McMaster University | HEALTH FORUM

RISE Rapid-Improvement Support and Exchange

COVID-19 Rapid Evidence Profile #12 (2 June 2020)

Questions

What insights from the available evidence and jurisdictional scans can inform who should be tested for COVID-19 and how frequently, where, by whom and with what follow-up actions should they be tested?

What we found

We organized our findings in relation to the seven sub-questions listed below to support the development of a robust testing strategy for the province:

- who should be tested for COVID-19?
- how frequently should these individuals be tested?
- where should testing take place?
- what part of the health system should lead the testing?
- what is the basis for these decisions?
- what approaches can be used that directly complement testing?
- what part of the health system should lead the approaches that directly complement the testing?

We identified 20 evidence documents that provide highly relevant evidence in relation to one or more of the above categories:

- eight guidelines developed using a robust process (e.g., GRADE);
- three rapid reviews; and
- nine primary studies with additional insights.

We provide in Table 1 an overview of lessons learned from the highly relevant evidence documents as well as from two jurisdictional scans (one for other countries and the other for Canadian provinces and territories). Additional details for those who want to know more are in Table 2 (the type and number of all documents that were identified), Table 3 (for experiences from other countries), and Table 4 (for experiences from Canadian provinces and territories). In addition, we provide a detailed summary of our methods in Appendix 1, the full list of included evidence documents (including those deemed of medium and low relevance) in Appendix 2, abstracts for highly relevant documents in Appendix 3, and hyperlinks for documents excluded at the final stage of reviewing in Appendix 4.

Box 1: Our approach

We identified documents addressing the question by searching the guide to key COVID-19 evidence sources on 2 June 2020.

We searched for guidelines that were developed using a robust process (e.g., GRADE), full systematic reviews (or review-derived products such as overviews of systematic reviews), rapid reviews, protocols for systematic reviews, and titles/questions for systematic reviews or rapid reviews. Single studies were only included if no relevant systematic reviews were identified.

We appraised the methodological quality of full systematic reviews and rapid reviews using AMSTAR. AMSTAR rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. It is important to note that: 1) the AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to systematic reviews pertaining to delivery, financial, or governance arrangements within health systems; and 2) quality-appraisal scores for rapid reviews are often lower because of the methodological shortcuts that need to be taken to accommodate compressed timeframes.

We identified experiences from select other countries and from Canadian provinces and territories by searching jurisdiction-specific websites (e.g., government ministries and web pages dedicated to COVID-19). Our scan of experiences from other countries focused on those that we identified as being further ahead in their approach to testing.

This rapid evidence profile was prepared in one day to inform next steps in evidence synthesis, guideline development and/or decision-making related to the question that was posed.

Table 1: Key findings from highly relevant evidence documents and experiences from other countries and Canadian provinces and territories

Sub-questions	Virus testing	Antibody testing
Who should be tested for the virus? • Symptomatic • Asymptomatic o Random o High risk based on contextual factors o High risk based on individual factors o High risk based on a combination of contextual and risk factors o Concerned individuals o Other	**Highly relevant evidence documents** • Guidelines developed using a robust process o Home-care patients with COVID-19 presenting with mild symptoms should only be released from home isolation after testing negative using PCR testing twice from samples collected at least 24 hours apart (WHO technical guidance) o Nucleic acid testing for all symptomatic individuals suspected of having COVID-19 is recommended, as well as for asymptomatic individuals with known or suspected contact with a COVID-19 case (Infectious Diseases Society of America) o The decision to test should be based on clinical and epidemiological factors, and should be linked to an assessment of the likelihood of infection (WHO technical guidance) o Patients and residents who enter long-term care facilities should be screened for COVID-19 through testing (Centers for Medicare & Medicaid Services and U.S. CDC) o To return to work after a COVID-19 illness, employees should have at least two consecutive nasopharyngeal swab specimens collected more than 24 hours apart that test negative (U.S. CDC) o It is recommended to establish a priority system for diagnostic testing for SARS-CoV-2 infection based on the availability of tests (U.S. CDC) o False-negative test results can occur, thus a single negative test does not completely exclude SARS-CoV-2 infection, and testing should be repeated (especially in people with a high likelihood of infection based on exposure history and/or clinical present (U.S. National Institutes of Health) • Rapid reviews o COVID-19 testing before surgery is recommended for people undergoing surgeries perceived as high risk, notably	**Highly relevant evidence documents** • No highly relevant documents found **Experiences from other countries** • Germany has established voluntary antibody testing for employed medical personnel • In Switzerland, a network of 12 universities is undertaking a study to examine the use of widespread antibody testing • In the U.K., widespread antibody testing is presumed to be rolled out beginning with health and social care workers **Experiences from Canadian provinces and territories** • No information found on Canadian experiences

Sub-questions	Virus testing	Antibody testing
	upper gastrointestinal, ear nose and throat, neurosurgery and interventional cardiac services (AMSTAR rating 3/9) o Accumulating case reports suggest that testing of all persons at the site of outbreaks in places such as long-term care residences, hospitals and homeless shelters can reduce transmission chains (AMSTAR rating 3/9) **Experiences from other countries** • In China, the principle of testing for all who need it and for all who seek it has been implemented, however, specific population groups targeted for testing include: inbound passengers; patients in fever clinics; newly admitted patients and their caregivers; staff in medical institutions; customs staff; staff in prisons; and staff in nursing homes • In Germany, virus testing prioritization is given to: those who are symptomatic; are asymptomatic but have had contact with a confirmed COVID-19 patient in the last two weeks; those with pre-existing conditions; and those whose employment places them in contact with vulnerable populations • In Denmark, virus testing has been prioritized for: those in close contact with a confirmed COVID-19 case; inhabitants of institutions such as nursing-care homes; patients who are going to be in hospitals or receiving elective procedures; women giving birth; and employees at a range of heath and social organizations (e.g., probation services, homeless shelters, those providing community care to vulnerable and immunosuppressed patients) • In South Korea, population-wide testing has been implemented • In Sweden, virus testing is being prioritized for: all patients seeking any type of healthcare; patients with particular risk factors (e.g., immunocompromised); people living in long-term care institutions; and staff working in health and social-care organizations • In Switzerland, virus testing is being prioritized for: all symptomatic individuals; asymptomatic persons seeking care from hospitals; and older adults living in nursing homes	

Sub-questions	Virus testing	Antibody testing
	• In the U.K., virus testing has been prioritized for the following groups: anyone who is symptomatic; all critical-care admissions; anyone exposed to an outbreak; anyone discharged from hospital to home care; those who continue to go to work; asymptomatic health and social-care workers; and pupils, teachers and family members who are attending school **Experiences from Canadian provinces and territories** • In addition to those experiencing symptoms of COVID-19, Canadian provinces are prioritizing groups for testing including: those that have been in contact with a positive COVID-19 case (B.C., AB, SK, MB, ON, P.E.I.); residents and staff of long-term care facilities and other institutions with vulnerable populations (B.C., AB, SK, MB, ON, P.E.I.); individuals requiring admissions to hospital (B.C., MB, ON, P.E.I.); patients transferring from hospital to home or between healthcare facilities (AB, ON); patients that are immunocompromised including cancer patients or those on hemodialysis (B.C., SK); residents of remote, isolated or Indigenous communities (B.C.); those living in vulnerable settings such as homeless shelters (SK); essential service providers and first responders (B.C., AB, ON); essential workers with frequent travel outside of the province (P.E.I.); and temporary foreign workers following the end of their 14-day self-isolation (P.E.I., YK)	
How frequently should they be tested? • With fixed periodicity • With a clear decision rule about other triggers o Outbreak management o Targeted campaigns where outbreak concerns exist	**Highly relevant evidence documents** • Guidelines developed using a robust process o Home-care patients with COVID-19 presenting with mild symptoms should only be released from home isolation after testing negative using PCR testing twice from samples collected at least 24 hours apart (WHO technical guidance) o To return to work after a COVID-19 illness, employees should have at least two consecutive nasopharyngeal swab specimens collected more than 24 hours apart that test negative (U.S. CDC) **Experiences from other countries**	**Highly relevant evidence documents** • No highly relevant documents found **Experiences from other countries** • No information found on the experiences of other countries **Experiences from Canadian provinces and territories** • No information found on Canadian experiences

