Office of the Auditor General of Ontario

COVID-19 Preparedness and Management

Special Report on Laboratory Testing, Case Management and Contact Tracing

November 2020

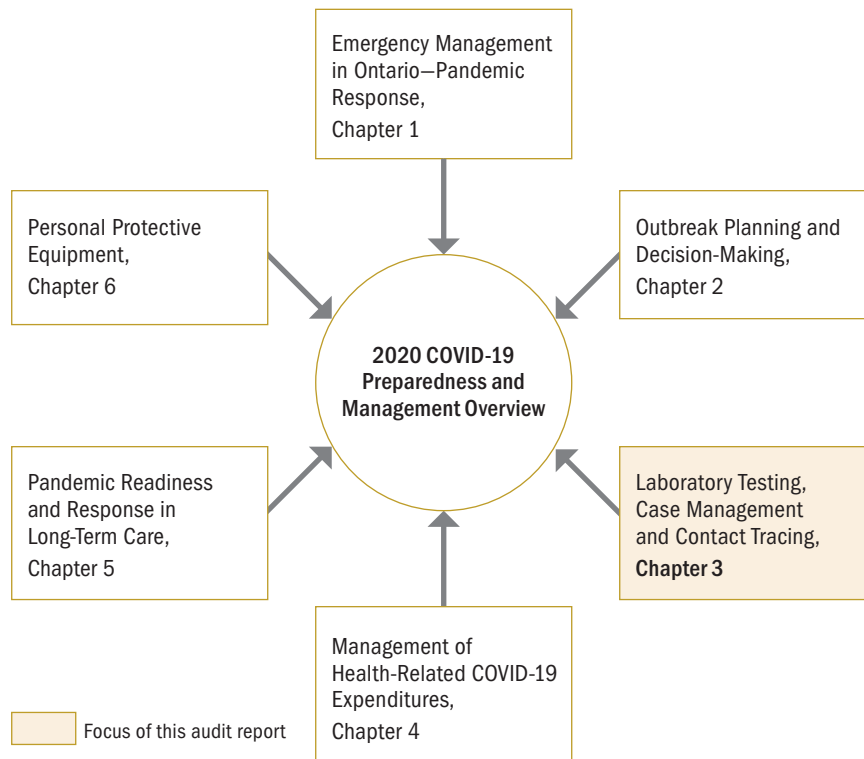# Laboratory Testing, Case Management and Contact Tracing

1.0 Summary

This report is one in a series of reports undertaken by our Office on the provinces' response to Coronavirus Disease 2019 (COVID-19) (see **Figure 1**). This report focuses on the province's COVID-19 laboratory testing, case management and contact tracing activities between January 2020 (when the first COVID-19 case in Canada was confirmed in Ontario) and August 2020.

We understand that the COVID-19 pandemic presented a challenge to health experts and government decision-makers around the world that in many ways was unprecedented in its impact and complexity. Ontario health experts and Ontario

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Figure 1: Six Key Areas of the COVID-19 Audit by the Office of the Auditor General of Ontario
Prepared by the Office of the Auditor General of Ontario

Emergency Management in Ontario—Pandemic Response, Chapter 1

Personal Protective Equipment, Chapter 6

Outbreak Planning and Decision-Making, Chapter 2

2020 COVID-19 Preparedness and Management Overview

Pandemic Readiness and Response in Long-Term Care, Chapter 5

Laboratory Testing, Case Management and Contact Tracing, **Chapter 3**

Management of Health-Related COVID-19 Expenditures, Chapter 4

Focus of this audit report

government decision-makers worked together intensively to respond to the challenges of the pandemic, which were many, as Ontario struggled with Quebec as the two provinces hardest hit by the first wave. We can be grateful that the worst-case scenarios some anticipated in the spring of 2020 did not materialize. For example, Ontario's health system was not overrun during the first wave. That being said, the work we conducted resulting in this series of COVID-19 reports has shown that there are lessons to be learned and possible new approaches and actions to be taken to help the province better continue to respond to and recover from this pandemic, as well as to better prepare ourselves for future events of this kind.

Key to containing the spread of COVID-19 are three activities: collecting and testing specimens from individuals to identify if they have COVID-19 (laboratory testing); contacting individuals who test positive to advise them regarding their condition and isolating, and to try to determine how they contracted COVID-19 (case management); and identifying and contacting the close contacts of individuals who have tested positive to advise them regarding testing and isolating (contact tracing). While academic research on COVID-19 transmission is evolving, The Lancet Public Health medical journal reported in July 2020 that when this whole process is done with no delays for a person with COVID-19, that person's potential to transmit COVID-19 to others can be reduced by 80%.

As of August 31, 2020, 148 assessment centres in Ontario were collecting specimens, and 43 laboratories were testing them. These laboratories consisted of an assortment of seven public health laboratories, 33 hospital laboratories, and three private-sector laboratories (also known as "community" laboratories). As of that date, Ontario had performed almost 3 million COVID-19 laboratory tests. About 42,400 of the almost 3 million tested (or 1.4%) tested positive. Their cases were managed and their contacts were traced, for the most part, by Ontario's 34 public health units.

While the Ministry of Health (Ministry) is the lead ministry involved in Ontario's COVID-19 response, there are a number of stakeholders involved in laboratory testing, case management and contact tracing. They include Ontario Health, Public Health Ontario, hospitals (which operate assessment centres and laboratories), community laboratories and the public health units.

Overall, we found that laboratory testing, case management and contact tracing for COVID-19 were not all being performed in a timely enough manner to contain the spread of the virus. In most cases, the Ministry's targets for these activities were not met.

For example, the Ministry has a target of laboratory tests being completed within 24 hours of a specimen being collected 60% of the time; an average of only 45% of laboratory tests were completed that quickly. Regionally, only Ottawa's public health region had met the target as of August 31, 2020. No other public health region, including the heavily populated regions of Toronto, Peel Region and York Region (dubbed the province's "hot spots") could meet the target. These "hot spot" regions also could not meet the Ministry's target of laboratory tests being completed within two days of a specimen being collected 80% of the time.

For case management, the Ministry has a target of public health units contacting 90% of individuals who have tested positive within 24 hours of the public health unit receiving the test result. As of August 2020, in the province as a whole, an average of only about 80% of individuals who tested positive had been contacted that quickly. The province's failure to meet the target was due mainly to the public health regions of Toronto, Ottawa, Peel Region and York Region taking more than a day to contact the infected individuals. The public health units in all other areas of the province either met or exceeded the 90% notification target, as shown in **Figure 18**.

For contact tracing, the Ministry has a target of public health units contacting 90% of close contacts of COVID-19 cases within one day of the public

health unit being notified. (The Ministry started tracking public health units' performance against this target on May 12.) As of August 2020, 92% of the close contacts of cases were contacted for contact tracing that quickly, performing better than the target by 2%, but there were still four public health units (Peel, Simcoe Muskoka, Thunder Bay and Windsor-Essex County) that failed to meet the 90% target (see **Figure 19**).

Since urban and densely populated regions in Ontario (such as Toronto, Peel Region, Ottawa and York Region) had more COVID-19 cases, these regions had a higher demand for laboratory testing, more cases to manage and more contacts to trace. As shown in **Figure 2**, between March and August 2020, it took a longer-than-average time for these regions to test specimens and start case management: the average time in other regions was 2.75 days from the time the specimen was collected, Ottawa's average time was 3.25 days, and Toronto's average time was 5.75 days. These regional differences can be significant and are concerning when the most populated cities and regions with the highest demand for testing have capacity issues leading to delays and backlogs.

In September 2020, the average times were two days from specimen collection to reporting a positive test result and 1.75 days from reporting the positive test result to starting case management. In October 2020, the average times were 2.25 days and one day, respectively. The average times in urban areas were generally longer: Ottawa's average time to complete these activities between September and October 2020 was 4.5 days, York Region's was 2.25 days, Peel Region's was 3.25 days and Toronto's was four days. Overall, the province did not meet the case management performance target in September and October, with an average of only about 75% of individuals who tested positive for COVID-19 being contacted within 24 hours.

The Ministry and other stakeholders have taken a number of actions—such as expanding testing capacity, automating some specimen collection and laboratory testing processes, and implementing a new public health information system—to expedite and improve the testing-to-tracing process. However, the need for more testing capacity and better information systems had been pointed out years ago by experts and others (including our Office), with little to no action taken until the onset of

Figure 2: Average Number of Days from Collecting Specimen for Laboratory Testing to Starting Case Management, by Public Health Region, March–August 2020

Source of data: Public Health Ontario
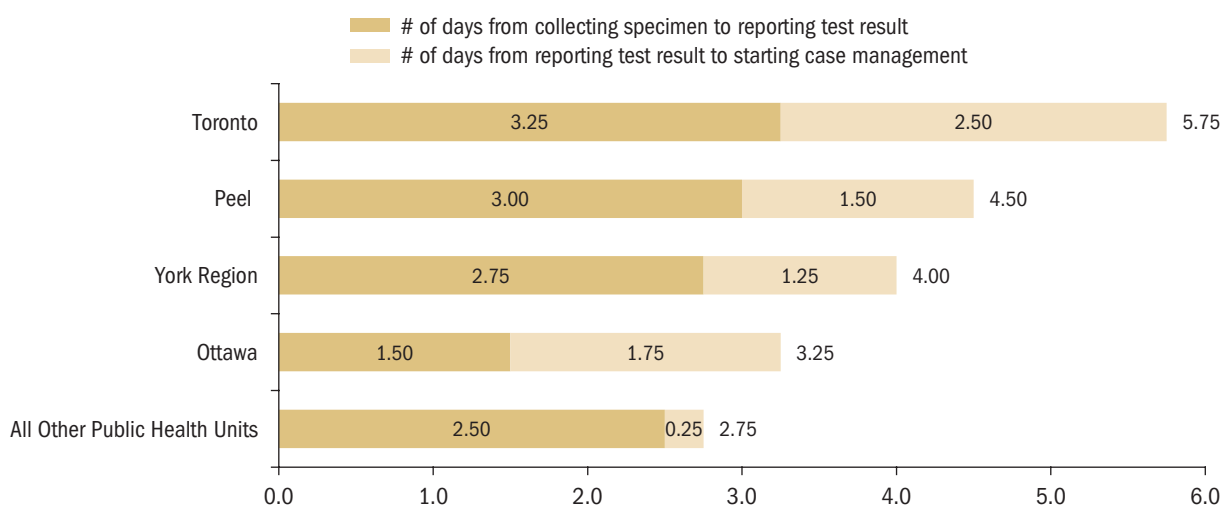
Note: This figure includes only the data for laboratory testing and case management. Contact tracing data is not fully available for the period shown of from March to August 2020. For laboratory testing and case management, results are rounded to the nearest quarter-day. As there were less than 25 cases in January and February combined, details for these months were not included in the chart.

the COVID-19 pandemic. If these long-standing concerns had been addressed earlier, the Ministry would have better information to enable it to adjust testing eligibility criteria to the highest-risk Ontarians and probable cases, and Ontario could have responded to COVID-19 more quickly, more effectively and more efficiently.

The following are some of our significant observations.

