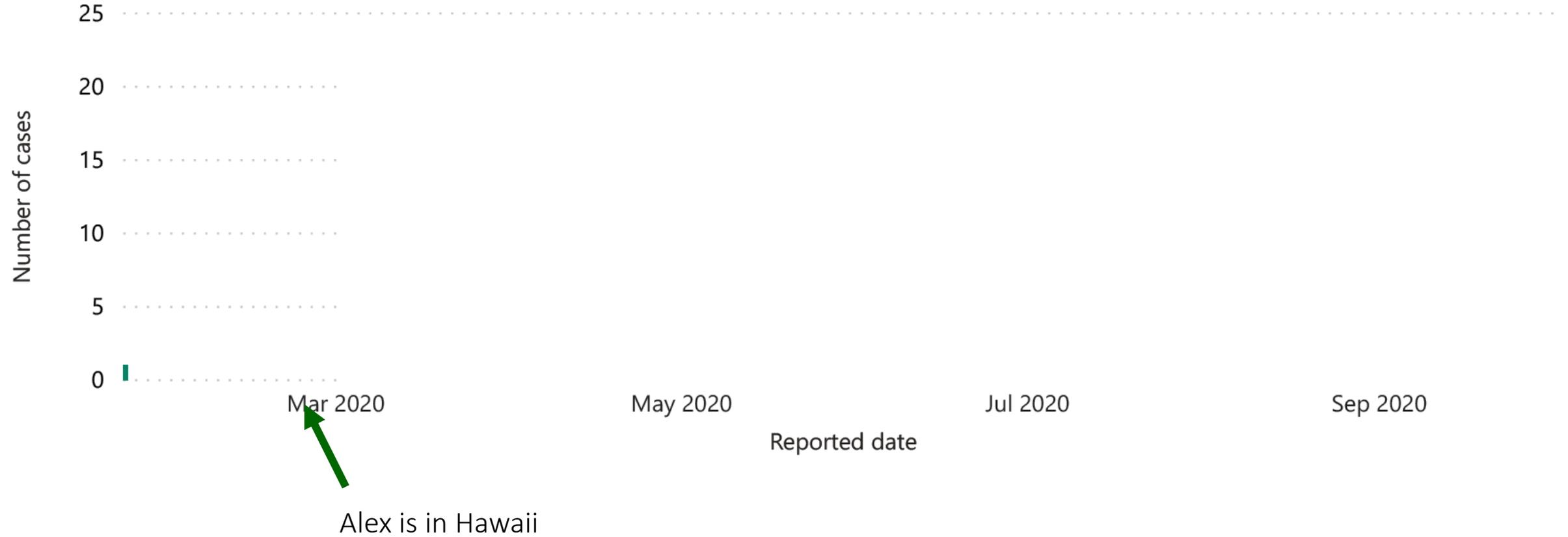


Current epidemiology of COVID-19

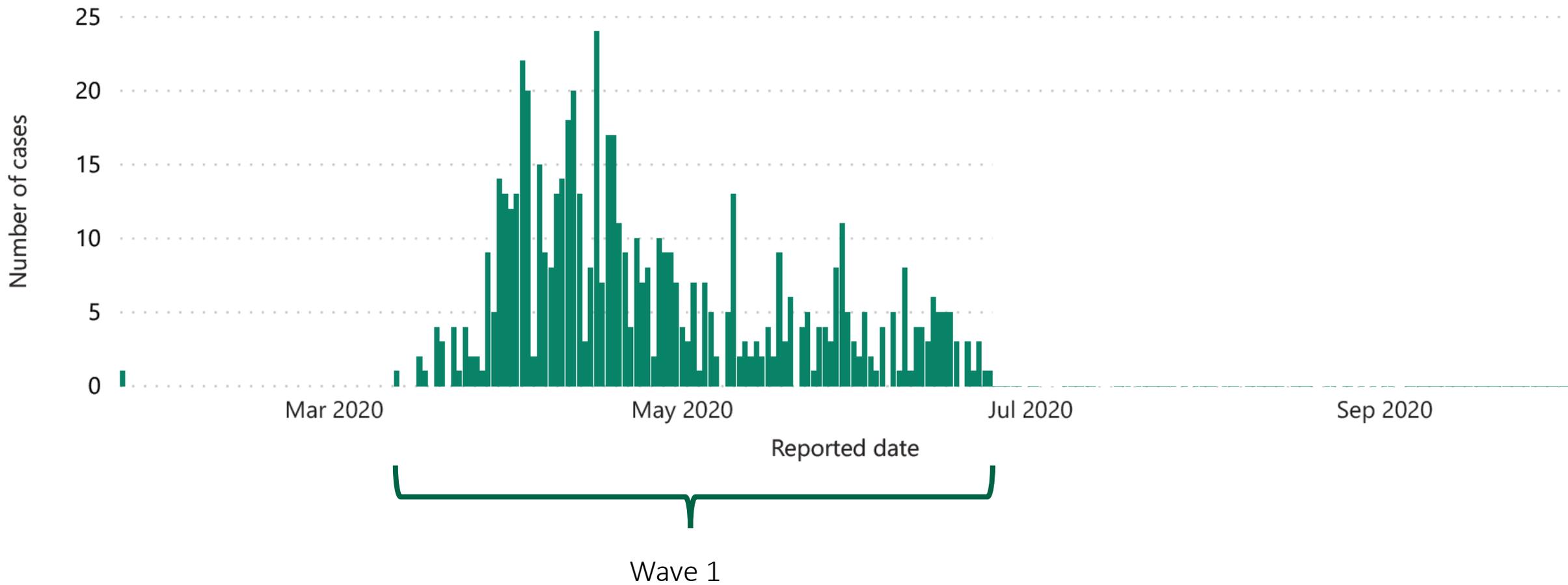
Early timeline of COVID-19

- On December 31, 2019, the WHO was informed of pneumonia cases in Wuhan, China that appeared to be caused by a novel virus
- Cases linked to Huanan Seafood Wholesale Market
 - Wet market where both dead and live animals (wild or domesticated) are sold
 - Potential for contamination
 - SARS and avian influenza (H5N1) were linked to wet markets
- In January 2020, Chinese officials confirmed a new, novel coronavirus
 - Virus believed to be zoonotic in origin, closely resembling bat coronaviruses, pangolin coronaviruses and SARS-CoV-1