Sub-questions	Virus testing	Antibody testing
	• In Denmark, when outbreaks occur all those in contact are tested twice, a week apart, to establish whether the outbreak is under control **Experiences from Canadian provinces and territories** • No information found on Canadian experiences	
Where should they be tested? • Centralized testing centres • Mobile clinics • Regular healthcare settings • Other	**Highly relevant evidence documents** **Experiences from other countries** • South Korea has established a range of testing centres including drive throughs and testing "phone booths" • In the U.K., testing has shifted from hospitals to 50 drive-through testing facilities, mobile testing units and self-testing for health and social-care staff **Experiences from Canadian provinces and territories** • Saskatchewan has established mobile worksite testing for high volume work settings including factories and other industrial worksites for those requiring a test	**Highly relevant evidence documents** • Rapid reviews o Moving diagnostic testing for COVID-19 from laboratory settings to the point of care is potentially transformative in the rate and quantity of testing, in particular the antibody-based tests could help to ascertain suitability of infected healthcare workers to return to front-line health services and to inform public-health strategies at the end of periods of lockdown or as social distancing restrictions were relaxed (AMSTAR rating 1/9) **Experiences from other countries** • No information found on the experiences of other countries **Experiences from Canadian provinces and territories** • No information found on Canadian experiences
What part of the health system should lead the testing? • Primary care • Hospitals • Public health • Other	**Highly relevant evidence documents** • Guidelines developed using a robust process o Patients and residents who enter long-term care facilities should be screened for COVID-19 through testing (Centers for Medicare & Medicaid Services and U.S. CDC) **Experiences from other countries** • In Denmark, the government recently announced the development of a new agency to take over responsibility for the coordination of testing	**Highly relevant evidence documents** • No highly relevant documents found **Experiences from other countries** • No information found on the experiences of other countries **Experiences from Canadian provinces and territories** • No information found on Canadian experiences

Sub-questions	Virus testing	Antibody testing
	• In Sweden, testing is largely being directed by primary care **Experiences from Canadian provinces and territories** • Both Newfoundland and Labrador and the Northwest Territories have established drive-by or drive-through testing sites	
What is the basis for the above decisions? • Optimizing the value of the test given sensitivity and specificity considerations • Optimizing test allocations given supply limitations • Other	**Highly relevant evidence documents** • Guidelines developed using a robust process o The decision to test should be based on clinical and epidemiological factors, and should be linked to an assessment of the likelihood of infection (WHO technical guidance) o Prioritized testing strategies could vary based on four transmission scenarios: when there are no cases, sporadic cases, clusters of cases, and community transmission (WHO technical guidance) o It is recommended to establish a priority system for diagnostic testing for SARS-CoV-2 infection based on the availability of tests (U.S. CDC) o False-negative test results can occur, thus a single negative test does not completely exclude SARS-CoV-2 infection, and testing should be repeated (especially in people with a high likelihood of infection based on exposure history and/or clinical present (U.S. National Institutes of Health) **Experiences from other countries** • No information found on the experiences of other countries **Experiences from Canadian provinces and territories** • No information found on Canadian experiences	**Highly relevant evidence documents** • Rapid reviews o Moving diagnostic testing for COVID-19 from laboratory settings to the point of care is potentially transformative in the rate and quantity of testing, in particular the antibody-based tests could help to ascertain suitability of infected healthcare workers to return to front-line health services and to inform public-health strategies at the end of periods of lockdown or as social distancing restrictions were relaxed (AMSTAR rating 1/9) **Experiences from other countries** • No information found on the experiences of other countries **Experiences from Canadian provinces and territories** • No information found on Canadian experiences
What approaches directly complement testing? • Prospective quarantining of exposed or potentially exposed individuals while awaiting test results	**Highly relevant evidence documents** • Guidelines developed using a robust process o Home-care patients with COVID-19 presenting with mild symptoms should only be released from home isolation after testing negative using PCR testing twice from samples collected at least 24 hours apart (WHO technical guidance)	**Highly relevant evidence documents** • No highly relevant documents found **Experiences from other countries** • No information found on the experiences of other countries

Sub-questions	Virus testing	Antibody testing
• Isolation of confirmed cases • 'Closing' settings with one or more positive tests to visitors • Contact tracing • Other	o To return to work after a COVID-19 illness, employees should have at least two consecutive nasopharyngeal swab specimens collected more than 24 hours apart that test negative (U.S. CDC) **Experiences from other countries** • In China, contact tracing has been prioritized by actively testing close contacts of COVID-19 cases as well as all of those in contact with cluster investigations o Asymptomatic persons who have been in contact and test positively are put under a 14-day centralized medical observation • In Germany, following testing, individuals are asked to self-isolate until they receive the results from their tests at which time they are provided with additional instructions from local public-health authorities • In Denmark, contact tracing is taking place to complement testing with those who have been in contact with a positive case asked to self-isolate until their own test results are returned • In South Korea, strong contact tracing measures have been implementing leveraging data from mobile phones, credit card transactions and CCTV cameras **Experiences from Canadian provinces and territories** • All provinces recommend individuals to self-isolate while awaiting test results and have maintained their self-isolation requirements for those with positive tests unless treatment is needed	**Experiences from Canadian provinces and territories** • No information found on Canadian experiences
What part of the health system should lead the approaches that directly complement the testing? • Primary care • Hospitals • Public health	**Highly relevant evidence documents** • No highly relevant documents found **Experiences from other countries** • No information found on the experiences of other countries **Experiences from Canadian provinces and territories**	**Highly relevant evidence documents** • No highly relevant documents found **Experiences from other countries** • No information found on the experiences of other countries

Sub-questions	Virus testing	Antibody testing
• Others	• No information found on Canadian experiences	**Experiences from Canadian provinces and territories** • No information found on Canadian experiences

Table 2: Overview of type and number of documents that were identified

Type of document	Total	Who should be tested?	How frequently should they be tested?	Where should they be tested?	What part of the health system should lead the testing?	What is the basis for the above decisions?	What approaches directly complement testing?	What part of the health system should lead the complementary approaches?
Guidelines developed using a robust process (e.g., GRADE)	9	7	2	0	1	4	3	0
Full systematic reviews	1	0	0	1	0	1	0	0
Rapid reviews	4	3	1	2	0	1	0	0
Guidelines developed using some type of evidence synthesis and/or expert opinion	2	1	0	0	1	0	0	0
Protocols for reviews that are underway	0	0	0	0	0	0	0	0
Titles/questions for reviews that are being planned	6	4	3	0	0	2	1	0
Single studies in areas where no reviews were identified	16	4	4	4	1	5	2	0