Laboratory Testing Capacity Limitations Delayed How Quickly All Symptomatic Individuals Could Get Tested

- **Expansion of laboratory testing capacity for COVID-19 was delayed, despite warnings about insufficient capacity to the Chief Medical Officer by Public Health Ontario and experts in February 2020**. On January 11, 2020, Ontario had the capacity to process only 110 COVID-19 tests a day at a single laboratory (located in Toronto and operated by Public Health Ontario). By the end of February 2020, both Public Health Ontario and other experts (including doctors across the province specializing in infectious diseases and/or microbiology) had realized that the existing testing capacity would not be sufficient and expressed their concerns to the Chief Medical Officer of Health. Public Health Ontario indicated that Ontario "must immediately expand testing for COVID-19" beyond its own laboratories; 36 experts also urged "the Ministry of Health to act now to support" rolling out COVID-19 testing to all hospital laboratories with the resources and expertise to do so. Although Public Health Ontario and the Ministry had been working with a number of core laboratories since the first week of March 2020 to develop a distributed network to expand COVID testing capacity, it was not until late March, a month after the concerns were raised, that a formal Provincial Diagnostic Network was developed to oversee and co-ordinate laboratory testing between participating laboratories.

- **Slow progress in expanding laboratory testing capacity contributed to an estimated 119,000 Ontarians who had COVID-19 not being tested.** It took Ontario considerably longer than other jurisdictions to develop the necessary capacity to allow anyone with COVID-19 symptoms to be tested. Alberta and British Columbia reached this point on April 13 and April 21, respectively, while Ontario did so on May 14 (one month later than Alberta and three weeks later than British Columbia). Prior to Ontario's expansion of its testing criteria on May 14, someone with several common COVID-19 symptoms (such as a fever, cough and trouble breathing) may not have been tested for COVID-19 if they did not meet other required testing criteria (such as contact with a known COVID-19 case). Studies by Public Health Ontario suggest that as of August 31, 2020, about 1.1% of Ontarians had contracted COVID-19 at some point, which would total over 161,000 individuals. Given that only about 42,000 COVID-19 cases were publicly reported at that time, this meant that about 119,000 Ontarians likely had COVID-19 but were never tested, which in turn meant that case management and contact tracing had never been performed on these cases. It is not known how many of these individuals recognized their COVID-19 symptoms and would have sought testing if the criteria had expanded sooner.

- **Ontario did not meet its laboratory testing capacity target of 50,000 tests per day either by the initial planned date of July 2020 or by the revised target date of September 2020**. The Ministry's goal in June 2020 was to sustain provincial testing volumes up to 25,000 tests per day and to achieve 50,000 tests per day by July 2020, in order to prepare for flu season and a potential

second wave. However, the testing capacity target of 50,000 tests per day by July was not met: the daily maximum capacity was 36,300 tests on July 29, 2020, which was about 13,700 tests (or about 27%) below the target. The Ministry then extended the target date for reaching a testing capacity of 50,000 tests per day from July 2020 to September 26, 2020. It further increased the target to build a capacity of 100,000 tests per day by the end of 2020. However, as of September 26, 2020, Ontario's total laboratory capacity was about 44,100 daily tests, which was still about 5,900 tests (or about 12%) below the capacity target of 50,000 tests. At that time, Ontario laboratories had approximately 68,000 specimens on site that required testing, creating a backlog that delayed the reporting of those test results by an average of over 37 hours.

- **Laboratory testing capacity did not always keep pace with demand, resulting in backlogs greater than daily laboratory capacity that at times delayed identification and reporting of positive cases.** On January 11, 2020, Ontario had the capacity to process only 110 COVID-19 tests a day at a single laboratory and by August 31, 2020, the number of tests Ontario was able to process daily had increased to about 41,000 at 43 laboratories. However, despite this increase, there were instances of backlogs of unprocessed tests. Laboratory backlogs are specimens at laboratories at the end of a day that are pending results. While backlogs are a normal and routine part of laboratory testing, they are a critical concern when the backlog exceeds laboratory daily capacity. There were instances of backlogs exceeding testing capacity at various points throughout the pandemic. Some laboratories had staff working 24/7 to continuously process specimens during that time. Between March and August 2020, the average daily number of tests that remained unresolved at the end

of the day increased: from over 3,700 tests in March, to over 20,500 tests in August, which followed the trend of increasing testing demand. At times throughout the pandemic these backlogs exceeded daily capacity, such as on June 27, when the backlog of specimens to test was 33,759 and the daily laboratory testing capacity was 31,950. Backlogs were at about 50,000 tests and greater in the last week of September, capping at over 90,000 unresolved tests in the first week of October, which was significantly greater than the 50,000 testing capacity target first reached on October 1. Backlogs that exceed daily testing capacity result in significant delays in the identification and reporting of positive COVID-19 cases.

Previous Recommendations and Concerns about Ontario's Laboratory Sector Not Addressed

- **The Ministry of Health took no action on Public Health Ontario's warnings from 2017 on its inability to respond to potential public health threats.** Public Health Ontario's annual base funding of about $148 million for its ongoing operations has remained flat since 2013/14. Public Health Ontario's 2017/18 to 2019/20 Annual Business Plan (approved by its Board in December 2016, and resubmitted for approval by the Ministry in May 2017) identified its highest overall risk as an organization was a "lack of sustainable funding to continue to deliver on [its] mandate, including [its] ability to comprehensively respond to emerging public health threats." Public Health Ontario submitted a plan in 2017, 2018 and 2019 to modernize and achieve efficiencies in its operations. The repeatedly submitted plans were not approved by the Ministry, and no additional funding was provided to modernize Public Health Ontario's laboratories. In this period,

the volume of laboratory tests grew by about 25%, from 5.1 million tests in 2013/14 to 6.4 million in 2019/20. The Ministry actually reduced Public Health Ontario's base funding allocation for 2019/20 by over $13 million (or about 9%) in comparison with 2018/19, which it later reinstated. To deal with funding pressures, Public Health Ontario cut 120 full-time-equivalent staff positions between 2014/15 and 2019/20. This represented over 12% of its 970 positions in 2014/15. These cuts included administrative staff, research staff and staff who worked directly in Public Health Ontario's laboratories.

- **Same laboratory testing constraints noted during Severe Acute Respiratory Syndrome (SARS) occurred during COVID-19.** The same issues around laboratory resources being insufficient for COVID-19 in 2020 were noted during SARS in 2003. According to a 2004 interim report by the SARS Commission, "During SARS, the provincial laboratory in Toronto quickly became swamped with specimens. Like other parts of the health care system, it lacked surge capacity—resources to deal with the expanded demands of an outbreak like SARS. One expert described the lab as 'under-funded and under resourced' prior to SARS." The recent staffing cuts at Public Health Ontario also echo problems observed during SARS. In its December 2003 interim report, the Ontario Expert Panel on SARS and Infectious Disease Control noted "ongoing and significant concern that existing core scientific medical and research capacity at the Ontario public health laboratory is far short of what is needed." Ontario's experience during both SARS and COVID-19 confirmed that Ontario's laboratory system was not well equipped to respond to a pandemic due to underfunding and inadequate resources.

- **Ministry did not follow previous recommendations by experts and our Office on reforming Ontario's laboratory sector until**

partway through its COVID-19 response. A 2015 report by the Laboratory Services Expert Panel (Panel) identified the need for central oversight of laboratory services and recommended Ontario establish a focal point for laboratory program leadership. Our Office's 2017 audit of Laboratory Services in the Health Sector also identified the Ministry's fragmented management of the laboratory sector. We recommended that the capabilities and responsibilities of different types of laboratory service providers be assessed to determine if changes are needed. However, little progress had been made on these recommendations prior to the Ministry having to respond to COVID-19. It was not until late March 2020, when COVID-19 was overwhelming Ontario's laboratory system, that the Provincial Diagnostic Network was established under Ontario Health to facilitate co-ordination between different types of laboratories. Unlike Ontario, Alberta already had a laboratory network in place prior to COVID-19.

Impact of Laboratory Testing, Case Management and Contact Tracing on COVID-19 Transmission

- **COVID-19 spread was not effectively curbed in thousands of cases because of the combined impact of delays in laboratory testing, case management and contact tracing.** As previously mentioned, a study published in The Lancet Public Health medical journal in July 2020 reported that when laboratory testing, case management and contact tracing are completed with no delays, 80% of COVID-19 transmission per person diagnosed can be prevented. No delays means that testing occurs immediately at the onset of symptoms, and at least 80% of contacts are contacted within one day of the test results being received. This 80% level of prevention is essential for "flattening the curve," where

one infected person does not transmit the virus to more than one other person, and some do not transmit to anyone else. When these activities are delayed by two days each, the study's modelling projected that only 39% of transmission per person diagnosed can be prevented. This much more limited level of prevention could set off an exponential rise in cases, with each person diagnosed transmitting to more than one additional person. In Ontario, between March and August 2020, the average amount of time between collecting a specimen and starting case management (i.e., contacting the person tested with a positive result) was more than four days. While the average time between specimen collection and starting case management has dropped steadily from a peak of about 5.5 days in March 2020, it still remained at 2.75 days in August 2020. Overall, less than 34% of individuals who tested positive for COVID-19 had a laboratory test completed and case management initiated within one day each. Thus, for the majority of positive cases, obtaining the positive test result and having the appropriate public health unit inform the tested individual did not occur fast enough to prevent further transmission of COVID-19 as effectively as if these activities were completed sooner. After removing case records with missing data and potential data errors, we noted more than 1,000 instances where the person who tested positive for COVID-19 was contacted by the public health unit more than 14 days after specimen collection. These instances represented approximately 3% of known COVID-19 cases. In these cases, the 14-day isolation period (recommended by the Ministry's guidance document for public health units, "Management of Cases and Contacts of COVID-19 in Ontario") was completely missed, and transmission could have occurred throughout the entire time the person was most infectious. Any

case management activities undertaken from day 15 onward would be largely, if not totally ineffective: The Lancet Public Health medical journal article identified that case management and contact tracing activities starting 10 days from symptom onset of a positive COVID-19 case was effective at reducing only 1% of transmission from the infected person.

- **Targets for laboratory testing turnaround time and case management were often not met.** Ontario Health established two targets for laboratory testing turnaround time: 60% of tests should be completed within one day of specimen collection and 80% should be completed within two days of specimen collection. Actual performance against the one-day target was 45% and was 77% for the two-day target (over the period January 2020 to August 2020). In contrast, over the same time period, British Columbia completed its tests on average within 23 hours. The Ministry established one target for case management: 90% of people testing positive should be contacted within one day of the positive test result being reported to a public health unit. Actual performance against this target was 80% (over the period January 2020 to August 2020).

- **Ministry did not follow recommendations by experts and our Office that could have sped up laboratory testing, case management and contact tracing.** Public Health Ontario, the Laboratory Services Expert Panel (Expert Panel) and our Office made a number of recommendations over the last decade to improve laboratory testing. However, the Ministry did not begin implementing these recommendations until after the onset of the COVID-19 pandemic. As well, the Ministry did not follow another recommendation made by the Testing Strategy Expert Panel regarding who should be eligible for COVID-19 testing. The issues are as follows:

- **Lack of electronic ordering (e-ordering) delayed COVID-19 laboratory test turnaround times.** Many of the steps involved in the COVID-19 laboratory testing process in Ontario are paper-based and performed manually. This not only slows down laboratory testing but also results in errors. E-ordering (as opposed to paper-based ordering) of laboratory tests has been recommended or referenced by various experts and our Office for over a decade (for example, our Office's 2009 Special Report on Ontario's Electronic Health Records Initiative, a 2015 report by the Laboratory Services Expert Panel, our Office's 2017 audit of Laboratory Services in the Health Sector, and Public Health Ontario's 2017 Laboratory Modernization and Pressure Management Plan). However, it was not until July 7, 2020, in recognition of data-entry bottlenecks, that Ontario Health contracted with an IT company to automate data collection (including e-ordering) and streamline the data flow between assessment centres and laboratories.