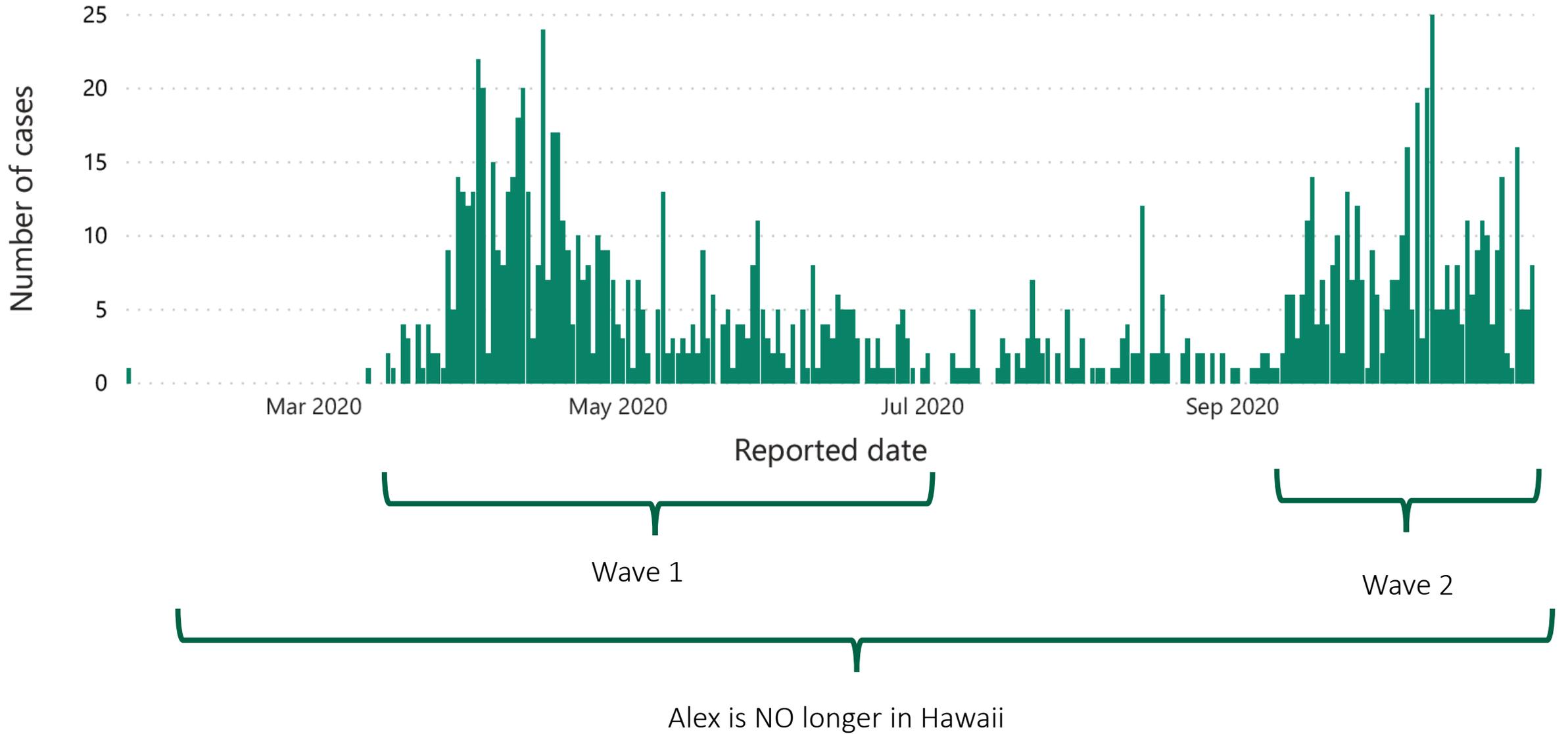
Cases by COVID-19 by reported date, Middlesex-London, 2020



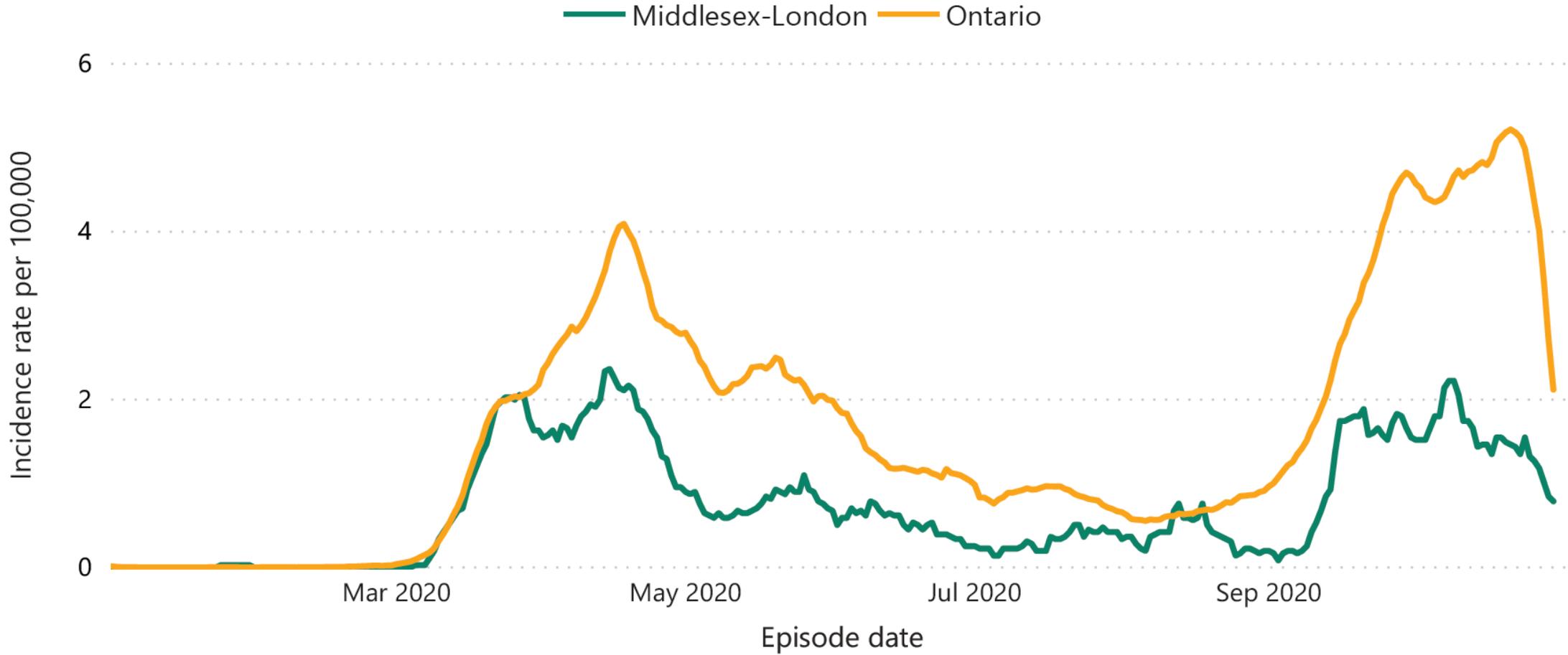
Cases by COVID-19 by reported date, Middlesex-London, 2020