Table 3: International experiences with testing for COVID-19

Country	Key findings
China	• Implementing the principles of "testing all who need" and "testing all who seek" o Based on the capacity for testing and the needs for epidemic prevention and control, different regions may take the principles of "testing all who need" for key populations such as those with close contact to cases, inbound passengers, patients in fever clinic, newly admitted patients and their caregivers, staff in medical institutions, customs (immigration inspection, health and quarantine) staff, staff in prisons and social welfare nursing homes. For other populations, the principle is "testing all who seek". o On April 8, Wuhan City lifted the control measures for channels and passage. In order to promote the safe and orderly flow of people leaving Wuhan, key groups of people who are leaving Wuhan (i.e., people who go to their destinations to work in public places, transportation services, pension institutions, prisons and other special places, and teachers, healthcare workers, and workers in relatively closed places) should follow the principle of "testing all who need" to go to qualified health facilities and other institutions for nucleic acid-based testing for COVID-19. The cost of the test for people following the principle of "testing all who need" was covered and coordinated by Hubei Province and Wuhan City. Other populations should follow the principle of "testing all who seek" and the costs will be paid by themselves. Those who have received the serum specific IgG antibody test and got a positive result will not need nucleic acid test. o In areas with relatively dense populations with higher mobility, and other key areas with borders and ports, the disease prevention and control institutions at the county level and higher, and secondary or higher hospitals, shall strive to strengthen capacity for nucleic acid testing; and encourage qualified societal testing bodies to provide testing services and expand commercial applications. Each region should promptly issue lists of testing agencies. • On 8 April 2020, China's State Council Joint Prevention and Control Mechanism Against COVID-19 issued the protocol for the management of asymptomatic persons infected with COVID-19 virus. o Testing of asymptomatic persons has been prioritized by: actively testing close contacts of COVID-19 cases; actively testing during cluster investigations; actively testing people who have been found to be exposed while tracing an infection source; actively testing people that have a travel or residential history in areas abroad with sustained COVID-19 transmission; and actively testing individuals found through epidemiological investigation. o Asymptomatic infected persons should be placed under medical observation for 14 days and close contacts of asymptomatic infected persons should be put under 14-day centralized medical observation. • On 7 March 2020, the National Health Commission of the People's Republic of China published the protocol for prevention and control of COVID-19 (Edition 6) which included the following recommendations about testing for different populations in different settings. o For individuals with respiratory symptoms such as fever and dry cough and digestive tract symptoms such as diarrhea of unknown cause in healthcare facilities, their specimen should be collected for testing. o For people who travelled to or resided in Wuhan and its surrounding areas within 14 days, people who travelled to or resided in communities where confirmed cases have been reported, and people who travelled to or resided in countries and areas with COVID-19 pandemic, if they developed respiratory symptoms such as fever and dry cough and digestive tract symptoms such as diarrhea, their specimen should be collected for testing. o For individuals with respiratory symptoms such as fever and dry cough and digestive tract symptoms such as diarrhea in the inbound and outbound ports, their specimen should be collected for testing.

Country	Key findings
	○ For close contacts who developed respiratory symptoms such as fever and dry cough and digestive tract symptoms such as diarrhea, their specimen should be collected for testing.
Germany	• In Germany, testing prioritization is given to: ○ those displaying COVID-19 symptoms; ○ those who have had contact with a confirmed COVID-19 patient in the last two weeks; ○ those with pre-existing conditions (e.g., immunocompromised); and ○ those whose employment places them in contact with individuals who are considered vulnerable (e.g., working in hospitals, elderly care). • In addition, large-scale, system-wide testing and voluntary antibody testing for employed medical personnel was established in early April. • Following testing, individuals are asked to self-isolate, respect hand hygiene and use a mask where contact with others in not avoidable. • Testing strategies have been run primarily by public health, in particular those at the local authority level, who are also responsible for contact tracing. • As a follow-up measure, the government launched the development of a voluntary smartphone app with Bluetooth to trace possible chains of COVID-19.
Denmark	• Danish Health Authority has asked that those who are symptomatic and the following asymptomatic individuals are prioritized for testing: ○ those who have been in close contacts with a person with a confirmed COVID-19 case; ○ inhabitants of nursing-care homes (and other institutions) as well as front-line nursing-home personnel in case of infection among inhabitants or colleagues; ○ patients expected to be hospitalized for 24 hours or more, independent of the patient's condition; ○ patients who are going to attend certain elective procedures at a specialist, dentist or outpatient clinic at a hospital; and ○ women giving birth, regardless of the duration of their stay in hospital. • In addition, systematic, standardized tests are being rolled out for: ○ employees in the healthcare sector; ○ employees of other social institutions such as those working in probation services or in homeless shelters; and ○ employees working with people at increased risk including patients in ongoing immunosuppressive treatment, innate or acquired compromised immune system, immobile persons, and the elderly (over the age of 80). • When outbreaks are suspected, systematic testing of all those affected by the outbreak is undertaken with a repeat test provided one week later to establish whether the outbreak is under control. • As of April 22, the Danish Health Authority has asked regions to establish temporary testing facilities away from hospitals. • With respect to tracing, individuals testing positive for COVID-19 will be asked to provide a list of those individuals with whom they have been in contact. ○ Close contacts will be offered testing on day 4 and day 6 of the initial contact and urged to enter into self-isolation until they have received a negative result of their own testing. • The government has announced the development of a new agency, which will be in operation in August, to take over responsibility for the coordination of testing and provision of personal protective equipment.
South Korea	• South Korea has established strong testing infrastructure including test-kit production, distribution and laboratory analysis and has combined this with tracking and tracing efforts.

Country	Key findings
	• General population-wide testing has been implemented using a number of innovative models including testing drive-throughs as well as testing "phone booths" where health workers administered throat swabs using thick rubber gloves built into walls. • After testing suspected cases, the ones testing positive are tracked, provided with treatment (where necessary), and ordered into self-isolation. o Those in isolation following a positive test are asked to download a mobile phone application, which alerts officials if a patient breaks isolation. • A wide range of tracing strategies are begin used including data from mobile phones on locations, the use of CCTV cameras, as well as credit and debit card transactions. o When a person tests positive, detailed information regarding their movements is sent by text message to residents living nearby as well as alerting individuals with whom the individual had contact. • Concerns around privacy with these measures act as a significant downside and are thought to prevent some infected people from coming forward.
Sweden	• To confirm COVID-19 PCR-tests are performed in the following priority order: o all patients seeking any type of healthcare, individuals with specific risk factors, and persons in long-term care; o personnel in the healthcare and social-care systems; o personnel in other critical societal sectors; and o other relevant parts of society. • The government has tasked the Public Health Agency to develop their testing strategy and to increase testing capacity.
Switzerland	• Testing is being recommended for all persons with: o symptoms of an acute respiratory disease and/or with sudden onset anosmia or ageusia; o asymptomatic persons seeking care from hospitals; and o older adults living in nursing homes. • Testing for asymptomatic populations is prioritized by cantons and primary-care professionals who refer patients to be tested. o Cantons are also responsible for determining the procedure for diagnostic investigation of patients with suspected COVID-19 cases. • Discussions are ongoing related to antibody testing with a network of 12 Swiss universities recently launching a nationwide study to examine the number of people that have already been infected with COVID-19 and to examine immunity and its lasting effects.
United Kingdom	• Testing is prioritized for the following groups: o anyone displaying symptoms of COVID-19; o all critical care admissions; o symptomatic and asymptomatic individuals exposed to an outbreak; o anyone discharged from hospital to a care home; o asymptomatic care-home residents and members of the public over the age of 65; o anyone who has to go out to work; o asymptomatic health and social-care workers; and o pupils, teachers and family members who are attending school as of June 1. • Widespread antibody testing is presumed to be rolled out beginning with health and social care workers.

Country	Key findings
	• Testing has gradually shifted away from hospitals, with the establishment of 50 drive-through testing facilities, mobile testing units for front-line essential workers, and implementation of self-testing kits via a national self-referral portal. o In addition, self-testing is being implemented for health and social-care staff members using on-site assessment pods previously used for testing ambulatory patients in the community.