- **Enabling unconditional asymptomatic testing overwhelmed the assessment centres and increased turnaround time on COVID-19 laboratory test results.** On May 24, 2020, the province announced the expansion of COVID-19 testing for asymptomatic Ontarians with no symptoms and no known exposure to COVID-19. More than twice as many Ontarians visited assessment centres for COVID-19 testing in the following week as did the week before. A Testing Strategy Expert Panel (Panel), responsible for developing an evidence-based province-wide testing strategy for COVID-19, had been meeting since April 5, 2020 and had never recommended asymptomatic persons who are not contacts of persons

with COVID-19, or part of outbreak investigations, be tested for COVID-19. On July 5, 2020, the Panel recommended that Ontario limit its asymptomatic testing in low-prevalence, low-risk populations (such as people with no known exposure to someone who tested positive for COVID-19) and ultimately end asymptomatic testing for the general population. The Panel's recommendations indicated that "there are potential negative consequences of high-volume asymptomatic testing" that included "[r]educing available laboratory capacity and increasing test turnaround times." These recommendations were not implemented by Ontario until September 24, 2020 more than two months after they were made. After that, only asymptomatic Ontarians meeting specific criteria be tested for COVID-19 at assessment centres (for example, if they were exposed to a confirmed case, if they were living or working in a setting that has a COVID-19 outbreak as identified by their public health unit, or if they were eligible for testing as part of a targeted testing initiative as determined by the Ministry of Health or the Ministry of Long-Term Care). Beginning on September 25, asymptomatic Ontarians could be tested for COVID-19 also at participating pharmacies, but again only if they met certain conditions (for example, if they were contacts of a confirmed positive case; if they worked at, resided in or would be visiting a long-term care home; if they worked at or resided in a homeless shelter or another congregate care settings; or if they were part of a targeted testing initiative directed by the Ministry of Health or the Ministry of Long-term Care). In British Columbia, testing guidance identified that "testing of asymptomatic individuals outside of an outbreak scenario is likely to be of low

yield, and is not an effective use of health system resources, and is therefore not recommended." Alberta Health Services informed us that testing of asymptomatic individuals was started on July 30, 2020 to help make use of available laboratory testing capacity. Alberta limited testing asymptomatic individuals with no known COVID-19 exposure to its pharmacies only on September 17, 2020 after it had found that such testing had identified only about seven positive COVID-19 cases for every 10,000 people tested. Alberta paused asymptomatic testing in its pharmacies for those with no COVID-19 exposure on October 20, 2020. An analysis by Ontario Health confirmed that test turnaround times will be shorter if laboratories operate at less than 75% capacity. As such, excluding asymptomatic people with no known exposure to COVID-19 from testing could free up testing capacity and result in faster overall turnaround times.

- **Lack of integration between the OLIS and iPHIS systems has necessitated the faxing and mailing of COVID-19 laboratory test results, which can delay case management and contact tracing.** The Ontario Laboratory Information System (OLIS) was created in the 1990s to store and track test results, and exchange test orders and results between hospitals, community laboratories, public health laboratories and practitioners. For that exchange of information to be effective, OLIS is supposed to be integrated with the integrated Public Health Information System (iPHIS), which stores case and outbreak information on Ontario's reportable infectious diseases. However, public health units have noted that the information in OLIS is not always complete or accurate and that the integration between OLIS and iPHIS has not been successfully implemented.

Regardless of whether a laboratory sent its test results to OLIS, public health units were still waiting to get COVID-19 test results directly from laboratories via fax or mail. By August 31, 2020, Public Health Ontario's laboratories had performed about 943,000 COVID-19 tests, and had mailed about 224,000 test results to ordering physicians or public health units, with the rest being faxed. Using these slow channels of communication means that case management and contact tracing risk being delayed to the point of losing their effectiveness in curbing COVID-19 transmission. Additionally, public health units received multiple faxes of the same laboratory test result, making data management challenging. Our Office's 2007 audit of Outbreak Preparedness and Management identified the lack of integration of OLIS and iPHIS as a concern. At that time, the Ministry informed us that it was in the process of connecting the two systems and expected this to occur in 2009; however, over 10 years later, the work has still not been completed.

Known Public Health Information Systems Deficiencies Not Addressed before COVID-19

- **Ontario's public health information system, iPHIS, contains numerous long-standing deficiencies, which had not started to be addressed until COVID-19.** iPHIS was created in 2005 as a platform for storing and reporting on individual cases of infectious diseases across the province. In the 15 years it has been in place, the Ministry has failed to fix known long-standing deficiencies that impair its efficiency and effectiveness. For COVID-19, they include difficulty in connecting close

contacts to a COVID-19 case in the system, not allowing users to easily make progress notes, not allowing users to easily attach electronic files to a COVID-19 case, and not easily allowing remote access to the system. These deficiencies forced public health units to develop their own systems or to rely on paper records to manage their high volumes of cases and their contact tracing work. While both our Office and the SARS Commission have recommended that the Ministry enhance its public health information system (our Office's 1997 and 2003 audits on Public Health Activity and the SARS Commission's 2004 Interim Report, which included recommendations for the province's public health information system prior to the implementation of iPHIS in 2005, our 2007 audit on Outbreak Preparedness and Management and our 2014 audit on Immunization programs), the Ministry has made only limited progress, despite iPHIS being implemented after some of these reports were first released. It was not until April 2020, as a result of COVID-19 spreading in Ontario and the province declaring a state of emergency, that the Ministry recognized the need to replace iPHIS with a new system for COVID-19 case management and contact tracing. Three public health units (Toronto, Ottawa and Middlesex-London) created their own systems during the COVID-19 pandemic to allow their staff to perform case management and contact tracing more effectively and efficiently. However, this created additional challenges when it came to consolidating all provincial data for reporting purposes.

- **Ontario has implemented a new system to help with case management and contact tracing, but challenges exist and improvements are needed.** In early June 2020, the province secured licences and services to customize the case management and contact tracing system used in the State of Massachusetts for use in the 34 public health

units across Ontario to address some of the deficiencies of iPHIS. However, public health units faced some early challenges implementing the new Case Management and Contact Tracing System (System). For example, public health units received duplicates of laboratory test results, as they were faxed in addition to being transferred electronically to the System from OLIS. The Ministry informed us that it has since worked with public health units to improve the System by reducing the number of duplicate test results received. Laboratory results submitted to OLIS also had some errors and missing or incomplete data, and these were transferred to the System. Public health units therefore continue to rely on faxes instead of using the System alone. Also, since three public health units have not fully started using the new System (Toronto, Ottawa and Middlesex-London), the System does not include all of the province's public health data (including COVID-19 case details), and the province continues to rely on these public health units to extract their local data for consolidation with the provincial reporting data. The Ministry informed us that certain functions of the new System (such as case referral) were available to Toronto and Ottawa as of October 23, leaving Middlesex-London as the only public health unit with no access to the System. Without complete data accessible centrally in the System, some public health units still had to rely on iPHIS for investigations of outbreak clusters, which makes it more challenging to establish links between cases reported in the new System.

Case Management and Contact Tracing Guidance Can be Improved

- **Clearer provincial guidance is needed for case management and contact tracing activities to be conducted consistently.** Our review of a sample of case management and

contact tracing files for 100 individuals who tested positive for COVID-19 and their close contacts (distributed among the four public health units of Toronto, Peel, Ottawa and Middlesex-London, between March 1 and June 30, 2020) found that while public health units had processes and procedures in place for managing the cases and tracing the close contacts, Ministry guidance was not always followed and inconsistencies occurred because the guidance was not clear enough on what should be done in certain specific situations. For example:

- The Ministry's guidance on case management states that cases must be monitored daily and that at a minimum, "they must be called on the phone within 24 hours from when the public health unit was notified of the case, as well as on day 7 and day 14 of the isolation period." However, we found that public health units did not all do this consistently, generally as a result of testing delays or an inability to start case management faster as a result of not having enough staff available to perform case management, resulting in late first contact of cases, such as during the mid-point of the case's self-isolation period. Overall, individuals were contacted an average number of five times, and this ranged from just once to 21 times.

- Public health units did not attempt to reach out to about 31% of the close contacts of individuals who tested positive for COVID-19. The shortfall mainly involved not contacting someone who lived in the same household as the individual with COVID-19. Ministry guidance states that all high-risk close contacts must be contacted, but does not specify whether relying on the infected individual to relay information from the public

health unit to their household is acceptable and sufficient.

- Confusion over who should report laboratory test results led to hundreds of COVID-19 cases reported late for case management and contact tracing. We found one incident where hundreds of COVID-19 cases were not being referred for case management and contact tracing in a timely manner due to confusion over reporting responsibilities. Between March and May 2020, 485 COVID-19 cases were not reported to public health units. Ontario Health's review of the incident determined that this was due to confusion over the reporting responsibilities of the parties involved. Specifically, the specimen collector and test requestor (William Osler Health Services) believed that the test performer (Mount Sinai Hospital's laboratory) would report positive test results to the respective public health units, and vice versa, even though both organizations are accountable to do this under the *Health Protection and Promotion Act*. Over 40% of these cases related to specimens collected in March and April 2020, with the rest collected in May, meaning case management and contact tracing often started about one month later than it should have for many cases, if not longer. While Ontario Health subsequently confirmed that this problem was isolated to these two organizations, if reporting responsibilities had been better defined for this specific type of situation and effectively communicated to stakeholders in the first place, this failure in reporting cases could have been avoided.

Improvements Needed in Collaboration, Communication and Specimen Collection Strategy for Assessment Centres

- **Assessment centres are not working collaboratively on a provincial level and not benefiting from provincially shared best practices (like laboratories are).** Ontario's laboratories are working as a team through their participation in the Provincial Diagnostic Network; however, no similar network exists for Ontario's 148 assessment centres. With the establishment of an assessment centre network, each centre's operations (including their operating hours, staffing ratios and operating method, such as offering "drive-through" COVID-19 specimen collection) could be compared to identify best practices, which could be shared among all centres. In the absence of a provincial network, assessment centres have organized and shared best practices on a regional basis, but staff at every assessment centre we spoke with said that a provincial network would have been helpful. A network could also establish targets and measure performance against them, as is done through the Provincial Diagnostic Network for laboratory test turnaround times. One area where Ontarians could have benefitted from targets and performance measurement would have been a regular collection of assessment centres wait times to determine where long lines may prevent or deter Ontarians from getting tested. Where information was available (assessment centres were not required to track and report this information on a regular basis), we noted that wait times varied significantly from one assessment centre to another, depending on the day, the time and the location. They ranged from about 20 minutes to up to eight hours in some instances.