Cases by COVID-19 by reported date, Middlesex-London, 2020



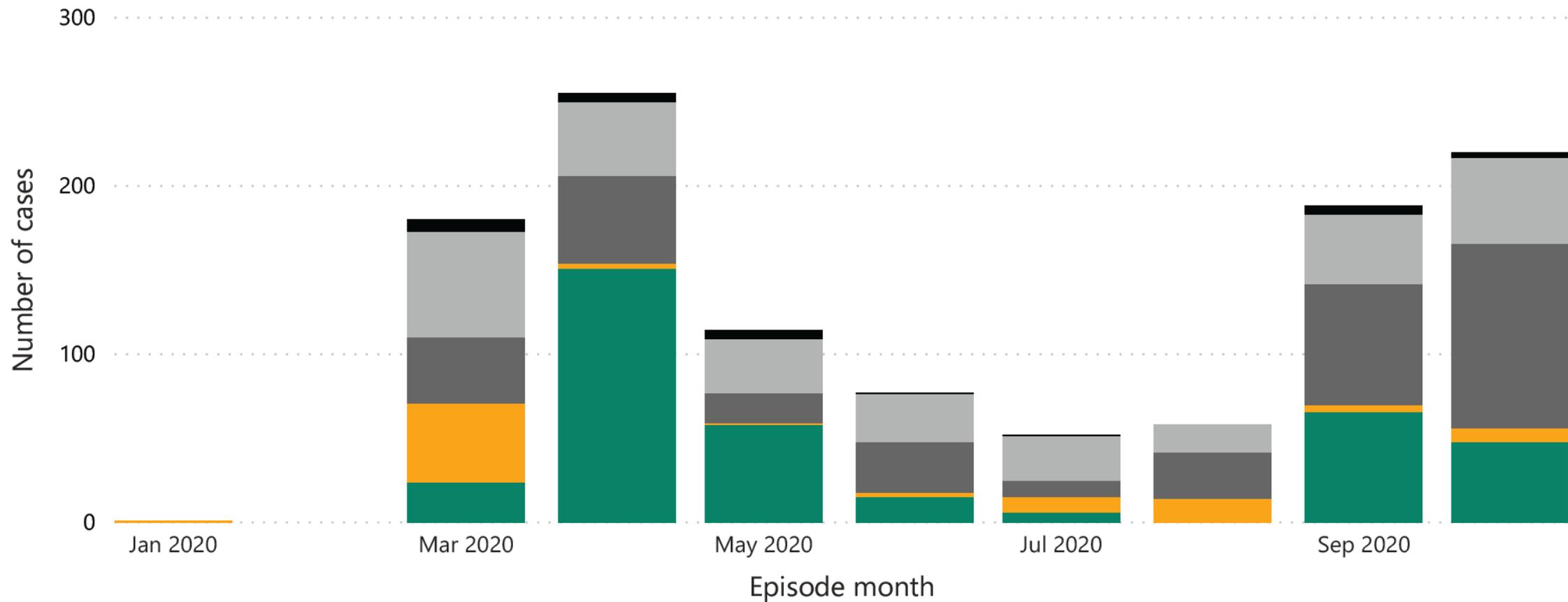
7-day moving average of daily incidence rates for Middlesex-London and Ontario



*Illnesses that began in the last 14 days may not yet be reported.

Cases by episode month and exposure source

● Outbreak ● Travel ● Contact of a confirmed case ● No known link ● Pending or undetermined



Current evidence regarding
COVID-19 transmission and
infection control practices

Viral Shedding

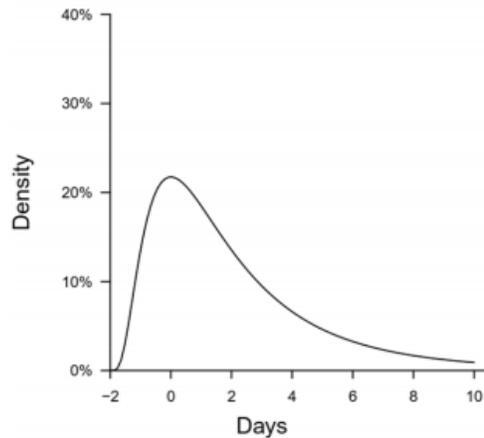
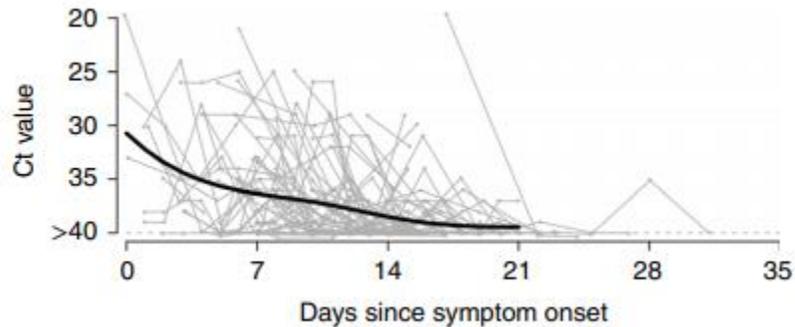
- Is detection of viral genetic material for prolonged periods associated with infectivity?



Viral Shedding

- Incubation period is 2-14 days (4-7 days)
 - 2.5% within 2.2 days and 97.5 % within 11.5 days
- Cases are infectious 2 days before symptom onset until 10 days after
 - If fever resolved and symptoms improved x 24 hours
 - Can be infectious up to 20 days if immunocompromised or critically ill

Viral Shedding



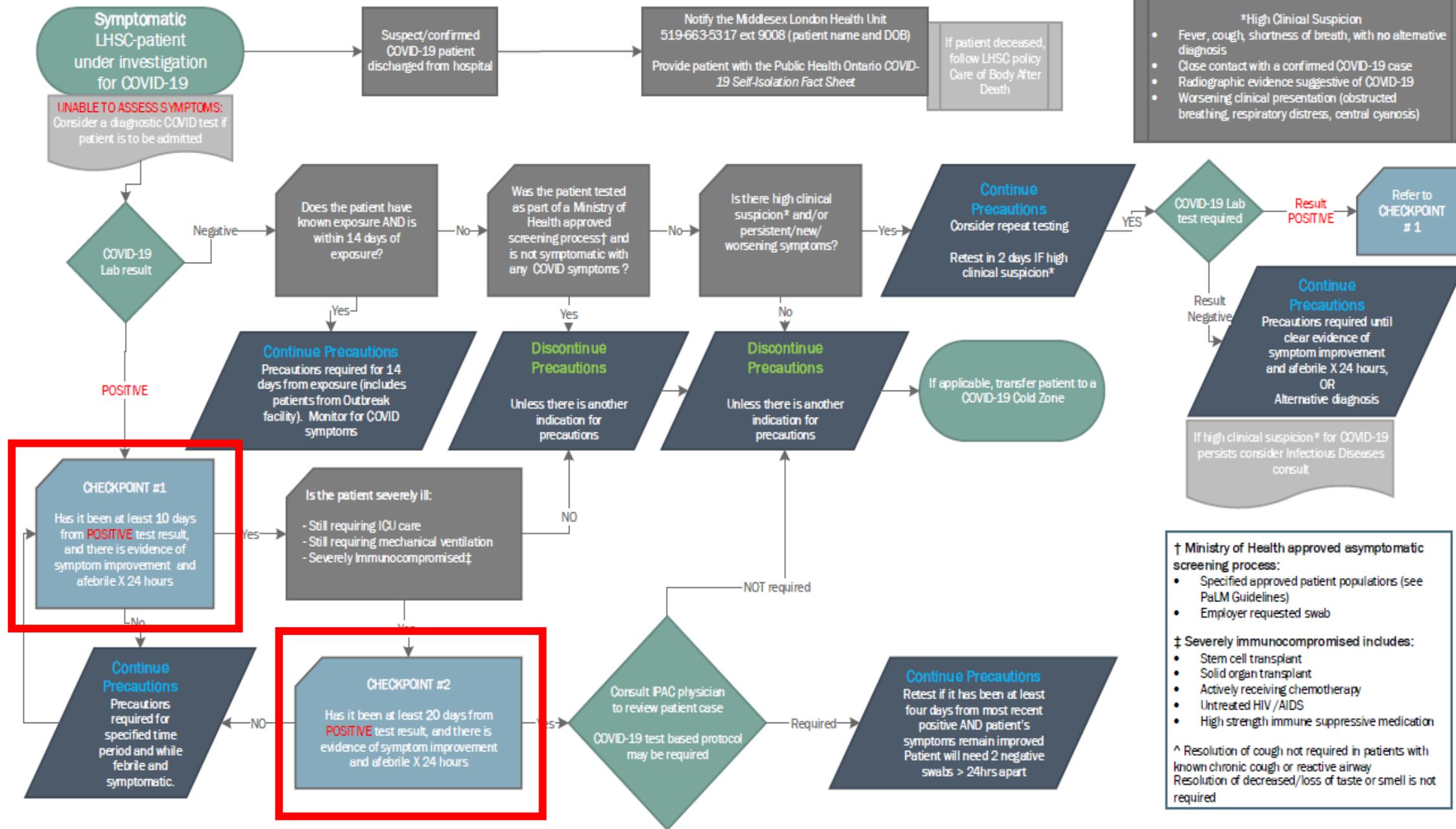
- Recovery of replication-competent virus:
 - For patients with mild to moderate COVID-19, has not been recovered after 10 days following symptom onset
 - Critically ill/immunocompromised patients, has not been recovered after 20 days after symptom onset
 - Patients can shed non-replicative virus for up to 12 weeks
- A large contact tracing study demonstrated that high-risk household and hospital contacts did not develop infection if their exposure to a case patient started 6 days or more after the case patient's illness onset