Table 4: Canadian provinces' and territories' experiences with testing for COVID-19

Province/ territory	Key findings
B.C.	• As of 2 June 2020, testing is recommended for anyone with cold, influenza or COVID-19-like symptoms, even mild ones (e.g., fever, chills, cough, shortness of breath, sore throat and painful swallowing, stuffy or runny nose, loss of sense of smell, headache, muscle aches, fatigue, and loss of appetite). The public can use the BC COVID-19 Self-Assessment Tool to help determine if they need further testing by a healthcare provider or at a local collection centre. • On 1 June 2020, the COVID-19: Testing Guidelines for British Columbia indicated that individuals in the following groups should be prioritized for testing: o residents and staff of long-term care facilities; o individuals requiring admission to hospital or likely to be admitted, such as pregnant individuals near-term; o patients on hemodialysis, or cancer patients receiving radiation or chemotherapy; o healthcare workers; o individuals with a higher probability of being infected with COVID-19 such as contacts of a known case of COVID-19 and travellers just returned to Canada; o residents of remote, isolated, or Indigenous communities; o people living in congregate settings such as work-camps, correctional facilities, shelters, group homes, assisted living and seniors' residences; o people who are homeless or have unstable housing; and o essential service providers, such as first responders. • Asymptomatic individuals do not require a test. • Healthcare providers can order a COVID-19 test for any patient based on their clinical judgment. • Individuals should self-isolate while they wait for their test result. • After a negative COVID-19 test, there are still self-isolation requirements for: those with symptoms; those exposed to a case of COVID-19; international travellers returning to Canada; and healthcare providers.
Alberta	• As of 2 June 2020, testing is available in Alberta to any person without symptoms who wants to be tested, but the following groups continue to be prioritized for testing: o any person exhibiting any symptom of COVID-19; o all close contacts of confirmed COVID-19 cases;

Province/ territory	Key findings
	o all workers and/or residents at specific outbreak sites; o all workers and residents at long-term care and level 4 supportive living facilities; and o all patients admitted to continuing care or transferred between continuing care and hospital settings. • In addition, testing will be prioritized for individuals in the following roles: o healthcare workers; o group home, disability support and shelter workers; o first responders, including firefighters and EMS; o those involved in COVID-19 enforcement, including police, peace officers, bylaw officers, environmental-health officers, and fish and wildlife officers; and o correctional facility staff, working in either a provincial or federal facility. • Individuals can book a testing appointment with the online COVID-19 self-assessment tool.
Saskatchewan	• As of 2 June 2020, testing is strongly recommended in Saskatchewan for anyone who has unexplained new or worsening symptoms (even mild symptoms) that may include one or more of the following: fever; cough; headache; muscle and/or joint aches and pains; sore throat; chills; runny nose; nasal congestion; conjunctivitis; dizziness; fatigue; nausea/vomiting; diarrhea; loss of appetite (difficulty feeding for children); loss of sense of taste or smell; shortness of breath; and difficulty breathing. • Testing will also be available for: o immunocompromised asymptomatic individuals (e.g., cancer patients); o patients being admitted to an acute-care hospital for a stay anticipated to be greater than 24 hours (including all expectant mothers entering a health facility to give birth); o individuals who are homeless or living in other vulnerable settings; o healthcare workers caring for certain immunocompromised patients; o any one working outside the home, including those currently working, or returning to work as part of the Reopen Saskatchewan plan, who desire a test; and o mobile (worksite) testing for high volume work settings (factories, industrial settings, etc.) for individuals requesting a test. • Testing for COVID-19 is available by referral only and not for walk-in testing.
Manitoba	• As of 2 June 2020, Manitoba is offering testing to all symptomatic individuals (symptoms include fever, cough, runny nose and sore throat). o Individuals are advised to take the self-assessment test ahead of visiting a screening location. • On 20 May 2020, testing was expanded to some asymptomatic individuals, including: o those visiting an ER, urgent care or a community-testing site; and o those admitted to acute-care or long-term care facilities.
Ontario	• On 28 May 2020, Ontario updated its COVID-19 Provincial Testing Guidance. o Any individual presenting with at least one symptom or sign should be considered for testing (fever, new or worsening cough, shortness of breath, sore throat, difficulty swallowing, new olfactory or taste disorders, nausea/vomiting, diarrhea, abdominal pain, runny nose or nasal congestion). Other atypical symptoms should be considered, particularly in children, older adults, and people living with a developmental disability.

Province/ territory	Key findings
	o Asymptomatic individuals who have been in contact with a confirmed case should be considered for testing. If they test negative and the contact becomes symptomatic, they should be re-tested and they should remain in self-isolation for 14 days from their last exposure to the case. o Guidance is also offered for specific settings (e.g., facility transfers, hospitals, long-term care facilities and retirement homes, workplaces and community settings) and for specific populations (e.g., healthcare workers, caregivers, first responders, essential workers, cross-border workers, newborns, asymptomatic cancer patients, pre-operative patients).
Quebec	• Since 4 May 2020, anyone who has symptoms similar to those of COVID-19 will have to call the line 1-877-644-4545, where their condition will be assessed in order to schedule an appointment with them at a designated screening clinic (CDD), if applicable, or a designated assessment clinic (CDE). • Six groups have been prioritized for testing: o G1: symptomatic patients hospitalized or requiring regular care in hospital settings, in particular symptomatic hospitalized patients (including the tests required for the lifting of isolation), symptomatic patients of hemodialysis units, symptomatic emergency patients whose condition justifies hospitalization or who have risk factors for complications, symptomatic pregnant women in the third trimester and people who must accompany a woman to a delivery, when symptomatic at the end of the pregnancy; o G2: symptomatic health professionals in direct contact with patients (including the tests required for return-to-work measures); o G3: users and staff in residential and long-term care centres, private seniors' residences and intermediate and family-type resources as soon as a new non-isolated positive case is identified, those experiencing hospital-to-home transitions, symptomatic people living in other at-risk environments (e.g., homeless shelters) and in living environments with older adults (70+); o G4: symptomatic individuals from all communities (including areas in reopening: schools, daycare, factories, mines, construction, etc.); o G5: first responders or workers in the public security system (e.g., police and firefighters, correctional officers) and other symptomatic workers providing services deemed critical/essential; and o G6: close contacts of cases, symptomatic or asymptomatic. • Symptomatic individuals can get tested at a designated screening or assessment clinic, a drive-through screening clinic, or an outdoor clinic. • On 1 May 2020, the government released detailed instructions for people with COVID-19 symptoms who are waiting to be tested or waiting for their test result.
New Brunswick	• As of 2 June 2020, New Brunswick continues to encourage all symptomatic people to present for COVID-19 testing. Individuals can access testing independently by calling 811 or through their primary-care provider. • On 28 April 2020, the government expanded the list of symptoms required to get a test (from eligibility for testing with two of five listed symptoms to two of nine listed symptoms).
Nova Scotia	• The Nova Scotia Health Authority has established COVID-19 assessment centres. If an individual needs in-person assessment, 811 will refer them to a centre. • Individuals waiting for their test results should self-isolate for 14 days.
Prince Edward Island	• As of 2 June 2020, PEI recommends testing for COVID-19 for the following individuals: o any person with COVID-19 symptoms;