- **Assessment centres were not given enough notice to prepare for expanded testing eligibility, which led to a surge in demand that overwhelmed their operations and increased wait times for specimen collection.** The province announced expanded testing at a news conference on May 24, 2020, indicating that no one seeking a COVID-19 laboratory test should be turned away. Assessment centres had been informed of the expansion just the day before in a memo from Ontario Health. The memo's only indication of when this would happen was in the next few days. Given such short notice and no definitive timeline, assessment centres were caught off guard by the announcement and were not able to staff their centres appropriately in time to address the surge in demand. The increased demand for testing resulted in longer wait times at assessment centres, and some individuals were turned away despite the province's assurance that this would not happen.

Overall Conclusion

Our audit found that the Ministry of Health (Ministry) did not have available, when COVID-19 impacted Ontario, co-ordinated effective systems and procedures in place that could easily be adjusted to perform timely COVID-19 laboratory testing, case management and contact tracing. Improvements continue to be needed in these areas to prevent the spread of COVID-19.

In numerous cases, case management and contact tracing did not begin promptly after specimen collection, reducing their effectiveness in preventing onward COVID-19 transmission. Between March and August 2020, the average amount of time between when a person's specimen was collected for COVID-19 testing and case management began if the person tested positive was over four days. While it took on average 2.75 days for this to occur in most regions of the province, the overall average time for the province is higher as a result of longer times in Ottawa (an average of

3.25 days), York Region (an average of four days), Peel Region (an average of 4.5 days) and Toronto (an average of 5.75 days). We investigated how often a positive test result was reported to the public health unit within a day of specimen collection and how often in those instances case management began within a day of the public health unit receiving the positive test result (so, how often two days or less transpired between specimen collection and the initiation of case management). This happened in less than 34% of cases. For the remaining majority of cases (66%), obtaining the positive test result and having the appropriate public health unit inform the tested individual did not occur fast enough to prevent further transmission of COVID-19 as effectively as if these activities had occurred sooner.

Ontario Health set targets for laboratory testing: 60% of laboratory tests completed and results reported within one day of specimen collection, and 80% of laboratory tests completed and results reported within two days of specimen collection. The province overall has not met these targets: only about 45% of laboratory tests were completed within one day, and 77% of laboratory tests were completed within two days. Regionally, only one of the 34 public health units (Ottawa) met the 60%-within-one-day laboratory testing target, and only four public health units (Hastings and Prince Edward Counties; Kingston, Frontenac, Lennox and Addington; Leeds, Grenville and Lanark District; and Ottawa) met the 80%-within-two-days target for positive cases.

The Ministry also set targets for case management: in 90% of cases, case managers reach the infected person within 24 hours of the public health unit receiving the positive test result. The province overall has also not met this target: in only 80% of cases, case managers reached the infected person within 24 hours. Regionally, 30 of the 34 public health units met the 90%-within-one-day case management target. The four that did not were Ottawa, Peel Region, Toronto and York Region.

This report contains seven recommendations, consisting of 26 action items, to address our audit findings.

OVERALL MINISTRY RESPONSE

The Ministry thanks the Auditor General for this report, and has made progress in implementing several of the recommendations.

Since COVID-19 was first identified as a public health issue, Ontario has taken action on all fronts to respond to the evolving global pandemic. Testing, case management and contact tracing are essential elements of an extensive provincial plan to protect Ontarians throughout this outbreak.

The province began building an integrated laboratory system to support COVID-19 laboratory testing in March 2020, leveraging existing public health laboratories, community laboratories and hospital laboratories. As of November 10, 2020, Ontario has processed approximately 5.5 million COVID-19 tests and have increased our capacity by more than tenfold. We have increased testing accessibility and have made testing available at over 160 Assessment Centres, community settings, and at 170 pharmacies across the province. We continue to work diligently with our regional partners by providing access to testing in communities where there are barriers, such as mobile testing and community-based testing centres.

From May to mid-October, 89% of positive COVID cases were reached in 24 hours and 90% from July to mid-October. In addition, as the report states, public health units have reached 92% of close contacts within 24 hours of being identified.

The Ministry launched and rolled out a new provincial COVID-19 reporting system in 31/34 health units over two months this summer. The new system is being continually upgraded and allows health units to access surge capacity from other health units and central pools, which

has helped them consistently meet the target of reaching 90% of cases and contacts within 24 hours. Toronto, Ottawa and Middlesex London have started transitioning to the new system.

OVERALL RESPONSE FROM ONTARIO HEALTH

Ontario Health welcomes the recommendations in the Auditor General of Ontario's Special Report, and has already taken steps to implement many of the identified actions. In the spring 2019, Ontario Health was asked by the Ministry of Health to support comprehensive COVID-19 testing by establishing a Provincial Diagnostic Network of laboratories. Previously, there was no formal network to co-ordinate the provincial leadership of collection sites, and the over 40 laboratories and various suppliers involved in laboratory testing in the province. As a result, the COVID-19 Provincial Diagnostic Network was created to resolve ongoing operational issues, develop processes and provide strategic insights around COVID-19 testing in Ontario. Similarly, to support appropriate access to testing, assessment centres were established across the province, in alignment with regional testing needs.

As the unprecedented situation caused by the COVID-19 pandemic evolved, Ontario Health has worked closely with the Ministry of Health, members of the Provincial Diagnostic Network, assessment centres and other partners to ramp up testing capacity and adapt the testing strategy. Ontario Health is committed to continuing to build on the strong foundation that has been established to implement ongoing improvements, including those recommended within this report, in order to ensure that all Ontarians have access to appropriate COVID-19 testing.

OVERALL RESPONSE FROM PUBLIC HEALTH ONTARIO

Public Health Ontario (PHO) is committed to working with partners across Ontario's health system to respond to COVID-19 in the areas of laboratory testing, case management and contact tracing.

PHO provides integrated laboratory and public health surveillance to investigate and support the management of communicable disease outbreaks of all types and sizes, including the COVID-19 pandemic. PHO is committed to working with the Ministry of Health (Ministry), local public health units, Ontario Health and other partners to continue to build and sustain a robust and resilient provincial laboratory system to better prepare for and respond to future outbreaks, pandemics and other health emergencies. With support from the Ministry, we have collaborated with Ontario Health since March, amid extremely challenging circumstances, to develop an integrated provincial network of laboratories to provide high-quality and reliable testing for COVID-19—helping to ensure that testing is available for all Ontarians who require it. PHO's role in the network includes providing scientific, technical and strategic leadership; acting as a leading provider of diagnostic testing; and serving as reference testing and quality assurance lead, including developing and validating novel testing approaches to enhance testing capability and capacity.

To help ensure that contacts of COVID-19 cases are identified and followed-up quickly, PHO initiated the COVID-19 contact follow-up program in April 2020. To date, over 600 staff have been trained to support contact tracing across Ontario. PHO has also provided advice and consultation to public health units on complex cases and outbreaks and worked closely with the Ministry and public health units on the development and implementation of a new case and contact management system for COVID-19.

PHO is committed to supporting the Ministry and public health units in the implementation of the Report's recommendations to ensure comprehensive and timely case management and contact tracing to reduce transmission of COVID-19 in Ontario.

2.0 Background

2.1 Overview

Laboratory testing and the collective task of case management and contact tracing are essential to detecting Coronavirus Disease 2019 (COVID-19) and preventing its transmission. **Figure 3** provides an overview of these activities, showing the path that begins with an individual going to a centre to be assessed and ending with the individual undergoing case management and contact tracing after testing positive for COVID-19.

2.1.1 Laboratory Testing

Laboratory testing not only identifies if someone has COVID-19, but also collects information (such as where and how the virus is spreading) from the individuals who have had their specimens collected and who have tested positive for COVID-19.

The majority of COVID-19 testing in Ontario is done through a molecular test (called polymerase chain reaction testing, or PCR testing) that analyzes a specimen swabbed from a person's nose or throat.

Specimens are collected for testing in various settings, such as hospitals, long-term-care homes, and newly added assessment centres throughout the province to respond to COVID-19. As of August 31, 2020, 148 assessment centres in Ontario were collecting specimens and 43 laboratories were testing the specimens for COVID-19. The 43 laboratories comprise seven public health laboratories, 33 hospital laboratories and three community

laboratories (operated by private companies). They are listed in **Appendix 1**.

Eligibility for COVID-19 testing has changed over the course of the pandemic. At the time this report was written in November 2020, anyone with COVID-19 symptoms (such as fever, cough and difficulty breathing or shortness of breath), contacts of confirmed positive cases, individuals associated with outbreak investigations and high-risk populations as identified in the provincial guidance could be tested at an assessment centre. Assessment centres were operated using different models, including "drive-throughs" where people could be tested directly in their cars (see **Section 4.7.1**). As of September 25, 2020, individuals with no COVID-19 symptoms and no known exposure to a confirmed case could be tested under certain circumstances (such as if they were planning to visit a long-term care home in the next two weeks) either at an assessment centre or at about 50 authorized pharmacies across Ontario on an appointment-only basis.
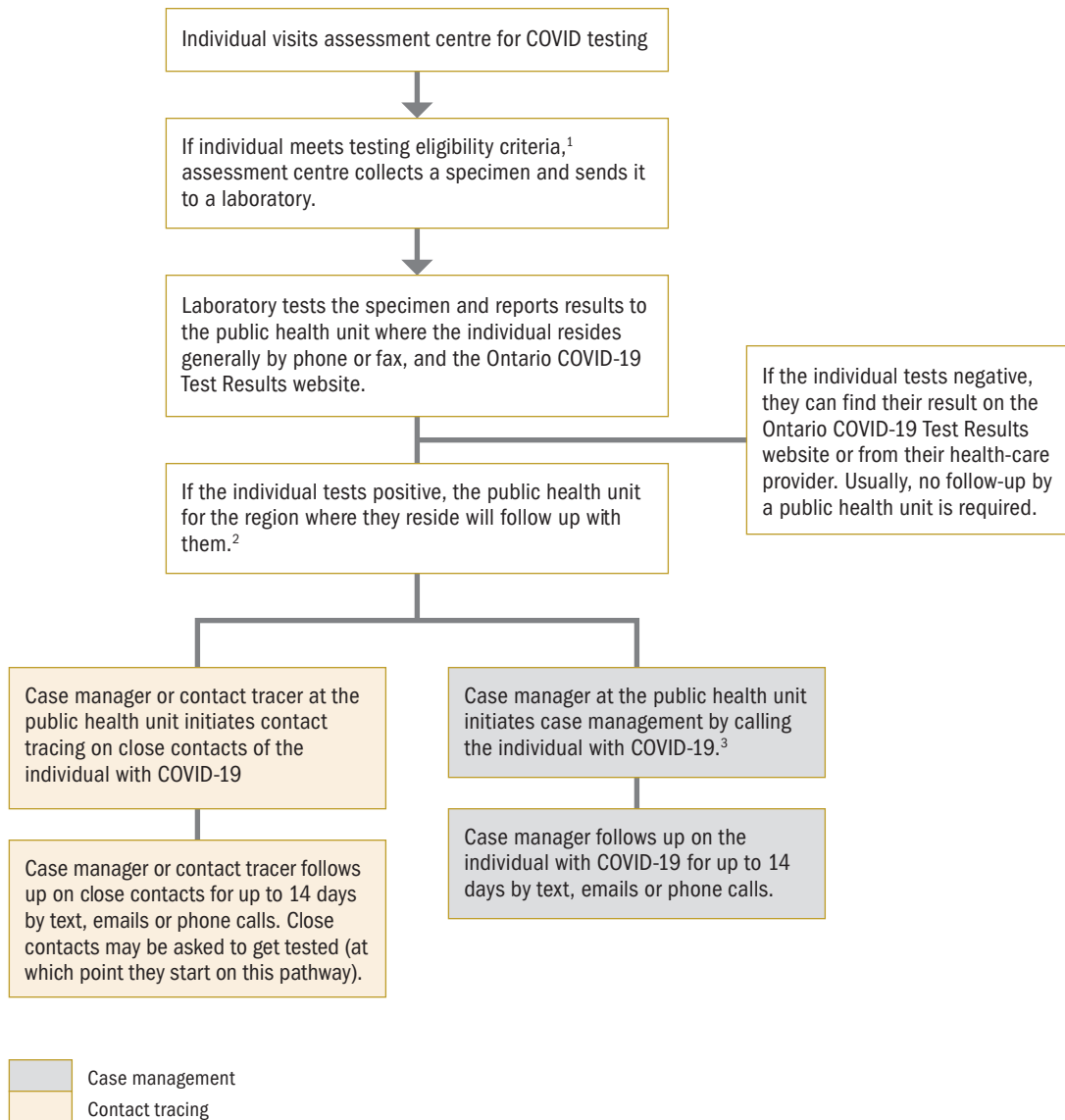
The Ontario Laboratories Information System (OLIS) is a data repository for laboratory test orders and results, including COVD-19 tests. Test results for patients can be electronically accessed by authorized health-care practitioners (such as hospital and primary-care physicians) who can then contact their patient to inform them of their COVID-19 laboratory test result. The province also launched the COVID-19 Test Results Viewer website, which can be used by individuals anywhere in the province to see their own test results once it becomes available in OLIS. This viewer was first launched on April 3, 2020.