<https://www.nejm.org/doi/full/10.1056/nejmc2001737>

<https://www.nature.com/articles/s41591-020-0869-5>

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/duration-isolation.html>

JAMA Intern Med 2020 May 1; doi:10.1001/jamainternmed.2020.2020.



***High Clinical Suspicion**

- Fever, cough, shortness of breath, with no alternative diagnosis
- Close contact with a confirmed COVID-19 case
- Radiographic evidence suggestive of COVID-19
- Worsening clinical presentation (obstructed breathing, respiratory distress, central cyanosis)

† Ministry of Health approved asymptomatic screening process:

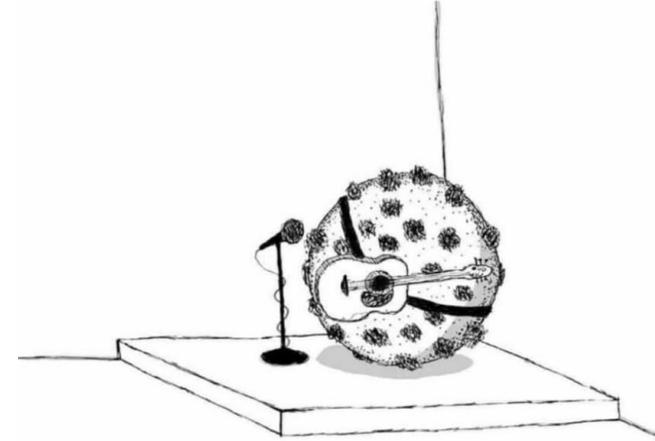
- Specified approved patient populations (see PaLM Guidelines)
- Employer requested swab

‡ Severely immunocompromised includes:

- Stem cell transplant
- Solid organ transplant
- Actively receiving chemotherapy
- Untreated HIV/AIDS
- High strength immune suppressive medication

^ Resolution of cough not required in patients with known chronic cough or reactive airway
Resolution of decreased/loss of taste or smell is not required

Airborne Transmission and COVID-19



"This one's dedicated to all the people that didn't believe in me when I was getting started."

- SARS-CoV-2 was first identified on January 6th, 2020
- As it was an emerging pathogen, PIDAC recommended enhanced precautions (N95), until further data was available
 - Important to note 10/12 Provinces, PHAC and WHO maintained routine droplet and contact
- On March 12th, given further available evidence, Ontario revised recommendations to require a medical mask (D+C), reserving N95s for AGMP

COVID-19 Transmission

- COVID-19 transmitted via droplets during close contact
 - Risk due to fomite/fecal-oral transmission is debated and not felt to be a major mode of transmission
- Airborne spread has not been reported for COVID-19 during routine social/clinical settings
 - Increased transmissibility can occur for:
 - Enclosed spaces/Poor Ventilation/Crowding
 - Higher risk activities (Singing/exercise)
 - Certain aerosol-generating procedures

Transmission

- The secondary attack rate (SAR) for COVID-19 is ~15-35% for household contacts
 - ~1-5% for other close contacts
 - Influenza SAR is between 5-40%
- Approximately 20% of infections are asymptomatic (~30% of children)
 - 1/3 to 1/2 of asymptomatic patients may go on to develop symptoms (pre-symptomatic)

Additional Precautions

DROPLET PRECAUTIONS	AIRBORNE PRECAUTIONS
<p data-bbox="825 534 1116 568"><u>For patients with:</u></p> <ul data-bbox="647 582 1253 811" style="list-style-type: none"><li data-bbox="647 582 845 616">■ Pertussis<li data-bbox="647 631 820 665">■ Mumps<li data-bbox="647 679 820 714">■ Rubella<li data-bbox="647 728 1253 811">■ Meningitis, etiology unknown and meningococcal <p data-bbox="723 868 1217 902"><u>Droplet + Contact Precautions</u></p> <p data-bbox="825 916 1116 951"><u>for patients with:</u></p> <ul data-bbox="647 965 1289 1145" style="list-style-type: none"><li data-bbox="647 965 1289 1145">■ Acute Respiratory Infection (e.g., croup, RSV, common cold, influenza, bronchiolitis, pneumonia, acute exacerbation of asthma)	<p data-bbox="1523 534 1814 568"><u>For patients with:</u></p> <ul data-bbox="1391 582 1824 716" style="list-style-type: none"><li data-bbox="1391 582 1824 616">■ Pulmonary tuberculosis<li data-bbox="1391 631 1574 665">■ Measles<li data-bbox="1391 679 1625 714">■ Chickenpox

Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee. Infection Prevention and Control for Clinical Office Practice. 1st Revision. Toronto, ON: Queen's Printer for Ontario; April 2015.

Characteristics of an Airborne Pathogen

- **Highly infectious over large spaces (>2m) and time**
 - Physical distancing has been shown to be effective in flattening the COVID-19 curve
 - Studies on airplane flights have not shown widespread transmission
- **Large secondary attack rate of close/family contacts**
 - For Measles and Chickenpox, >90%
 - Large studies have shown SAR in 15-35% range, far less than a typical airborne pathogen
- **High R_0 number**
 - For airborne pathogen, such as measles in 12-18 range
 - COVID-19 consistently between 2-3