Province/ territory	Key findings
	○ any person who was in close contact of a laboratory-confirmed case starting 48 hours prior to the case developing symptoms; ○ any person hospitalized with influenza-like illness: fever and new or worsening cough, sore throat, joint pain, muscle aches, fatigue; ○ any person admitted to the intensive-care unit with any respiratory symptom; ○ admitted patients to Hillsborough Hospital, Provincial Addictions Treatment Facility, and Prince County Hospital Inpatient Psychiatry Unit; ○ any healthcare worker with fever, new or worsening cough, sore throat, runny nose, sneezing, congestion or unusual fatigue; ○ healthcare workers who travel to P.E.I. to work or who traveled out of the province; ○ staff of the QEH Microbiology Laboratory; ○ long-term and community-care residents and staff; ○ new residents are to be tested prior to admission; ○ any resident with fever, new or worsening cough, sore throat, runny nose, sneezing, congestion or unusual fatigue; ○ all staff and residents who are close contacts of a positive case; ○ long-term care staff who work at more than one healthcare site should be tested on a regular basis; ○ patients transferring between healthcare facilities as per protocol; ○ temporary foreign workers prior to the end of their 14-day self-isolation; ○ essential workers with frequent travel outside of P.E.I. (e.g., long-haul truck drivers); and ○ any other individual or group as indicated by P.E.I.'s Chief Public Health Officer or Medical Microbiologist.
Newfoundland and Labrador	• As of 2 June 2020, individuals who develop symptoms of COVID-19 are advised to complete the 811 self-assessment tool to determine if they should call 811. • If it is determined by 811 that an individual requires testing, this will be arranged through Public Health. • Testing may be completed in the home, at a drive-through testing site, or another location as determined by Public Health.
Yukon	• Individuals should take the COVID-19 self-assessment to determine if they should be tested. ○ Individuals should be tested if they have travelled or have had close contact with a person with a recent travel history who was or is now symptomatic, or are a known close contact to a confirmed case of COVID-19, and have any of the following symptoms: cough, fever/chills, sore throat, headache, runny nose or nasal congestion, vomiting, diarrhea, fatigue or muscle aches, or difficulty breathing. ○ Individuals should also be tested if they have not travelled outside of Yukon but have the following symptoms: cough, fever and/or chills, or difficulty breathing.
Northwest Territories	• The government recommends that anyone experiencing symptoms of COVID-19 should call a healthcare provider, who may recommend a test. • Test swabs are collected by a healthcare provider and then sent to Alberta to be processed. Some health facilities are collecting swabs in "drive-by" testing sites.
Nunavut	• The government of Nunavut produced a self-assessment tool to help determine whether individuals should be tested for COVID-19. Testing is recommended based on symptoms and identified exposure either by high-risk contact and/or returned from travel.

Wilson MG, Waddell K, Gauvin FP, Mansilla C, Moat KA, Wang Q, Voorheis P, Bhuiya AR, Ahmad A, Lavis JN. COVID-19 rapid evidence profile #12: What insights from the available evidence and jurisdictional scans can inform who should be tested for COVID-19 and how frequently, where, by whom and with what follow-up actions should they be tested? Hamilton: McMaster Health Forum, 2 June 2020.

The McMaster Health Forum is one of the three co-leads of RISE, which is supported by a grant from the Ontario Ministry of Health to the McMaster Health Forum. To help Ontario Health Team partners and other health- and social-system leaders as they respond to unprecedented challenges related to the COVID-19 pandemic, the Forum is preparing rapid evidence responses like this one. The opinions, results and conclusions are those of the McMaster Health Forum and are independent of the ministry. No endorsement by the ministry is intended or should be inferred.

The authors declare that they have no professional or commercial interests relevant to the rapid evidence profile. The funders played no role in the identification, selection, assessment, synthesis, or presentation of the research evidence or experiences profiled in the rapid evidence profile.

Appendix 1: Methodological details

We use a standard protocol for preparing each rapid evidence profile (REP) to ensure that our approach to identifying research evidence as well as experiences from other countries and from Canadian provinces and territories are as systematic and transparent as possible in the time we were given to prepare the profile.

Identifying research evidence

For each REP, we search our continually updated guide to key COVID-19 evidence sources for:
1) guidelines developed using a robust process (e.g., GRADE);
2) full systematic reviews;
3) rapid reviews;
4) guidelines developed using some type of evidence synthesis and/or expert opinion;
5) protocols for reviews or rapid reviews that are underway;
6) titles/questions for reviews that are being planned; and
7) single studies (when no guidelines, systematic reviews or rapid reviews are identified).

Each source for these documents is assigned to one team member who conducts hand searches (when a source contains a smaller number of documents) or keyword searches to identify potentially relevant documents. A final inclusion assessment is performed both by the person who did the initial screening and the lead author of the rapid evidence profile, with disagreements resolved by consensus or with the input of a third reviewer on the team. The team uses a dedicated virtual channel to discuss and iteratively refine inclusion/exclusion criteria throughout the process, which provides a running list of considerations that all members can consult during the first stages of assessment.

During this process we include published, pre-print and grey literature. We do not exclude documents based on the language of a document. However, we are not able to extract key findings from documents that are written in languages other than Chinese, English, French or Spanish. We provide any documents that do not have content available in these languages in an appendix containing documents excluded at the final stages of reviewing.

Identifying experiences from other countries and from Canadian provinces and territories

For each rapid evidence profile we collectively decide on what countries to examine based on the question posed. For other countries we search relevant sources included in our continually updated guide to key COVID-19 evidence sources. These sources include government-response trackers that document national responses to the pandemic. In addition, we conduct searches of relevant government and ministry websites. In Canada, we search websites from relevant federal and provincial governments, ministries and agencies (e.g., Public Health Agency of Canada).

While we do not exclude countries based on language, where information is not available through the government-response trackers, we are unable to extract information about countries that do not use English, Chinese, French or Spanish as an official language.

Assessing relevance and quality of evidence

We assess the relevance of each included evidence document as being of high, moderate or low relevance to the question and to COVID-19. We then use a colour gradient to reflect high (darkest blue) to low (lightest blue) relevance.

Two reviewers independently appraise the methodological quality of systematic reviews and rapid reviews that are deemed to be highly relevant. Disagreements are resolved by consensus with a third reviewer if needed. AMSTAR rates overall methodological quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. High-quality reviews are those with scores of eight or higher out of a possible 11, medium-quality reviews are those with scores between four and seven, and low-quality reviews are those with scores less than four. It is important to note that the AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to systematic reviews pertaining to health-system arrangements or to economic and social responses to COVID-19. Where the denominator is not 11, an aspect of the tool was considered not relevant by the raters. In comparing ratings, it is therefore important to keep both parts of the score (i.e., the numerator and denominator) in mind. For example, a review that scores 8/8 is generally of comparable quality to a review scoring 11/11; both ratings are considered 'high scores.' A high score signals that readers of the review can have a high level of confidence in its findings. A low score, on the other hand, does not mean that the review should be discarded, merely that less confidence can be placed in its findings and that the review needs to be examined closely to identify its limitations. (Lewin S, Oxman AD, Lavis JN, Fretheim A. SUPPORT Tools for evidence-informed health Policymaking (STP): 8. Deciding how much confidence to place in a systematic review. *Health Research Policy and Systems* 2009; 7 (Suppl1):S8.

Preparing the profile

Each included document is hyperlinked to its original source to facilitate easy retrieval. For all included guidelines, systematic reviews, rapid reviews and single studies (when included), we prepare declarative headings that provide a brief summary of the key findings and act as the text in the hyperlink. Protocols and titles/questions have their titles hyperlinked given that findings are not yet available. We then draft a brief summary that highlights the total number of different types of highly relevant documents identified (organized by document), as well as their key findings, date of last search (or date last updated or published), and methodological quality.