2.1.2 Case Management and Contact Tracing

Case management and contact tracing are primarily performed by Ontario's 34 public health units. They are guided in their work by a document created by the Ministry of Health (Ministry) called "Management of Cases and Contacts of COVID-19 in

Figure 3: Pathway from Laboratory Testing to Case Management and Contact Tracing
Prepared by the Office of the Auditor General of Ontario

Individual visits assessment centre for COVID testing

If individual meets testing eligibility criteria,[1] assessment centre collects a specimen and sends it to a laboratory.

Laboratory tests the specimen and reports results to the public health unit where the individual resides generally by phone or fax, and the Ontario COVID-19 Test Results website.

If the individual tests negative, they can find their result on the Ontario COVID-19 Test Results website or from their health-care provider. Usually, no follow-up by a public health unit is required.

If the individual tests positive, the public health unit for the region where they reside will follow up with them.[2]

Case manager or contact tracer at the public health unit initiates contact tracing on close contacts of the individual with COVID-19

Case manager at the public health unit initiates case management by calling the individual with COVID-19.[3]

Case manager or contact tracer follows up on close contacts for up to 14 days by text, emails or phone calls. Close contacts may be asked to get tested (at which point they start on this pathway).

Case manager follows up on the individual with COVID-19 for up to 14 days by text, emails or phone calls.

Case management
Contact tracing

1. See **Figure 9** and **Appendix 4** for how the eligibility criteria for testing changed in the first several months of the pandemic.
2. Between March and August 2020, the average time between when the specimen was collected and a positive result was reported to a public health unit was 2.75 days.
3. Between March and August 2020, the average time between when a positive result was reported to a public health centre and the public health unit initiated case management was 1.5 days.

Ontario." Between February 7 and August 31, 2020, the Ministry updated this guidance eight times to reflect evolving knowledge about the virus. The latest version was released on June 23, 2020. Same as other jurisdictions such as British Columbia and Alberta, individuals participate in case management and contact tracing on a voluntary basis.

Figure 4 explains the differences between case management and contact tracing. Case management targets individuals who have COVID-19, while contact tracing targets individuals who were in close contact with someone with COVID-19.

Figure 4: Key Differences between Case Management and Contact Tracing

Prepared by the Office of the Auditor General of Ontario

	Case Management	Contact Tracing
Who performs it?	• Case investigator (generally a public health nurse working at a public health unit); a health-care background with specialized training and experience in public health is needed to assess the individual's health condition, assess acquisition sources, obtain exposures and identify links to other cases	• Non-public health nurses or inspectors can be trained to trace contacts; a health-care background is not required as the main responsibility is to communicate public health requirements and not to assess the individual's health condition or the source of acquisition or identify clusters/outbreaks.[1]
Who is contacted?	• Person who has tested positive for COVID-19 or is a probable case of COVID-19 under Ontario case definition	• Person who has been identified as having had close contact with a probable or confirmed COVID-19 case
What are the key activities?	• Confirm COVID-19 diagnosis with the person • Attempt to identify source of exposure to COVID-19 through understanding person's activities in period prior to COVID-19 diagnosis • Identify and collect demographic information • Confirm person's symptoms and overall health condition, and the progression of the illness • Provide advice on when to engage primary care or seek emergency care • Share expectations on individual's activities, including the need to self-isolate • Identify close contacts associated with the person during the period before and after having COVID-19 symptoms and/or testing positive for COVID-19	• Advise the person about potential exposure to COVID-19 • Inform the person about requirement to self-isolate • Advise the person to self-monitor and contact public health unit if symptoms develop or call 911 to seek emergency care
How frequently do the activities have to be performed?[2]	• Initiate first call to the person within 24 hours of being notified of the COVID-19 case • Follow up daily and at minimum on day 7 and 14 of the isolation period through text, emails or phone calls	• Initiate first call within 24 hours of being notified of a close contact • Follow up at the beginning, middle and end of the isolation period through text, emails or phone calls.

1. Before COVID-19, contact tracing was usually done by case managers. However, with the large volume of COVID-19 cases, separate contact tracers were reported to perform this task.

2. Management of cases and contacts of COVID-19 in Ontario (version 8.0).

Case Management

Case management is the process where a case manager (generally, a public health nurse) contacts a person who has been identified as having COVID-19 and provides advice on how to manage their condition. Specifically, case managers perform the following activities:

- advise the person about when to seek additional support from a primary care practitioner or hospital;

- confirm the person's symptoms and overall health condition, and the progression of the illness;
- identify and collect demographic information;
- advise the person what precautions they need to take to avoid further transmission of COVID-19 to others;
- discuss the person's activity during the period prior to getting a COVID-19 test to help determine how the person contracted COVID-19;

- identify and collect contact information on the individuals the person interacted with who may have been exposed to COVID-19;
- continue to contact the person with COVID-19 for up to two weeks after the test result was reported to the public health unit;
- identify potential outbreaks; and
- advise the person of any legal requirements under the orders issued through section 22 of the *Health Protection and Promotion Act*.

Contact Tracing

Contact tracing is the process by which a case manager or contact tracer (typically a public health unit staff member or another staff member provided by the province co-ordinated by Public Health Ontario who is not required to have a health-care background) contacts individuals identified as having interacted with a person who tested positive for COVID-19. Contact tracing perform the following activities:

- inform the individuals that they may have exposure to COVID-19;
- alert the individuals about the need for them to monitor their symptoms and the public health measures that they should follow (such as self-isolation); and
- advise the individuals about whether they should be tested for COVID-19.

These individuals may be contacted for a period of up to two weeks to determine if any COVID-19 symptoms have developed. If the individuals get tested and are identified to have COVID-19, they will be referred to a case manager to undergo the case management process.

Resources for Case Management and Contact Tracing

During the COVID-19 pandemic, public health units have increased their capacity to perform case management and contact tracing activities. Between December 2019 and August 2020, public health

units increased their resources by about 10 times on average by redeploying staff within their units, receiving staff on secondment from other municipal departments, and hiring for temporary and full-time positions.

Public Health Ontario and the Ministry also assisted public health units by providing additional people to help perform contact tracing. These people were not required to have a health-care background, but it was required that they be over-seen and their work be co-ordinated by individuals with public health and health-care expertise. In April 2020, Public Health Ontario started co-ordinating contact tracing activities for approximately 150 additional staff provided by the federal government. In June 2020, the Ministry announced that an additional 1,700 staff from Statistics Canada would be available to help Ontario with contact tracing. In October 2020, the Ministry announced it would build a supplementary pool of 600 contact tracers from the Ontario Public Service and the broader public sector.

2.2 Roles and Responsibilities of Key Players

While the Ministry is ultimately responsible for Ontario's health-care response to COVID-19, a number of other parties are also involved. They include Public Health Ontario, community laboratories operated by private companies, hospitals, Ontario Health and 34 public health units. **Figure 5** describes the roles and responsibilities of these key players.

Under the *Health Protection and Promotion Act*, physicians and institutions (such as laboratories, long-term-care homes and hospitals) are responsible for reporting certain diseases and outbreaks to the public health units where affected individuals reside. On January 22, 2020, the Minister of Health announced an update to the *Health Protection and Promotion Act* that added "diseases caused by novel coronaviruses, including SARS and MERS" to the list of Diseases of Public Health Significance under

Figure 5: Roles and Responsibilities of Main Participants in COVID-19 Laboratory Testing, Case Management and Contact Tracing

Prepared by the Office of the Auditor General of Ontario

Participant	Roles and Responsibilities
Ministry of Health	• Leads Ontario's health-care response to COVID-19 • Licenses laboratories to perform COVID-19 testing • Issues COVID-19 Provincial Testing Guidance, which outlines testing eligibility • Develops guidance (with contributions from Public Health Ontario) on the performance of case management and contact tracing for COVID-19
Public Health Ontario	• Provides scientific evidence and expert guidance on matters related to public health, and operates 11 public health laboratories that perform testing of various infectious diseases, including COVID-19 (in seven of its 11 laboratories) • Validates laboratory testing done by other hospital and community laboratories so that those laboratories can be licensed to independently perform COVID-19 testing • Provides advice to public health units on case management and contact tracing, including advice for dealing with complex and unusual cases and on what to enter into the integrated Public Health Information System (iPHIS) • Co-ordinate the additional contact tracing staff provided by the province and the federal government • Notifies public health units and the health-care practitioner or assessment centre that ordered the test when a test it performed on an individual residing in their region is positive • Reports the result of all COVID-19 laboratory tests it performs into the Ontario Laboratory Information System (OLIS) • Provides to the Ministry of Health on a daily basis details of new COVID-19 cases entered into iPHIS
Ontario Health	• Establishes and leads a Provincial Diagnostic Network made up of the 43 laboratories that perform COVID-19 testing to identify and discuss common challenges and opportunities amongst participants • Provides guidelines to assessment centres on operational processes and procedures • Enters into competitively procured contracts with two organizations (Switch Health Holdings Inc. and DriverCheck Inc.) to conduct on-site specimen collection of specific high-risk populations that were impractical to test through usual means (such as, migrant farm workers at farms experiencing COVID-19 outbreaks, who were advised not to visit an assessment centre)
Hospitals	• Collect specimens through emergency departments or assessment centres • Perform COVID-19 testing themselves (33 hospital laboratories) or send specimens to another laboratory for testing • Notify public health units and the health-care practitioner or assessment centre that ordered the test when a test they performed on an individual residing in their region is positive • Notify the individual from whom they collected a specimen of a positive COVID-19 test result • Report into OLIS the results of all COVID-19 laboratory tests they perform
Community laboratories	• Receive and test specimens for COVID-19 (three community laboratories: Alpha Laboratories Inc, Dynacare and LifeLabs) • Notify public health units and the health-care practitioner or assessment centre that ordered the test when a test they performed on an individual residing in their region is positive • Report into OLIS the results of all COVID-19 laboratory tests they perform
Public health units	• Enter details of individuals with COVID-19 into iPHIS • Perform case management and contact tracing of individuals with COVID-19 and their close contacts • Organize collection of specimens for COVID-19 in settings outside of assessment centres (e.g., long-term-care homes)

the Designation of Diseases regulation (O. Reg. 135/18). Public health units are expected to enter the details of any person who contracts a reportable disease into the integrated Public Health Information System (iPHIS), which is maintained by the Ministry to generate province-wide reports.