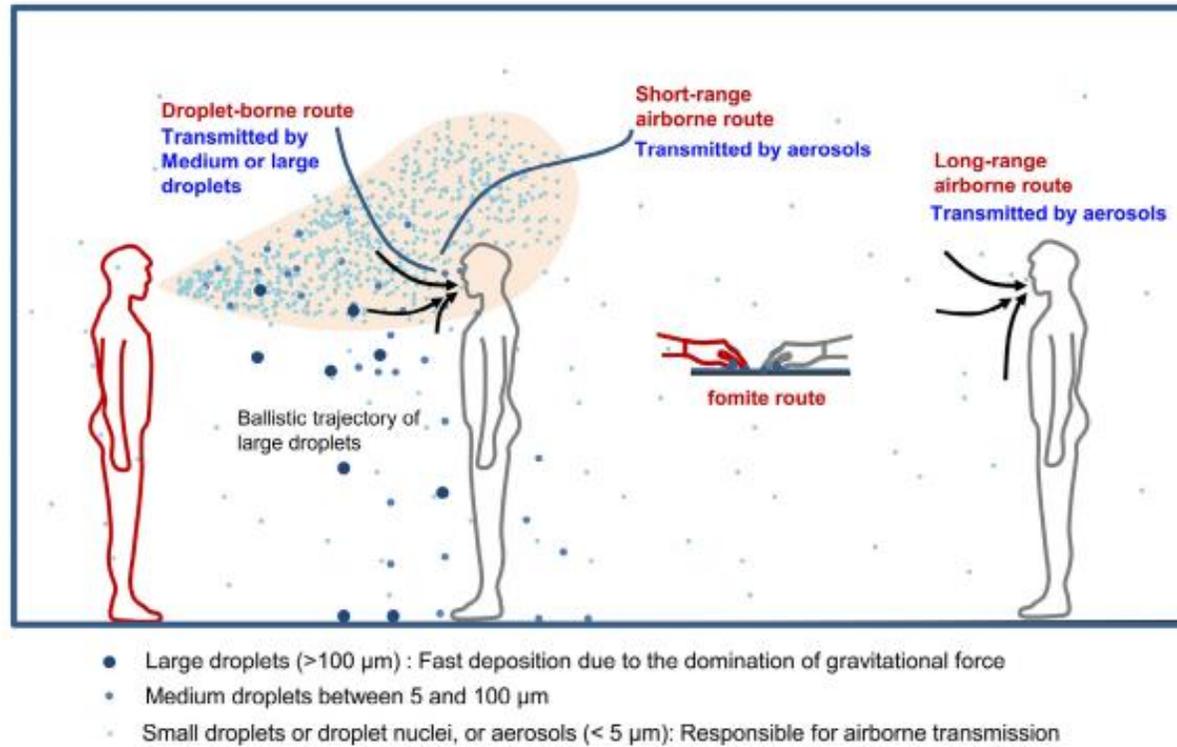


Fig 4. Illustration of different transmission routes. Small droplets ($<5\ \mu\text{m}$), sometimes called aerosols, are responsible for the short-range airborne route, long-range airborne route, and indirect contact route; large droplets are responsible for the direct spray route and indirect contact route.

[https://www.ajicjournal.org/article/S0196-6553\(16\)30531-4/pdf](https://www.ajicjournal.org/article/S0196-6553(16)30531-4/pdf)

Data from Influenza

- Studies have previously shown that influenza viral RNA can be detected in particles less than 5µm in size, throughout care areas

Table 1. Clinical investigation of airborne influenza in a hospital emergency department.

Day	No. of patients reporting influenza-like symptoms	Total no. of stationary samplers	Total no. of personal samplers	Samplers showing results positive for influenza virus	No. of TCID ₅₀ -equivalent RNA particles detected in the sampler			
					First stage	Second stage	Filter	Total
1	4	9	4	Waiting room (lower sampler)	460	0	0	460
				Waiting room (upper sampler)	0	13,426	2852	16,278
				Reception and triage room	0	1941	0	1941
				Personal sampler (physician 1)	3160	0	0	3160
				Personal sampler (physician 2)	309	0	0	309
				Personal sampler (physician 3)	0	4623	0	4623
2	0	13	0	Waiting room, (upper sampler)	1114	0	0	1114
3	5	13	1	None
4	3	13	0	Children's waiting room (lower sampler)	4025	11,040	0	15,065
				Children's waiting room (upper sampler)	5762	<100	0	5762
				Waiting room (lower sampler)	15,532	0	0	15,532
				Waiting room (lower sampler)	0	1367	0	1367

NOTE. TCID₅₀, median tissue culture infective dose.

Data From Influenza

- In addition, culture positive Influenza A has been recovered from aerosol sized particles

Table 2. Viral shedding

Variable	NP swab	Coarse aerosol	Fine aerosol
Culture passage			
Valid assays	169	NA	134
Positive (%)	150 (89)	NA	52 (39)
Quantitative culture (FFU)			
Valid assays	159	NA	136
Positive (%)	98 (62)	NA	41 (30)
GM (GSD)	2.5×10^3 (23)	NA	37 (4.4)
Range	ND – 5.1×10^5	NA	ND – 1.1×10^3
RNA copies			
Valid assays	218	218	218
Positive (%)	211 (97)	88 (40)	166 (76)
GM (GSD)	8.2×10^8 (52)	1.2×10^4 (14)	3.8×10^4 (13)
Range	ND – 3.8×10^{11}	ND – 4.3×10^8	ND – 4.4×10^7

N95 Respirators vs Medical Masks for Preventing Influenza Among Health Care Personnel

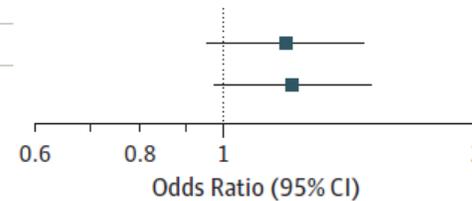
A Randomized Clinical Trial

- However, the best available evidence found no difference in effectiveness between N95 and masks

Figure 2. Primary and Secondary Outcomes of Influenza and Respiratory Illnesses and Adjusted Risk Estimates Among Health Care Personnel in the N95 Respirator Group vs the Medical Mask Group

A Primary outcome

	<u>N95 Respirator</u> Events/Seasons	<u>Medical Mask</u> Events/Seasons	Incidence Rate Ratio (95% CI)
Laboratory-confirmed influenza			
ITT cohort	207/2512	193/2668	1.18 (0.95-1.45)
PP cohort	204/2243	190/2446	1.20 (0.97-1.48)



IPAC Precautions

- Routine Practices
 - Hand hygiene, risk assessment, environmental control, administrative controls, and PPE
- Additional Precautions
 - Universal masking (+/-) eye protection
 - Droplet and Contact precautions for COVID-19 patients routinely (Above plus gowns and gloves)
 - Droplet and Contact plus enhanced PPE (N95) if AGMP
 - Protected intubation protocol

Routine Practices for Aerosol Generating Medical Procedures

Policy: Routine Practices

Revised Date: September 2020

Reviewed Date: September 2020

Aerosol generating medical procedures (AGMP) are any procedure performed on a patient that can induce the production of aerosols of various sizes, including droplet nuclei. Medical procedures that generate aerosols or droplet nuclei in high concentrations can present a risk for opportunistic airborne transmission of pathogens that are not otherwise spread via the airborne route (e.g. COVID-19) and can increase the risk for transmission of organisms known to spread by the airborne route (e.g. TB). The following procedures are considered AGMP:

- Endotracheal intubation *
- Code Blue *
- Bronchoscopy *
- Sputum induction **
- Autopsy**
- Breath stacking
- Chest tube insertion for trauma
- Extubation
- High frequency oscillation ventilation/jet ventilation
- Large volume nebulizers for humidity
- Manual ventilation
- Specialized High-flow oxygen delivery: o AIRVO, Optiflow
- Nasopharyngoscopy
- Non-invasive /invasive positive pressure ventilation
- Oral, pharyngeal, transsphenoidal and airway surgeries
- Open suctioning
- Tracheostomy insertion/tracheostomy tube change/decannulation

All healthcare workers should perform a Point of Care Risk Assessment (PCRA) prior to performing an AGMP to ensure the appropriate personal protective equipment (PPE) and environmental controls are used.