Appendix 2: Evidence documents that address the question, organized by document type and sorted by relevance to the question and COVID-19

Type of document	Relevance to question	Focus	Recency or status
Guidelines developed using a robust process (e.g., GRADE)	• Who should be tested for the virus? o Symptomatic • How frequently should they be tested? o With fixed periodicity • What approaches directly complement testing? o Isolation of confirmed cases	Home-care patients with COVID-19 presenting with mild symptoms should only be released from home isolation after testing negative using PCR testing twice from samples collected at least 24 hours apart (WHO technical guidance)	17 March 2020
	• Who should be tested for the virus? o Symptomatic o Asymptomatic ▪ High risk based on contextual factors ▪ High risk based on individual factors ▪ High risk based on a combination of contextual and risk factors	Nucleic acid testing for all symptomatic individuals suspected of having COVID-19 is recommended, as well as for asymptomatic individuals with known or suspected contact with a COVID-19 case (Infectious Diseases Society of America)	6 May 2020
	• Who should be tested for the virus? o Symptomatic o Asymptomatic ▪ High risk based on contextual factors ▪ High risk based on individual factors ▪ High risk based on a combination of contextual and risk factors • What is the basis for the above decisions? o Other	The decision to test should be based on clinical and epidemiological factors, and should be linked to an assessment of the likelihood of infection (WHO technical guidance)	2 March 2020
	• Who should be tested for the virus? o Asymptomatic ▪ High risk based on a combination of contextual and risk factors • What part of the health system should lead the testing? o Other	Patients and residents who enter long-term care facilities should be screened for COVID-19 through testing (Centers for Medicare & Medicaid Services and U.S. CDC)	2 April 2020
	• Who should be tested for the virus? o Symptomatic	To return to work after a COVID-19 illness, employees should have at least two consecutive	22 April 2020

Type of document	Relevance to question	Focus	Recency or status
	• How frequently should they be tested? o With fixed periodicity • What approaches directly complement testing? o Isolation of confirmed cases	nasopharyngeal swab specimens collected more than 24 hours apart that test negative (U.S. CDC)	
	• What is the basis for the above decisions? o Optimizing test allocations given supply limitations	Prioritized testing strategies could vary based on four transmission scenarios: when there are no cases, sporadic cases, clusters of cases, and community transmission (WHO technical guidance)	21 March 2020
	• Who should be tested for the virus? o Symptomatic o Asymptomatic ▪ Other • What is the basis for the above decisions? o Optimizing test allocations given supply limitations	It is recommended to establish a priority system for diagnostic testing for SARS-CoV-2 infection based on the availability of tests (U.S. CDC)	3 May 2020
	• Who should be tested for the virus? o Symptomatic • What is the basis for the above decisions? o Optimizing the value of the test given sensitivity and specificity considerations	False-negative test results can occur, thus a single negative test does not completely exclude SARS-CoV-2 infection, and testing should be repeated (especially in people with a high likelihood of infection based on exposure history and/or clinical present (U.S. National Institutes of Health)	12 May 2020
	• What approaches directly complement testing? o Prospective quarantining of exposed or potentially exposed individuals while awaiting test results o Isolation of confirmed cases ▪ Contact tracing	For home-care patients, testing may be complemented with the isolation of pending diagnosis and confirmed cases of COVID-19 and contact tracing of those who have been exposed to individuals between two and 14 days after the onset of the symptoms (WHO technical guidance)	Published 17 March 2020
Full systematic reviews	• Where should they be tested? o Regular healthcare settings • What is the basis for the above decisions? o Optimizing the value of the test given sensitivity and specificity considerations	Rapid point-of-care diagnostic tests for COVID-19 are necessary, but need to be adequately sensitive and specific (AMSTAR rating 8/11)	Literature searched until 13 April 2020
Rapid reviews	• Who should be tested o Asymptomatic ▪ High risk based on contextual factors	COVID-19 testing before surgery is recommended for people undergoing surgeries perceived as high risk, notably upper gastrointestinal, ear nose and	Last updated 21 April 2020

Type of document	Relevance to question	Focus	Recency or status
		throat, neurosurgery and interventional cardiac services (AMSTAR rating 3/9)	
	• Who should be tested o Asymptomatic ▪ High risk based on contextual factors • How frequently should they be tested o With a clear decision rule around other triggers ▪ Outbreak management	Accumulating case reports suggest that testing of all persons at the site of outbreaks in places such as long-term care residences, hospitals and homeless shelters can reduce transmission chains (AMSTAR rating 3/9)	Last updated 29 April 2020
	• Where should they be tested? o Centralized testing centres o Mobile clinics o Regular healthcare settings • What is the basis for the above decisions? o Optimizing the value of the test given sensitivity and specificity considerations o Other	Moving diagnostic testing for COVID-19 from laboratory settings to the point of care is potentially transformative in the rate and quantity of testing, in particular the antibody-based tests could help to ascertain suitability of infected healthcare workers to return to front-line health services and to inform public-health strategies at the end of periods of lockdown or as social distancing restrictions were relaxed (AMSTAR 1/9)	Last updated 7 April 2020
	• Who should be tested for the virus? o Asymptomatic ▪ High risk based on contextual factors ▪ Other • Where should they be tested? o Other	No literature or evidence-based guidelines were identified regarding clinical effectiveness or recommendations of testing all new admissions or mass testing (i.e., testing everyone within the facility) for COVID-19 in correctional facilities.	Last updated 1 May 2020
Guidelines developed using some type of evidence synthesis and/or expert opinion	• What part of the health system should lead the testing? o Other	Labs play key roles in diagnostic and serological testing, as well as biomedical monitoring (e.g., for severity assessment of COVID-19 patients), and must have extensive independent analytics validation, strict pre-analytical operating procedures to reduce errors, clear consideration of patient characteristics and test time, as well as ongoing advocacy for the appropriate implementation of diagnostic tests	
	• Who should be tested for the virus? o Symptomatic o Asymptomatic ▪ High risk based on contextual factors	Testing should first be prioritized for hospitalized patients and symptomatic healthcare workers, and then for symptomatic patients who are 65 years or older and reside in a long-term care facility, patients	

Type of document	Relevance to question	Focus	Recency or status
	▪ High risk based on individual factors ▪ High risk based on a combination of contextual and risk factors	with underlying medical conditions and first responders	
Protocols for reviews that are underway	None identified		
Titles/questions for reviews that are being planned	• Who should be tested for the virus? o Symptomatic o Asymptomatic ▪ Random ▪ High risk based on contextual factors ▪ High risk based on individual factors ▪ High risk based on a combination of contextual and risk factors ▪ Concerned individuals ▪ Other • How frequently should they be tested? o With fixed periodicity o With a clear decision rule about other triggers ▪ Outbreak management ▪ Targeted campaigns where outbreak concerns exist • What is the basis for the above decisions? o Optimizing the value of the test given sensitivity and specificity considerations o Optimizing test allocations given supply limitations o Other	What is the most effective Covid-19 screening strategy?	Question in development
	• Who should be tested for the virus? o Symptomatic o Asymptomatic ▪ Random ▪ High risk based on contextual factors ▪ High risk based on individual factors ▪ High risk based on a combination of contextual and risk factors	Universal screening for SARS-CoV-2	Question in development

Type of document	Relevance to question	Focus	Recency or status
	▪ Concerned individuals ▪ Other • How frequently should they be tested? o With fixed periodicity o With a clear decision rule about other triggers ▪ Outbreak management ▪ Targeted campaigns where outbreak concerns exist • What is the basis for the above decisions? o Optimizing the value of the test given sensitivity and specificity considerations o Optimizing test allocations given supply limitations o Other		
	• Who should be tested for the virus? o Symptomatic o Asymptomatic o Random ▪ High risk based on contextual factors ▪ High risk based on individual factors ▪ High risk based on a combination of contextual and risk factors ▪ Concerned individuals ▪ Other	Antibody tests for identification of current and past infection with SARS-CoV-2	Question in development
	• How frequently should they be tested? o With fixed periodicity o With a clear decision rule about other triggers ▪ Outbreak management ▪ Targeted campaigns where outbreak concerns exist	Routine laboratory testing to determine if a patient has COVID-19 pneumonia or SARS-CoV-2	Question in development
	• What approaches directly complement testing? o Prospective quarantining of exposed or potentially exposed individuals while awaiting test results o Isolation of confirmed cases	Population screening as an option for the long-term isolation of COVID-19 in the entire population	Question in development