2.3 Why We Are Issuing This Special Report

COVID-19 has impacted the lives of all Ontarians. As of August 31, 2020, Ontario had experienced the third-highest number of COVID-19 cases per 100,000 residents in Canada (see **Figure 6a**) and the second-highest number of deaths per 100,000 residents (see **Figure 6b**). **Appendix 2** compares the number of residents, COVID-19 cases and COVID-19 deaths in Canadian provinces and territories as of August 31, 2020.

Ontario faces some significant and unique challenges in coping with COVID-19 compared to the rest of Canada. First, it has highly decentralized public health and health systems; our past audit reports, especially our 2007 audit on Outbreak

Preparedness and Management, have identified long-standing issues with decentralization. Second, Ontario has unique demographics (including a high immigrant population), geography and population density (particularly in southern Ontario), all of which greatly increase the risk of community transmission of COVID-19. Such community spread did occur, primarily in Toronto, Peel and Ottawa, and will continue to be a significant risk going forward. In light of the continuing spread of COVID-19 as the economy reopens and the possibility of potential subsequent waves, it is critical to identify individuals with COVID-19 on a timely basis through laboratory testing, to trace their contacts quickly, and to advise them and their contacts quickly on what to do.

The purpose of this report is to present information to help interpret what happened provincially related to COVID-19 laboratory testing, case management and contact tracing in order to help COVID-19 decision making going forward and in relation to future public health pandemics.

In this report, we present:

Figure 6a: Number of COVID-19 Cases per 100,000 Residents by Province and Territory, as of August 31, 2020

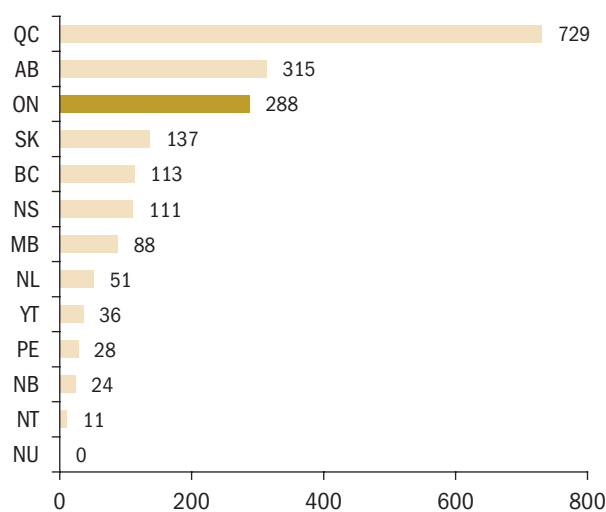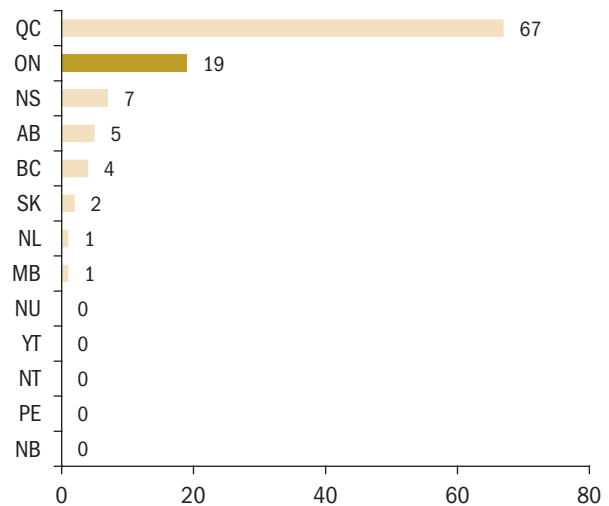Prepared by the Office of the Auditor General of Ontario

	Value
QC	729
AB	315
ON	288
SK	137
BC	113
NS	111
MB	88
NL	51
YT	36
PE	28
NB	24
NT	11
NU	0

Figure 6b: Number of COVID-19 Deaths per 100,000 Residents by Province and Territory, as of August 31, 2020

Prepared by the Office of the Auditor General of Ontario

	Value
QC	67
ON	19
NS	7
AB	5
BC	4
SK	2
NL	1
MB	1
NU	0
YT	0
NT	0
PE	0
NB	0

Note: Numbers are rounded to the nearest whole number. As a result, some provinces and territories identified as having zero deaths per 100,000 residents did have COVID-19 deaths.

- Ontario's performance in collecting and testing COVID-19 specimens, including weaknesses in the process that resulted in delayed test results;
- Ontario public health units' performance and challenges in managing COVID-19 cases and tracing contacts; and
- recommendations on ways to improve Ontario's laboratory testing, case management, and contact tracing, so that the work can be completed more quickly.

3.0 Audit Objective and Scope

Our audit objective was to assess whether the Ministry of Health (Ministry), in association with its partners (including Public Health Ontario, Ontario Health and public health units), have effective systems and procedures in place to:

- perform necessary laboratory testing for Coronavirus Disease 2019 (COVID-19) in a timely manner;
- perform case management and contact tracing in a complete, timely and accurate manner, in accordance with available guidance; and
- collect, report and utilize data to deploy resources so that laboratory testing, case management and contact tracing can effectively reduce the spread of COVID-19.

In planning for our work, we identified the audit criteria (see **Appendix 3**) we would use to address our audit objective. These criteria were established based on a review of applicable legislation, policies and procedures, internal and external studies and best practices. Senior management at the Ministry reviewed and agreed with the suitability of our objectives and associated criteria.

This report focuses on the province's COVID-19 laboratory testing, case management and contact tracing activities between January 2020 (when the first COVID-19 case in Canada was confirmed in Ontario) and August 2020. We conducted our audit between May 2020 and September 2020. We obtained written representation from Ministry management that, effective November 13, 2020, it had provided us with all the information it was aware of that could significantly affect the findings or the conclusion of this report.

Our audit work primarily involved the Ministry, Ontario Health and Public Health Ontario. In performing our audit work, we:

- examined data on COVID-19 laboratory testing, including tests completed daily and backlogs of tests provincially and by laboratory, as well as documents outlining plans to increase Ontario's COVID-19 laboratory testing capacity and progress to date;
- examined data on case management and contact tracing, including details of when public health units started managing the cases of individuals diagnosed with COVID-19 and when public health units performed contact tracing work;
- spoke with senior management from the Ministry, Ontario Health and Public Health Ontario to understand Ontario's initial COVID-19 laboratory testing capacity, as well as the plans for and the challenges of expanding it.

To assess effectiveness, we performed tests on case management and contact tracing records from four public health units: Middlesex-London, Ottawa, Peel and Toronto.

To understand the operations and challenges with performing COVID-19 testing, we spoke with five hospitals or hospital networks that operated laboratories (Eastern Ontario Regional Laboratory Association, Health Sciences North, London Health Sciences Centre, Mount Sinai Hospital and William Osler Health System), eight assessment centres (both the Oakridge Arena and Carling Heights Optimist Community Centre Assessment Centres operated by London Health Sciences, the Brampton and Etobicoke Drive-Thru COVID-19 Testing Centres operated by William Osler Health System,

the Mount Sinai Hospital Assessment Centre, the Toronto Western Hospital Assessment Centre operated by University Health Network, the Brewer Park Assessment Centre operated by the Ottawa Hospital, and the Health Sciences North Research Institute Assessment Centre, which operates as a drive-through, and two community laboratories that perform COVID-19 laboratory testing (Dynacare and LifeLabs).

To obtain an understanding of case management and contact tracing and its challenges, we spoke with the Medical Officers of Health, senior management and staff at 10 of the 34 public health units (which accounted for over 75% of COVID-19 cases in Ontario as of August 31, 2020): Haldimand-Norfolk; Hamilton; Kingston, Frontenac and Lennox and Addington; Middlesex-London; Ottawa; Peel; Thunder Bay; Toronto; York Region; and Windsor-Essex County.

To understand how other provinces expanded laboratory testing capacity, we spoke with senior management at Alberta Health Services, the British Columbia Centre for Disease Control Public Health Laboratory and the Nova Scotia Health Authority.

We engaged Dr. David Walker, who chaired the Province of Ontario's Expert Panel on SARS and Infectious Disease Control (2004) and the subsequent Expert Panel on the Legionnaires' Disease Outbreak in the City of Toronto (2005), as our independent advisor to assist us with our work.

We conducted our work and reported on the results of our examination in accordance with the applicable Canadian Standards on Assurance Engagements—Direct Engagements issued by the Auditing and Assurance Standards Board of the Chartered Professional Accountants of Canada. This included obtaining a reasonable level of assurance.

The Office of the Auditor General of Ontario applies the Canadian Standard on Quality Control and, as a result, maintains a comprehensive quality control system that includes documented policies and procedures with respect to compliance with rules of professional conduct,

professional standards and applicable legal and regulatory requirements.

We have complied with the independence and other ethical requirements of the Code of Professional Conduct of the Chartered Professional Accountants of Ontario, which are founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour.

4.0 Detailed Audit Observations

4.1 Limited Laboratory Testing Capacity Has Been a Long-Standing Issue, But Never Addressed

Ontario faced challenges in increasing its laboratory testing capacity, including the challenges of competing with other jurisdictions for the same laboratory testing equipment and supplies, and staffing laboratories with qualified people to perform all necessary testing. While Ontario's Coronavirus Disease 2019 (COVID-19) laboratory testing capacity increased from 110 tests per day on January 11, 2020 to over 40,000 tests per day on August 31, 2020, this increase did not occur fast enough to meet the public's demand for tests. The Ministry of Health (Ministry) did not act on previous advice and recommendations made by Public Health Ontario, a Laboratory Services Expert Panel and our Office that would have enabled Ontario's capacity to increase as fast as that of British Columbia and Alberta. This lag prevented Ontario from expanding the eligibility criteria for COVID-19 testing, contributing to about 119,000 Ontarians who may have contracted COVID-19 not being tested for it.

4.1.1 Increases in Laboratory Testing Capacity Did Not Always Keep Pace with Demand, Resulting in Concerning Backlogs at Times and Under-Reporting of Daily Cases

Ontario's capacity to perform COVID-19 laboratory tests, while having significantly increased since January 2020, was still sometimes insufficient to meet the public's demand for testing, especially after decisions were made to expand who was eligible to be tested.

On January 11, 2020, Ontario had the capacity to perform only 110 tests per day, at Public Health Ontario's one laboratory in Toronto. The number of laboratories performing tests increased to 43 (seven public health laboratories, 33 hospital laboratories and three community laboratories) as of August 31, 2020 (see **Appendix 1**). **Figure 7** shows the daily COVID-19 laboratory test capacity and tests performed from March 29, 2020 (which was when Ontario Health began tracking this information) to August 31, 2020. The number of laboratory tests performed were generally below Ontario's testing capacity for various reasons. One was that

more capacity than needed had been intentionally built throughout the province so that it could be available in surge situations, but that excess capacity in one part of the province could not always be rapidly utilized to support an overwhelmed laboratory in another part of the province. As identified in **Section 4.1.4**, specimens were sent between laboratories where deemed feasible.