When performing an AGMP on any patient it is important to following the following infection control practices and principles:

Patient Presentation	PPE Required	Environmental Controls
Unable to Assess	N95 mask, Face shield, Gown, Gloves	Negative pressure room preferred When negative pressure is not available, and for all other AGMP <ul style="list-style-type: none"> • Private room with door closed, • In shared space with curtains drawn and $\geq 2m$ segregation from other patients
Routine Practices, No additional precautions required	Mask with eye protection, PLUS Point of Care Risk Assessment	Private room with door closed preferred If not available, in shared space with curtains drawn and $>2m$ segregation from other patients
Additional Precautions – Droplet, Contact Influenza, RSV	Mask with eye protection, Gown, Gloves	
Additional Precautions – Airborne Tuberculosis, Chickenpox, Disseminated shingles	N95 mask with eye protection, PLUS Point of Care Risk Assessment	Negative pressure room preferred When negative pressure is not available, and for all other AGMP <ul style="list-style-type: none"> • Private room with door closed, • In shared space with curtains drawn and $\geq 2m$ segregation from other patients
Infectious Disease Threat or Disease of Emerging Significance COVID-19, MERS-CoV, Ebola	N95 mask, Face shield, Gown, Gloves	
Protected Protocol (see *)	Level III gown (or higher), N95 mask, Extended cuff gloves, Face shield, Goggles or protective eyewear, Bouffant cap	

*Designates procedures performed under protected protocol

**N95 and negative pressure must always be utilized when performing sputum induction due to risk of TB

AG

Routine Practices for Aerosol Generating Medical Procedures

Policy: Routine Practices

Revised Date: September 2020

Reviewed Date: September 2020

The following procedures are NOT considered AGMP:

- Collection of NP or throat swab
- Ventilator circuit disconnect
- Chest compressions alone
- Chest tube removal or insertion (except for trauma/emergent insertion)
- Coughing
- Oral suctioning
- Oral hygiene
- Gastroscopy or colonoscopy
- Laparoscopy (GI/Pelvic)
- ERCP
- Cardiac stress test
- Caesarian section or vaginal delivery (with epidural)
- Any procedure with regional anesthesia
- Electroconvulsive therapy (ECT)
- Transesophageal Echocardiogram (TEE)
- Nasogastric, nasojejunal, gastrostomy, gastrojejunostomy, jejunostomy tube insertion
- Bronchial artery embolization
- Chest physiotherapy (outside of breath stacking)
- Routine High-flow oxygen delivery: By nasal prongs, venturi/venti masks, HiOx masks, non-rebreather masks
- Intranasal medication administration
- Nebulized medication administration

Definitions:

Endotracheal intubation: The placement or removal of any airway device (i.e. endotracheal tube, laryngeal mask, airway) or the use of a laryngoscope to aid in insertion of feeding tube or removal of foreign body

Sputum induction: Delivery of 3% hypertonic saline to obtain respiratory secretions from patients with symptoms of TB; the hypertonic saline is delivered via small volume nebulizer

Large volume nebulizers for humidity: The provision of humidified air or O₂ via a large volume bottle attached to a wall flowmeter. Used via tracheostomy mask or face mask.

Manual ventilation: Any ventilation with a manual resuscitation bag via an artificial airway or mask; includes the use of the breath stacking device, in-exsufflator, or any other cough generating procedure.

Non-invasive positive pressure ventilation (CPAP, BiPAP): The delivery of ventilatory support without the need for an invasive, artificial airway; enhances breathing by giving the patient a mixture of air and oxygen from a flow generator through a fitted facial mask or nasal mask.

Open suctioning (not inclusive of oral suctioning): Suctioning a patient utilizing either a single use (open) catheter or in-line suction catheter below the vocal cords (Lower respiratory tract). The patient may or may not have an artificial airway in place

PPE

- What does the level of a mask mean?



ASTM Mask Rating

- Masks are given a rating by the American Society of Testing and Materials (ASTM)
- These ratings are based on bacterial/particle filtering efficiency and fluid resistance

ASTM Mask Rating

Test	Level 2 Mask	Level 3 Mask
Bacterial Filtration Efficiency	≥ 98%	≥ 98%
Particulate Filtration Efficiency	≥ 98%	≥ 98%
Fluid Resistance to Synthetic Blood	120 mmHg	160 mmHg
Clinical Indications	Routine clinical care	Trauma/orthopedic surgeries with high pressure irrigation

- Level 3 masks with integrated eye protection visor have been purchased due to greater production supply
- Level 2 masks with safety glasses/goggles/face shield, are indicated for any patient interaction at LHSC (Outside of trauma/orthopedic surgery)

Public health's approach to Wave 2

Roles of local public health in a pandemic

- Surveillance
- Case and contact management
- Outbreak management
- Health communication
- Guidance and technical advice
 - Infection prevention and control
 - Testing strategy
 - Public health measures

Case and contact management

- Identification of a probable or confirmed case triggers an investigation to assess:
 - Potential exposures
 - Potential transmission
- Allow for interventions to prevent further transmission

Contact tracing at MLHU

Month ▼	New reported cases	New contacts identified	Ratio of contacts identified to cases	Attempted follow-up within 24h	Attempted follow-up within 48h	Successful follow-up within 24h	Successful follow-up within 48h
October 2020	265	1,284	4.8	95.1%	1.9%	93.6%	2.4%
September 2020	148	601	4.1	99.3%	0.2%	95.8%	1.3%
August 2020	57	147	2.6	96.6%	0.7%	94.6%	0.7%
July 2020	49	248	5.1	99.6%	0.4%	98.8%	1.2%
June 2020	87	409	4.7	91.7%	2.4%	88.0%	4.2%
May 2020	131	457	3.5	95.8%	0.7%	93.4%	1.8%
April 2020	341	1,012	3.0	94.6%	2.0%	94.6%	2.0%
March 2020	66	279	4.2	95.3%	0.7%	95.3%	0.7%
February 2020	0	0					
January 2020	1	0					

Outbreak Response

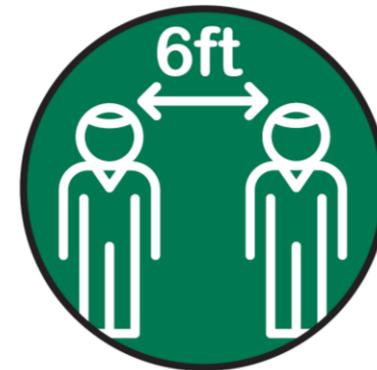
- Increase, often sudden, in the number of cases of a disease above what is normally expected in a population
- Population may be defined as a geographic area or a certain demographic
- Epidemic and outbreak are synonymous terms, but outbreak is often used for a more limited geographic area

Outbreaks in Middlesex-London

- Long-term care and retirement homes
- Schools
- Workplaces

Core Principles of Public Health Measures

- Physical distancing
- Proper hand hygiene
- Masking, where appropriate
- Symptom screening
- Exclusion and testing protocols
- Frequent cleaning
- Cohorting and social circles



Public health and the Hospitality and Fitness Sectors

Why do we care about food and drink establishments and fitness facilities?