Type of document	Relevance to question	Focus	Recency or status
	○ 'Closing' settings with one or more positive tests to visitors ○ Contact tracing ○ Other		
	• Who should be tested for the virus? ○ Symptomatic ○ Asymptomatic ▪ Random ▪ High risk based on contextual factors ▪ High risk based on individual factors ▪ High risk based on a combination of contextual and risk factors ▪ Concerned individuals ▪ Other	Rapid point-of-care tests for diagnosis of SARS-CoV-2 infection	Question in development
Single studies in areas where no reviews were identified	• Who should be tested for the virus? ○ Symptomatic ○ Asymptomatic ▪ High risk based on individual factors	An evidence-based approach to COVID-19 testing which at least includes fever and loss of taste or smell should be utilized when determining which healthcare workers should be tested	Published 12 May 2020
	• Who should be tested for the virus? ○ Asymptomatic ▪ High risk based on individual factors • How frequently should they be tested? ○ With fixed periodicity	Tests were performed at day zero and day five on 337 asymptomatic passengers who were repatriated to France, and it was found that by optimizing the sampling process, sending samples sequentially and reducing the time-scale for biological analysis, it was possible to test the samples within five hours (including sampling, shipment and biological tests)	Published 14 March 2020
	• How frequently should they be tested? ○ With fixed periodicity	Early active case detection combined with daily sequential sampling of upper respiratory tract specimens over two days has allowed for detection of the majority of COVID-19 cases in a cohort from the National Centre for Infectious Diseases (Singapore), but caution should be taken in interpreting negative results in patients with suspicious clinical or epidemiological features, and a decision-making matrix or adjunctive CT scans of the thorax could be implemented to guide decisions on further repeat testing and de-isolation in such patients	Published 19 April 2020

Type of document	Relevance to question	Focus	Recency or status
	• How frequently should they be tested? o With fixed periodicity	Data from 70 patients in the United States (Virginia) who underwent repeat testing suggest that short-interval testing is low yield, and that assuming that specimen collection is appropriate, the presence or absence of virus in the nasopharynx or other sites is not expected to change dramatically within 24 hours	Published 25 April 2020
	• Where should they be tested? o Other	A hospital team-based COVID-19 assessment program in the United States was used to evaluate patients outside of the traditional healthcare setting, and was found to benefit both the public health and clinical healthcare systems by increasing safety and efficiency while reducing the costs and complexity of testing for patients who do not require emergency evaluation or hospitalization	Published 12 March 2020
	• What is the basis for the above decisions? o Optimizing test allocations given supply limitations	When the incidence rate of SARS-CoV-2 infection is 10% or less, group testing will result in the saving of re-agents and personnel time with an overall increase in testing capability of at least 69%	Published 18 April 2020
	• What is the basis for the above decisions? o Optimizing test allocations given supply limitations	A single positive sample can be detected in pools of up to 32 samples using standard kits and protocols with an estimated false negative rate of 10%, and detection of positive samples diluted in even up to 64 samples may also be attainable but likely with additional amplification cycles	Published 2 May 2020
	• What is the basis for the above decisions? o Optimizing test allocations given supply limitations	Pooling of up to 30 samples per pool can increase test capacity with existing equipment and test kits and detects positive samples with sufficient diagnostic accuracy, but borderline positive single samples might escape detection in large pools (correspondence)	Published 28 April 2020
	• What is the basis for the above decisions? o Optimizing test allocations given supply limitations	For a prevalence of 10% of positive tests, 40.6% of tests can be saved using testing groups of four subjects; for 20% prevalence, 17.9% of tests can be saved using groups of three subjects; for higher prevalence rates, the strategy flattens and loses effectiveness	24 April 2020

Type of document	Relevance to question	Focus	Recency or status
	• Where should they be tested? o Other (home) • What is the basis for the above decisions? o Optimizing the value of the test given sensitivity and specificity considerations • What approaches directly complement testing? o Other (telehealth)	Saliva oropharyngeal swab or dried blood spot specimens collected at home by patients with clinician telehealth support are suitable for testing for both SARS-CoV-2 RNA and serology	Published 29 May 2020
	• Where should they be tested? o Other	Strategic planning to augment COVID-19 testing capacity in India indicated that adopting the following interventions could help increase public sector daily testing capacity to nearly 100,000-120,000 tests/day: moving to a 24-hour working model in the existing approved laboratories can enhance daily testing capacity to 40,464 tests/day (from 5,500); leveraging qRT-PCR and nucleic acid amplification test (NAAT)-based machines available with the Multidisciplinary Research Units (MRUs), National AIDS Control Organisation (NACO) and National Tuberculosis Elimination Programme (NTEP); using combination/multiplex kits; and provision of automated RNA extraction platforms at all laboratories could also optimize run time and contribute to capacity increase by 1.5-2 times.	Published 28 April 2020
	• What part of the health system should lead the testing? o Hospitals o Other (research environments that have laboratory capabilities)	Capacity to facilitate SARS-CoV-2 RNA testing during surge in cases can be facilitated by twinning research environments with clinical laboratory capabilities	Published 23 May 2020
	• What approaches directly complement testing? o Prospective quarantining of exposed or potentially exposed individuals while awaiting test results o Isolation of confirmed cases o Contact tracing	Rapid identification and isolation of cases, quarantine of close contacts, and active monitoring of other contacts have been effective in suppressing expansion of the outbreak	Published 20 March 2020

Type of document	Relevance to question	Focus	Recency or status
	• Who should be tested for the virus? o Asymptomatic ▪ High risk based on a combination of contextual and risk factors • How frequently should they be tested? o With clear decision rule abut other triggers o Other	Given potential for negative test results in pre-symptomatic patients, it is important to conduct repeat tests for those likely to be infected	Published 19 April 2020
	• Who should be tested for the virus? o Symptomatic	Testing symptomatic healthcare workers is crucial for ruling out SARS-CoV-2 and optimizing health workforce capacity during the COVID-19 pandemic	Published 9 April 2020
	• Where should they be tested? o Mobile clinics o Other (home-based testing)	Setting up a community testing team can be a cost-effective, safe and necessary step to enable individuals in self-isolation to be tested in their own homes to prevent overwhelming healthcare settings	Published 25 March 2020

Appendix 3: Abstracts for highly relevant documents

Type of document	Abstract
Single studies in areas where no reviews were identified	An evidence-based approach to COVID-19 testing which at least includes fever and loss of taste or smell should be utilized when determining which healthcare workers should be tested **Abstract** Background: Limitations on testing availability has been a challenge during the COVID-19 pandemic. An evidence based symptom criteria for identifying heath care workers (HCW) for testing, based on the probability of positive COVID-19 test results, would allow for a more appropriate use of testing resources. Methods: This was an observational study of outpatient COVID-19 testing of HCW. Prior to testing, HCW were asked about the presence of 10 symptoms. Their responses were then compared to their subsequent pharyngeal swab COVID-19 Polymerase Chain Reaction test results. These data were used to derive and evaluate a symptom based testing criteria. Results: 961 HCW were included in the analysis, of which 225 (23%) had positive test results. Loss of taste or smell was the symptom with the largest positive likelihood ratio (3.33). Dry cough, regardless of the presence or absence of other symptoms, was the most sensitive (74%) and the least specific (32%) symptom. The existing testing criteria consisting of any combination of one or more of three symptoms (fever, shortness of breath, dry cough) was 93% sensitive and 9% specific (AUC = 0.63, 95% CI: 0.59 – 0.67). The derived testing criteria consisting of any combination of one or more of two symptoms (fever, loss of taste or smell) was 89% sensitive and 48% specific (AUC = 0.75, 95% CI: 0.71 – 0.78). The hybrid testing criteria consisting of any combination of one or more of four symptoms (fever, shortness of breath, dry cough, loss of taste or smell) was 98% sensitive and 8% specific (AUC = 0.77, 95% CI: 0.73 – 0.80). Conclusion: An evidence-based approach to COVID-19 testing which at least includes fever and loss of taste or smell should be utilized when determining which HCW should be tested.
	Tests were performed at day zero and day five on 337 asymptomatic passengers who were repatriated to France, and it was found that by optimizing the sampling process, sending samples sequentially and reducing the time-scale for biological analysis, it was possible to test the samples within five hours (including sampling, shipment and biological tests) **Abstract** Background An ongoing epidemic of respiratory diseases caused by a novel coronavirus (COVID 2019, SARS-CoV2) started in Wuhan, Hubei, in China at the end of December 2019. The French government decided to repatriate the 337 French nationals living in Wuhan and place them in quarantine in their home country. We decided to test them all for SARS-Cov2 twice in order to reduce anxiety among the population and decision-makers. Methods We investigated the presence of SARS-CoV-19 in asymptomatic carriers by testing all repatriated patients within the first 24 h of their arrival in France and at day 5. Viral RNA was extracted from pooled nasal and oropharyngeal swab fluids or