As more Ontarians became eligible for testing, there were significant backlogs. In this report, the term backlog refers to all specimens at laboratories that were pending results. This includes specimens arriving near the end of the day that could not be processed in time, specimens undergoing processing where the results were not yet available at the end of the day, and specimens arriving and piling up faster than laboratories could process them. The larger the backlog compared to laboratory capacity, the longer it takes to receive results. While small backlogs are inevitable and routine in the normal course of laboratory operations, larger backlogs (specifically those exceeding the daily laboratory capacity) are of a significant concern as they can delay test results from being known and

Figure 7: Daily COVID-19 Testing Capacity and Tests Performed, March 29–August 31, 2020
Source of data: Ontario Health
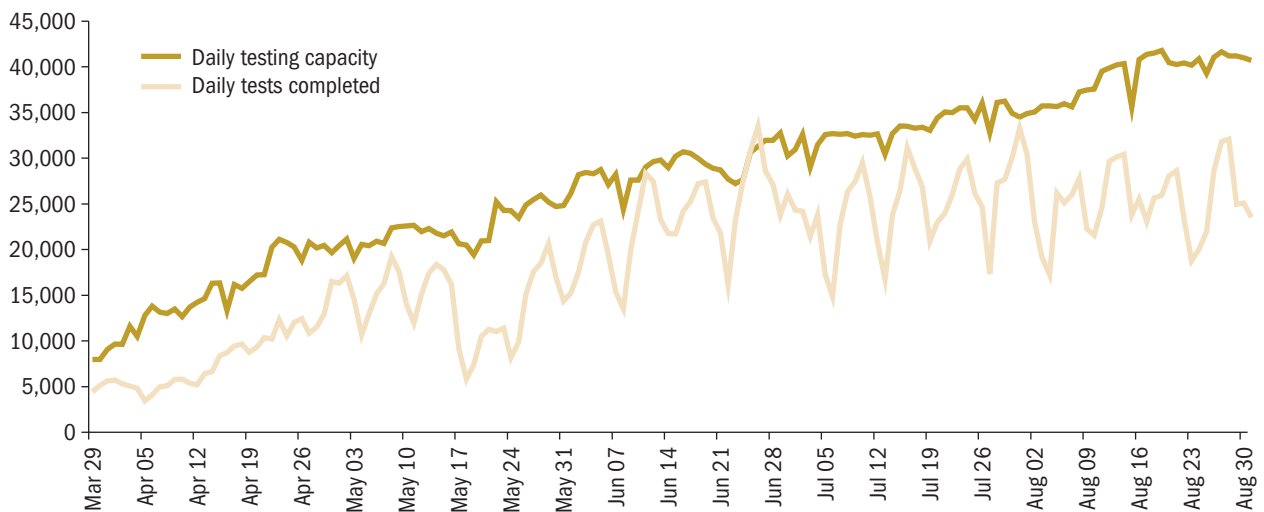
Note: March 29, 2020 was the first day that Ontario Health tracked this information. Daily tests completed can exceed daily testing capacity (such as on June 25 and June 26) due to several reasons: they include laboratories increasing their staffing on a particular day and staff working overtime. Daily tests completed can also be below daily testing capacity for a number of reasons: they include specimens not being distributed equally among laboratories, resulting in laboratory equipment not being used in some laboratories while other laboratories experience backlogs; laboratory equipment not being ready for use due to preventative maintenance or repairs; and human resources needed to operate equipment not being available during certain hours of the day.

communicated. Even though some laboratories were staffed and operating 24/7 to continuously process specimens during the pandemic, there were sometimes still significant backlogs. **Figure 8a** shows the daily laboratory test backlogs (or tests not yet resolved) from January to August 2020. While the backlogs increased significantly over time, this growth is expected and not a cause for alarm because the increased demand for testing over this period meant that at any given time there were more specimens either being processed or queued to be processed in laboratories. **Figure 8b** shows the monthly average of the daily backlogs from January to August 2020. Daily backlogs delayed testing throughout March, but on average were lower than the tests completed from April through August. Nevertheless, there were still instances after April where backlogs occurred that were above the province's daily testing capacity. For example, on June 27, the backlog of specimens to test was 33,759 and the daily laboratory testing capacity was 31,950. We also noted backlogs of about 50,000 tests and more in the last week of September, capping at over 90,000 unresolved tests in the first week of October, which was significantly greater than the 50,000 testing capacity target first reached on October 1.

Not having capacity to complete all COVID-19 tests each day increased the wait for the result for an individual, their health-care practitioner and their public health unit (see **Section 4.3.2** and **Section 4.3.3** for details of these waits). The existence of significant backlogs delayed positive cases of COVID-19 from being known and reported (to the individual tested, healthcare practitioners, public health units and as part of the province's daily COVID-19 reporting).

4.1.2 Delay in Increasing Testing Capacity Resulted in Numerous Ontarians with Symptoms or with COVID-19 Never Being Tested

The delay in increasing the capacity of laboratories to perform COVID-19 tests (see **Section 4.1.1**) meant it took longer for Ontario to be able to test anyone with symptoms compared to Alberta and British Columbia. As shown in **Figure 9**, which summarizes key changes to COVID-19 testing eligibility criteria in Ontario (with additional details provided in **Appendix 4**), it was not until May 14, 2020 that Ontario allowed any individual with symptoms to be tested. This was about one month after Alberta and about three weeks after British Columbia allowed testing of symptomatic individuals (April 13 in Alberta and April 21 in British Columbia).

Thus, before May 14, 2020, thousands of Ontarians who did not meet the case definition for COVID-19 or provincial testing guidance were not allowed to be tested, including some who were symptomatic. Based on Public Health Ontario's analysis, we estimated that about 119,000 Ontarians can be assumed to have had COVID-19 without having been tested for it. For those who did have COVID-19 but were excluded from testing and would have sought testing, this not only resulted in the Ministry not having accurate information about actual COVID-19 cases to make decisions, but it also meant that people whose cases should have been managed, and their close contacts, who should have been advised of their risks, were never called by their public health unit. If Ontario had increased its testing capacity more quickly, it could have tested more Ontarians with symptoms earlier and likely reduced overall COVID-19 transmission in the province.

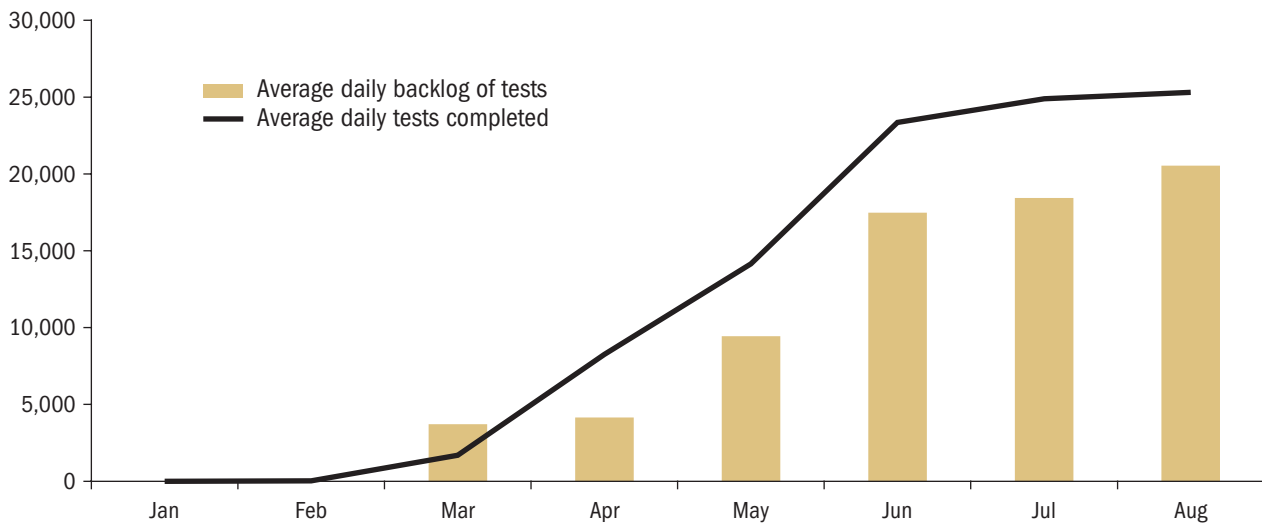**Figure 8a: Daily COVID-19 Testing Backlog, January 26–August 31, 2020**

Source of data: Government of Ontario website
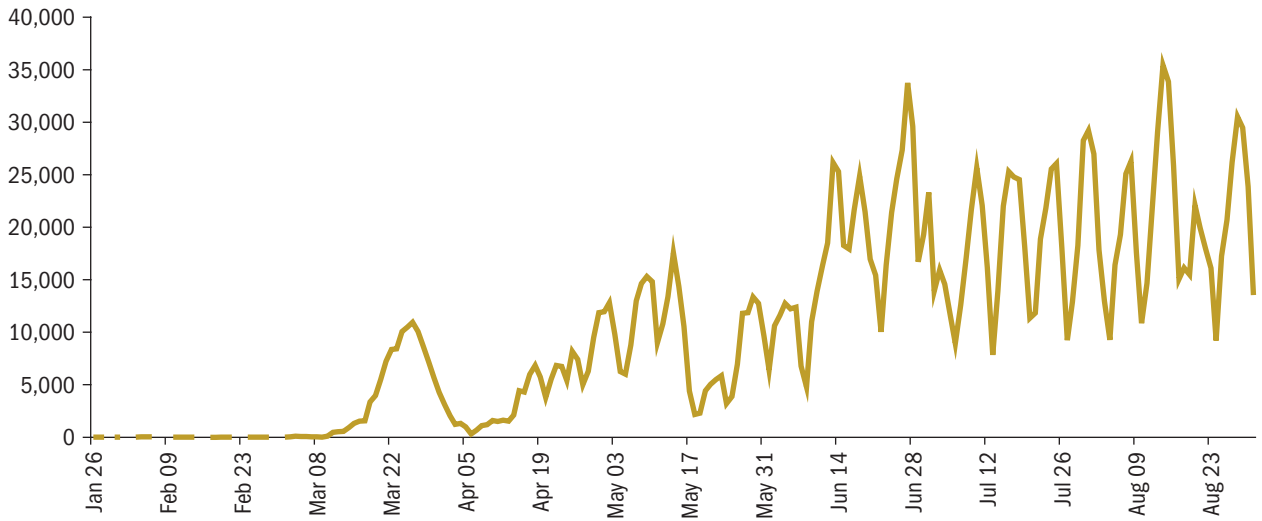
Note: January 26, 2020 was the first day for which this data was publicly reported on the Government of Ontario website. "Backlog" in this report refers to all tests that are pending results, which include both tests waiting to be processed and tests that are being processed.

Figure 8b: Average Daily COVID-19 Testing Backlog and Tests Completed by Month, January–August 2020

Source of data: Government of Ontario website and Ontario Health

Note: January 26, 2020 was the first day for which this data was publicly reported on the Government of Ontario website. "Backlog" in this report refers to all tests that are pending results, which include both tests waiting to be processed and tests that are being processed.