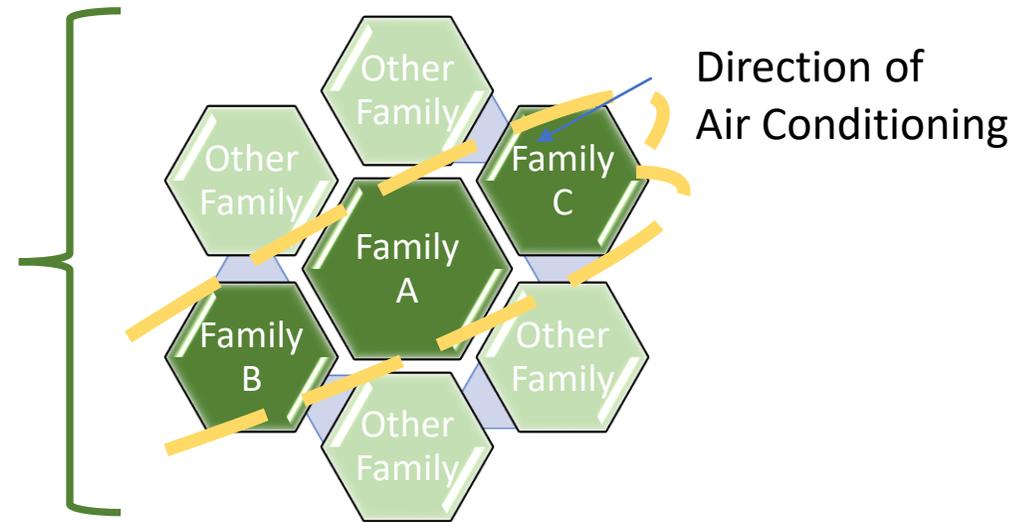
- Three hospitality sectors examples
 - Example 1: early case in China demonstrating importance of distancing
 - Example 2: US evidence that bars and restaurants are key driver of COVID-19 exposures
 - Example 3: local evidence of staff spread, despite existing public health measures
- One fitness facility example
 - SpinCo, Hamilton, Ontario



Restaurant Spread: Distancing & A/C

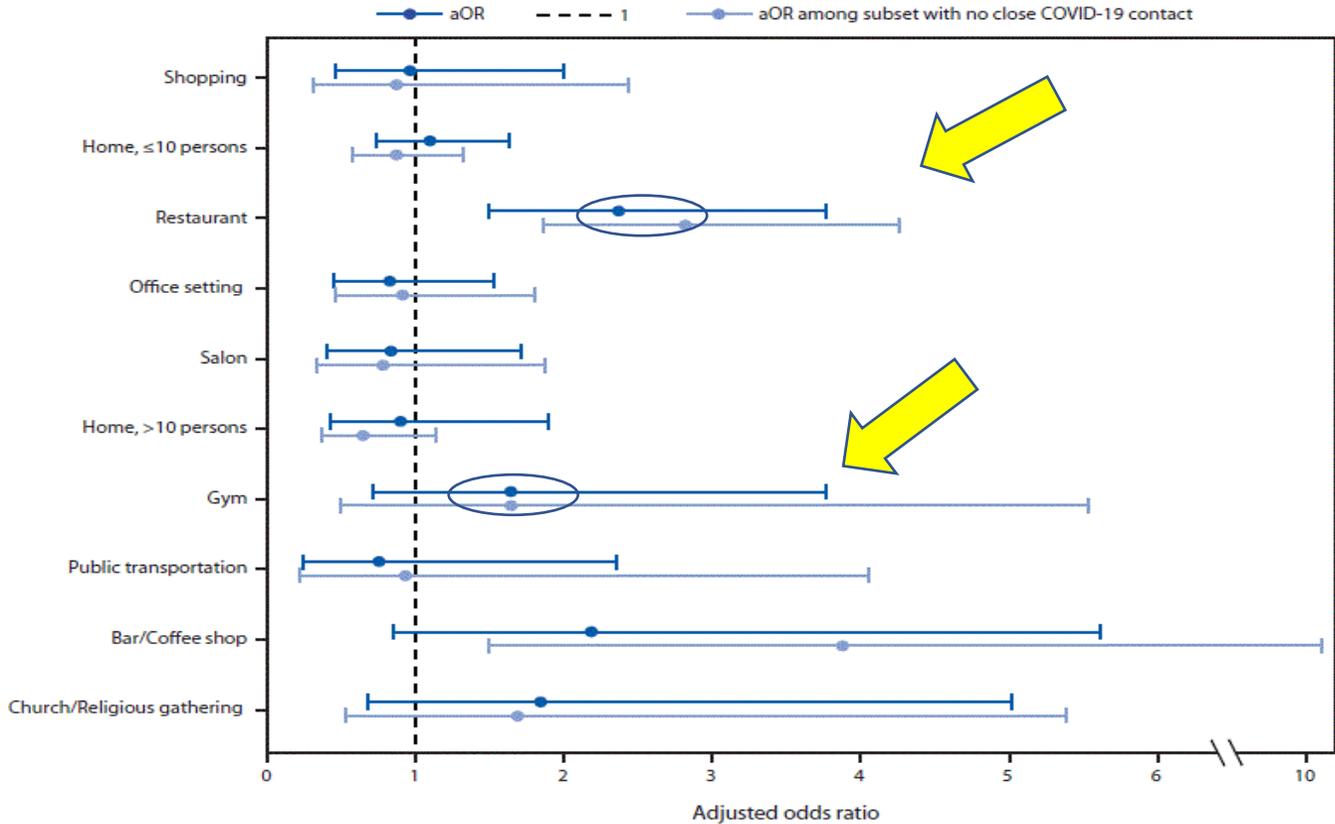
*1-hour lunch on
January 24th, 2020
in Guangzhou, China*

Close Physical Distance
(Less than 2 metres)



Multisite Survey of hospitalized patients, with and without COVID, July 2020

FIGURE. Adjusted odds ratio (aOR)* and 95% confidence intervals for community exposures[†] associated with confirmed COVID-19 among symptomatic adults aged ≥ 18 years (N = 314) — United States, July 1–29, 2020



Multisite Survey of hospitalized patients, with and without COVID, July 2020

In the 2 weeks before getting sick with COVID-19 compared to people not sick with COVID-19