	sputum in the absence of nasal/oropharyngeal swabs. Detection of SARS-CoV-2 RNA was then carried out using several real-time reverse transcription (RT)-PCR assays. Results We tested 337 passengers at day 0 and day 5. All the tests for SARS-CoV2 were negative. By optimising the sampling process, sending samples sequentially and reducing the time-scale for biological analysis, we were able to test the samples within 5 h (including sampling, shipment and biological tests). Conclusion Optimising our procedures reduces anxiety and reassures the population and decision makers.
	Early active case detection combined with daily sequential sampling of upper respiratory tract specimens over two days has allowed for detection of the majority of COVID-19 cases in a cohort from the National Centre for Infectious Diseases (Singapore), but caution should be taken in interpreting negative results in patients with suspicious clinical or epidemiological features, and a decision-making matrix or adjunctive CT scans of the thorax could be implemented to guide decisions on further repeat testing and de-isolation in such patients **Abstract** The COVID-19 epidemic requires accurate identification and isolation of confirmed cases for effective control. This report describes the effectiveness of our testing strategy and highlights the importance of repeat testing in suspect cases in our cohort.
	A hospital team-based COVID-19 assessment program in the United States was used to evaluate patients outside of the traditional healthcare setting, and was found to benefit both the public-health and clinical-healthcare systems by increasing safety and efficiency while reducing the costs and complexity of testing for patients who do not require emergency evaluation or hospitalization **Abstract** Thousands of people in the United States have required testing for SARS-CoV-2. Evaluation for a special pathogen is resource intensive. We report an innovative approach to home assessment that, in collaboration with public health, enables safe evaluation and specimen collection outside the healthcare setting, avoiding unnecessary exposures and resource utilization.
	When the incidence rate of SARS-CoV-2 infection is 10% or less, group testing will result in the saving of re-agents and personnel time with an overall increase in testing capability of at least 69% **Abtract** Objectives To establish the optimal parameters for group testing of pooled specimens for the detection of SARS-CoV-2. Methods

	The most efficient pool size was determined to be five specimens using a web-based application. From this analysis, 25 experimental pools were created using 50 μL from one SARS-CoV-2 positive nasopharyngeal specimen mixed with 4 negative patient specimens (50 μL each) for a total volume of 250 μL. Viral RNA was subsequently extracted from each pool and tested using the CDC SARS-CoV-2 RT-PCR assay. Positive pools were consequently split into individual specimens and tested by extraction and PCR. This method was also tested on an unselected group of 60 nasopharyngeal specimens grouped into 12 pools. Results All 25 pools were positive with cycle threshold (Ct) values within 0 and 5.03 Ct of the original individual specimens. The analysis of 60 specimens determined that 2 pools were positive followed by identification of 2 individual specimens among the 60 tested. This testing was accomplished while using 22 extractions/PCR tests, a savings of 38 reactions. Conclusions When the incidence rate of SARS-CoV-2 infection is 10% or less, group testing will result in the saving of reagents and personnel time with an overall increase in testing capability of at least 69%.
	A single positive sample can be detected in pools of up to 32 samples using standard kits and protocols with an estimated false negative rate of 10%, and detection of positive samples diluted in even up to 64 samples may also be attainable but likely with additional amplification cycles **Abstract** Background The recent emergence of SARS-CoV-2 lead to a current pandemic of unprecedented scale. Though diagnostic tests are fundamental to the ability to detect and respond, overwhelmed healthcare systems are already experiencing shortages of reagents associated with this test, calling for a lean immediately-applicable protocol. Methods RNA extracts of positive samples were tested for the presence of SARS-CoV-2 using RT-qPCR, alone or in pools of different sizes (2-, 4-, 8-, 16-, 32- and 64-sample pools) with negative samples. Transport media of additional 3 positive samples were also tested when mixed with transport media of negative samples in pools of 8. Results A single positive sample can be detected in pools of up to 32 samples, using the standard kits and protocols, with an estimated false negative rate of 10%. Detection of positive samples diluted in even up to 64 samples may also be attainable, though may require additional amplification cycles. Single positive samples can be detected when pooling either after or prior to RNA extraction. Conclusions

	As it uses the standard protocols, reagents and equipment, this pooling method can be applied immediately in current clinical testing laboratories. We hope that such implementation of a pool test for COVID-19 would allow expanding current screening capacities thereby enabling the expansion of detection in the community, as well as in close organic groups, such as hospital departments, army units, or factory shifts.
	For a prevalence of 10% of positive tests, 40.6% of tests can be saved using testing groups of four subjects; for 20% prevalence, 17.9% of tests can be saved using groups of three subjects; for higher prevalence rates, the strategy flattens and loses effectiveness **Abstract** Coronavirus disease (Covid-19) has reached unprecedented pandemic levels and is affecting almost every country in the world. Ramping up the testing capacity of a country supposes an essential public health response to this new outbreak. A pool testing strategy where multiple samples are tested in a single reverse transcriptase-polymerase chain reaction (RT-PCR) kit could potentially increase a country's testing capacity. The aim of this study is to propose a simple mathematical model to estimate the optimum number of pooled samples according to the relative prevalence of positive tests in a particular healthcare context, assuming that if a group tests negative, no further testing is done whereas if a group tests positive, all the subjects of the group are retested individually. The model predicts group sizes that range from 11 to 3 subjects. For a prevalence of 10% of positive tests, 40.6% of tests can be saved using testing groups of four subjects. For a 20% prevalence, 17.9% of tests can be saved using groups of three subjects. For higher prevalences, the strategy flattens and loses effectiveness. Pool testing individuals for severe acute respiratory syndrome coronavirus 2 is a valuable strategy that could considerably boost a country's testing capacity. However, further studies are needed to address how large these groups can be, without losing sensitivity on the RT-PCR. The strategy best works in settings with a low prevalence of positive tests. It is best implemented in subgroups with low clinical suspicion. The model can be adapted to specific prevalences, generating a tailored to the context implementation of the pool testing strategy.

Appendix 4: Documents excluded at the final stages of reviewing

Type of document	Focus
Guidelines developed using a robust process (e.g., GRADE)	Not applicable
Full systematic reviews	Not applicable
Rapid reviews	Not applicable
Guidance developed using some type of evidence synthesis and/or expert opinion	Not applicable
Protocols for reviews that are underway	Not applicable
Titles/questions for reviews that are being planned	Not applicable
Single studies in areas where no reviews were identified	Serological tests facilitate identification of asymptomatic SARS-CoV-2 infection in Wuhan, China Detection of SARS-CoV-2 RNA and antibodies in diverse samples: Protocol to validate the sufficiency of provider-observed home-collected blood, saliva and oropharyngeal samples