More likely to have eaten at a restaurant

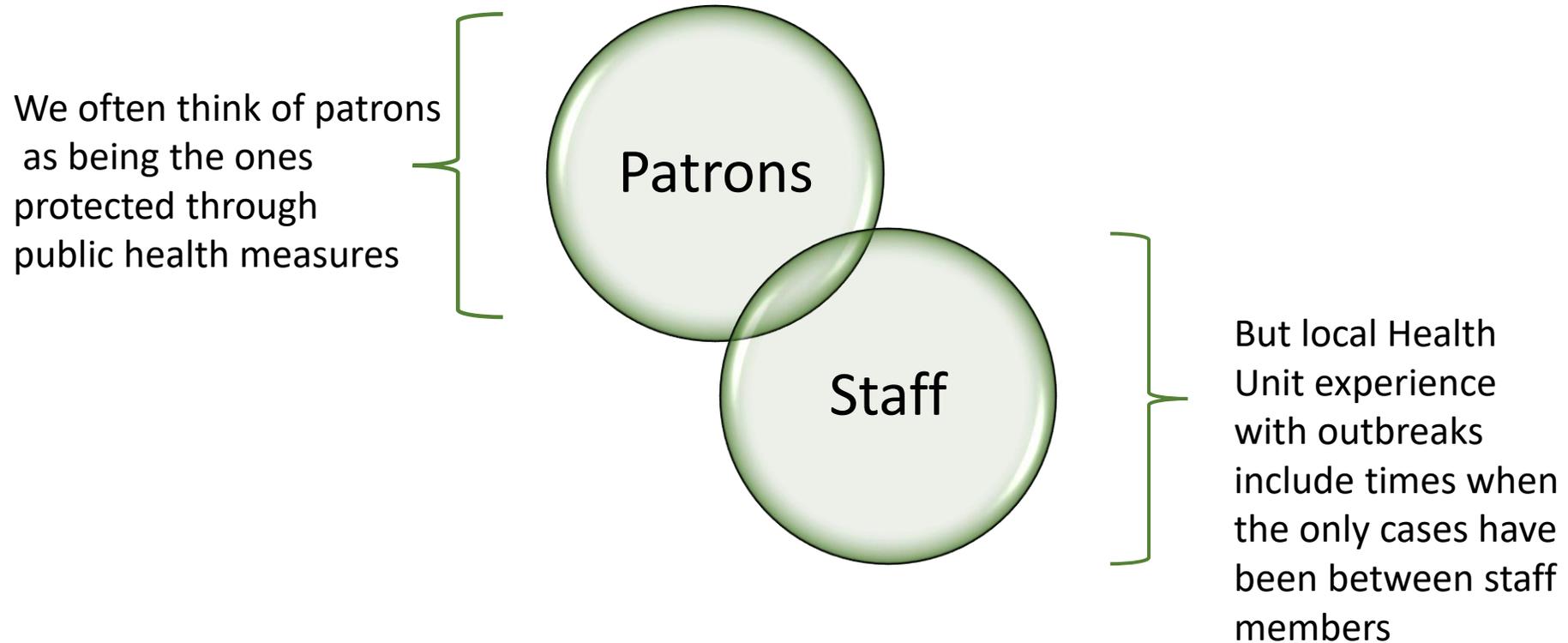


*More likely to have eaten at a restaurant,
with no known exposure to a positive case*



*More likely to have gone to a bar/café,
with no known exposure to a positive case*

Staff Outbreak in Local Coffee Shop

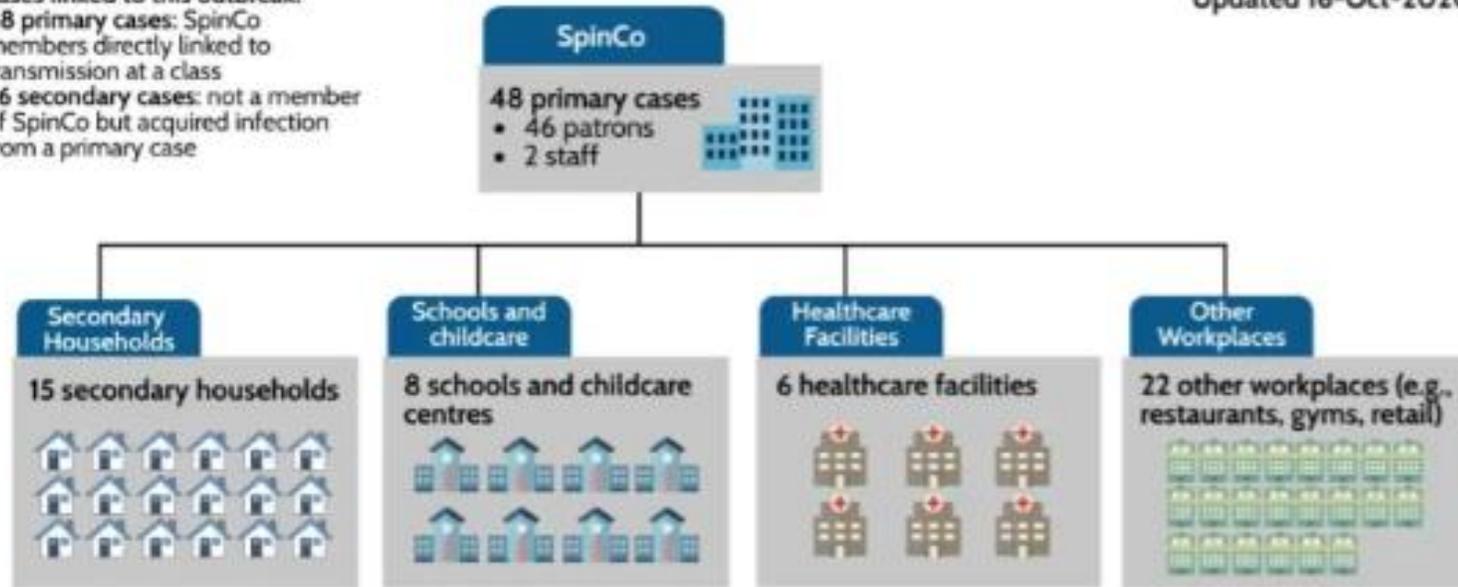


Hamilton SpinCo Superspreader Outbreak

74 cases linked to this outbreak:

- 48 primary cases: SpinCo members directly linked to transmission at a class
- 26 secondary cases: not a member of SpinCo but acquired infection from a primary case

Updated 16-Oct-2020



Key messages

- Primary cases originating from SpinCo were connected to various other settings resulting in 26 secondary cases in some of these settings.
- This information is preliminary and subject to change pending further investigation.

Primary care and Wave 2 onward

Ministry of Health

COVID-19 Guidance: Primary Care Providers in a Community Setting

Version 6 – September 4, 2020

Highlights of changes

- Clarification that for patients who screen negative and are coming to the office/clinic for vaccine administration, gloves are not required to be worn, but considered as per the Canadian Immunization Guide (Bullet 24).
- Removal of wording on "essential visits".
- Recommendation to actively screen all patients (and those accompanying, if applicable) upon entry to office/clinic, in addition to phone screening
- Masking for patients and accompanying persons for entirety of clinic visit
- In addition to symptomatic patients, testing should also be offered to, or arranged for, asymptomatic patients with a known or suspected exposure
- Requirement to self-isolate while working for asymptomatic primary care providers revised to reflect return from travel outside of Canada or to an area inside Canada with an elevated rate of COVID-19 (Bullet 31).
- Added reference to the Centre For Effective Practice's [Primary Care Operations in the COVID-19 Context](#) Resource Tool

Testing

- COVID-19 Provincial Testing Guidance was updated on September 24
- Focus is symptomatic individuals
- Any Ontarian presenting with at least one symptom or sign of COVID-19 should be considered for COVID-19 PCR testing
- Influenza testing should also be offered for those with ILI symptoms
 - Symptomatic institutionalized and hospitalized patients
 - Outbreaks (up to 4 specimens from symptoms individuals)
 - Persons residing in remote communities

Testing cont.

- What about asymptomatic individuals?
 - Close contacts identified by public health OR who have received an alert from the COVID-19 app
 - Outbreak response
 - Individuals identified in high-risk populations through a provincial targeted testing campaign
 - Workers and visitors to long-term care homes

Serology testing

- Only available for clinical use in specific instances
- Not for screening and diagnosis of acute COVID-19 infection
- Positive serology does NOT equal immunity
- Clinical indications
 - Investigation MIS-C in patients without lab confirmation of COVID-19
 - For patients with severe illness who have tested negative for COVID-19 by PCR and serology testing would help inform clinical management or public health action

Point of Care Testing (POCT) devices currently being considered in Ontario

- Ontario considering 2 POCT devices
 - Abbott ID Now PCR POCT
 - Abbott PanBio Antigen POCT
- Lower sensitivity compared to lab PCR testing
 - Negative test may require confirmation with lab based PCR
- Most helpful for populations with long TATs (ie. remote populations)

Key Points

- We're in this for a while...expect additional waves
- Continue to do what you can virtually but ensure that in-person services are available, as you are able
- Have a low threshold for testing; currently good availability through the assessment centres
- Staff are protected through routine IPAC practices:
 - Screening for and isolating symptomatic patients
 - Hand hygiene
 - Appropriate PPE (Including masking when indicated)

PLEASE, JUST PLEASE

DO NOT GO TO WORK SICK!

Questions