Thousands of Ontarians Seeking COVID-19 Testing, Including Those with Symptoms, Were Not Allowed to be Tested

Between March 18 (the earliest date that data is available) and August 31, 2020, about 95,700 (or 6%) of Ontarians who visited an assessment centre were not tested. This was mainly due to these individuals not meeting the provincial COVID-19 testing guidance at the time. The period between March 18 and March 31, 2020 was when the highest proportion of people were affected: between these dates, assessment centres did not collect samples for testing from more than 40% (or about

Figure 9: Key Changes to Criteria Individuals Must Meet To Be Tested for COVID-19

Prepared by the Office of the Auditor General of Ontario

	Guidance Release Date[1]				
	Jan 24	**Apr 8**	**May 14**	**May 24**[2]	**Sep 24**
General Criteria					
Individual has COVID-19 symptoms only[3]			x		x
• and has recently travelled to an impacted area[4]	x	x			
• and has had close contact with a confirmed or probable case[5]	x	x			
• and has had close contact with a symptomatic individual who travelled to an impacted area[3,4]	x	x			
Individual has no symptoms but one of the following applies[6]			x		x
• individual was in close contact with a confirmed case or linked to an outbreak[7]			x		x
• individual is part of a high-risk population[8]					x
Criteria specifies that low-risk, asymptomatic individuals should not be tested					x
Criteria Related to Specific Populations or Settings					
Individual works, lives in and/or visits specific settings[9]		x	x		x
Individual belongs to a priority population[10]		x	x		x

1. On April 8, Ontario released its first iteration of testing guidance for COVID-19. Prior to April 8, testing criteria was based on the existing case definition. The case definition was regularly updated as the international and provincial understanding of COVID-19 developed.

2. On May 24, Ontario announced asymptomatic testing for anyone who wanted a test. This was never reflected in Ontario's testing guidance.

3. What constitutes COVID-19 symptoms has been expanded since the beginning of the pandemic. Common symptoms include fever, dry cough and trouble breathing.

4. Impacted areas changed from Wuhan, China to Hubei Province, China to Mainland China and eventually to other countries with known outbreaks of COVID-19.

5. Close contacts of both confirmed and probable cases were included in Ontario's case definition until before the May 14 guidance. Since then, the criteria includes only confirmed cases.

6. While asymptomatic testing was never recommended, it was also not prohibited, and collecting specimens from asymptomatic individuals continued until September 24.

7. From May 14 until May 28, asymptomatic testing (which was announced on May 24) was recommended only for individuals linked to an outbreak. The addition of being in close contact with a confirmed case was added on May 14 and all successive iterations.

8. High-risk populations include workers at and residents of settings such as long-term-care homes, visitors at long-term-care homes, workers at and residents of homeless shelters and other congregate settings, and any individual identified as part of a targeted testing campaign as directed by the Ministry of Health, the Ministry of Long-Term Care or local public health units.

9. Settings identified in testing criteria have evolved over time. As of September 24, setting-specific guidance existed for hospitals, long-term-care and retirement homes, facility transfers, congregate living settings and institutions, workplaces, community settings, and remote, isolated, rural and Indigenous communities.

10. Priority populations identified in testing criteria have evolved over time. As of September 24, population-specific guidance existed for health-care workers, caregivers, care providers, first responders, emergency child-care-centre workers, people living in the same household as those already mentioned, essential workers, cross-border workers, school workers and students, and those requiring frequent contact with the health care system.

16,800) of the about 41,300 people who went to the centres.

The Ministry issued guidance that specified testing eligibility criteria, which changed significantly over time (see **Figure 9** and **Appendix 4**). For example, prior to May 14, 2020, the guidance did not encourage testing of the general population, even those with symptoms, unless they were known to have had contact with a confirmed COVID-19 case or belonged to specific groups (such as health-care workers). Following a provincial announcement on May 24, 2020, anyone with no symptoms could be tested for COVID-19 and was encouraged to do so. Four months later, asymptomatic testing was again restricted on September 24, 2020. While not all individuals who were asymptomatic could

now get tested, pharmacies began COVID-19 specimen collection on asymptomatic individuals who met certain criteria (such as working at, residing in or planning to visit a long-term-care home).

The Ministry did not track which of the individuals denied testing at assessment centres actually had COVID-19 symptoms. Staff at six of the eight assessment centres we spoke to acknowledged that they had to turn symptomatic people away from testing due to the Ministry's strict eligibility criteria (see **Appendix 4**). For example:

- One assessment centre identified that at times it was turning away daily up to 40% of those seeking a test (or 45 to 140 people), with many of these people being turned away in order to adhere to the Ministry's eligibility criteria.
- Another assessment centre identified the Ministry's tight eligibility requirements as the main reason for not testing people who requested a COVID-19 test.

Public Health Ontario Study Suggests about 119,000 Ontarians with COVID-19 Were Never Tested

Health experts can use the existence of COVID-19 antibodies in an individual as evidence that the individual contracted COVID-19 at some point. Public Health Ontario has conducted several studies to measure the prevalence of antibodies in Ontarians. One of the studies noted that as of August 2020,

COVID-19 antibodies had been detected in about 1.1% of the specimens tested (or 72 of 6,789 specimens tested). Public Health Ontario indicated that based on this study, it is reasonable to conclude that about 1.1% of Ontario's population may have been exposed to COVID-19 as of August 2020.

Applying this to Ontario's population of 14.7 million results in an estimate of over 161,000 Ontario residents infected with COVID-19 as of August 2020. Ontario publicly reported that only about 42,000 individuals had tested positive for COVID-19 as of August 31, 2020. This suggests that about 119,000 Ontarians (or nearly three out of every four Ontarians with COVID-19) who may have contracted COVID-19 were never tested, and neither they nor their close contacts were monitored and advised by their public health units as part of case management. It is not known how many of these individuals recognized that they had COVID-19 symptoms and would have sought testing if it was available to them.

4.1.3 Ontario Did Not Achieve Laboratory Testing Capacity Targets

On April 6, 2020, the Ministry set a target provincial COVID-19 laboratory test capacity of 20,000 tests per day by the week of April 19, 2020. This capacity target was further increased by increments to 50,000, 65,000, 75,000 and 100,000 tests per day. **Figure 10** shows the timeline set by the Ministry

Figure 10: Daily COVID-19 Testing Capacity Targets: Daily Testing Capacity, Target Deadlines and Dates Target Met

Sources of data: Ministry of Health and Ontario Health

Target		Date Target Met[1]
Daily Testing Capacity (# of Tests)	**By (Target Deadline Date)**	
20,000	Apr 25	Apr 22
50,000	Sep 26[2]	Oct 1
65,000	Oct 20	Oct 24
75,000	Mid-Nov	Nov 2
100,000[3]	End of Dec	n/a

1. Based on maximum daily testing capacity prior to or as of November 15, 2020.

2. The initial target deadline for reaching a capacity to process 50,000 daily tests was July 2020.

3. The target capacity to perform 100,000 tests per day is based on projections of Ontario's fall and winter second wave and testing demand estimates validated by the Office of the Chief Medical Officer of Health and Public Health Ontario.

for the achievement of a capacity of 100,000 tests per day. While Ontario was able to meet the target of a capacity of 20,000 tests daily on April 22, it did not meet its target dates for achieving the capacity to perform 50,000 and 65,000 tests per day. More recently, Ontario built sufficient capacity to perform 75,000 tests per day on November 2, well in advance of its mid-November target.

On June 18, 2020, Treasury Board/Management Board of Cabinet (TB/MBC) approved initiatives to increase laboratory testing capacity. The goal was to sustain current testing volumes up to 25,000 tests per day and to achieve the capacity to perform 50,000 tests per day by July 2020 in order to prepare for flu season and a potential second wave. The initiatives included funding community laboratories and implementing digital test requisition (electronic ordering, or e-ordering). **Figure 11** lists the initiatives and their funding commitments. These initiatives include increasing testing supplies, automating IT capabilities to allow testing to be performed more efficiently, and transitioning operational leadership of the laboratory network from an external firm to Ontario Health.

The provincial target of a daily capacity of 50,000 tests by July 2020 was not met. The high-est daily capacity by the end of July was reported on July 29, 2020, of about 36,300 tests. This was about 27% (or 13,700 tests) below the target. Ontario Health informed us that this target was not met because of delays in obtaining enough testing equipment and a lack of testing supplies and human resources to complete the testing.

The Ministry then extended the target deadline to September 26, 2020 for the capacity of 50,000 daily tests, and targeted the end of 2020 for a capacity of 100,000 daily tests (see **Figure 10**). Ontario missed the September 26, 2020 target by about 12% (or 5,900 tests), achieving a capacity of about 44,100 daily tests. The number of tests at laboratories that were not yet resolved on that date was approximately 68,000. Despite the missed early targets, the recent expansion of testing capacity to meet the 75,000-capacity target ahead of the target date is a positive step for the province, although it still remains unclear whether the capacity target of 100,000 daily tests will be met by the end of December.

Figure 11: Initiatives by the Ministry of Health to Increase COVID-19 Laboratory Testing Capacity
Source: Ministry of Health

Initiative	Funding ($ million)	Brief Description
Maintain current testing volumes	48.00	Enable community laboratories to continue to perform COVID-19 laboratory testing throughout 2020/21.
Maintain operations and transition leadership of the Provincial Diagnostic Network	7.00	Continue an engagement with an external consultant to organize, facilitate and lead laboratory co-ordination, and train Ontario Health staff to take over these responsibilities.
Improve IT capabilities related to testing	8.50	Improve IT capabilities to automate manual testing processes (includes implementing electronic test requisition and tracking to replace paper requisitions and manual data entry).
Increase testing supplies and equipment	3.00	Support accelerated production of the supplies used to collect specimens to perform COVID-19 laboratory tests.
Explore options for workplace testing	0.15	Work with Infrastructure Ontario to identify options for private-sector workplace testing.
Total	**66.65**	

4.1.4 Laboratory Testing Capacity Was Increased Late, Despite Warnings by Public Health Ontario and Experts in February 2020

The National Microbiology Laboratory in Winnipeg, Manitoba was initially responsible for confirming all COVID-19 tests in Canada. It confirmed the first Canadian COVID-19 case on January 27, 2020.

As noted in **Section 4.1.1**, Ontario's testing capacity on January 11, 2020 was just 110 tests per day. The single testing site was Public Health Ontario's laboratory in Toronto, which Public Health Ontario initially expected would be sufficient to meet the needs of Ontarians given its past experience testing for influenza and the H1N1 virus. Influenza had required an average of only about 100 tests per day over the past three fiscal years, while the H1N1 outbreak in 2009 required only about 135 tests per day over a year-long period.

By early February 2020, hospital and community laboratories had expressed interest in participating in COVID-19 testing. On February 12, Ontario's Chief Medical Officer of Health sent a letter to hospital and community laboratories, noting that "[a]t the present time, the current testing activity is low and well within the capacity of Public Health Ontario to turn results around quickly." The letter invited interested laboratories to nevertheless email the Ministry Emergency Operations Centre to set up discussions on a co-ordinated process.

By the end of February 2020, both Public Health Ontario and health-care experts had realized that the existing laboratory testing capacity would not be sufficient and expressed their concerns to the Chief Medical Officer of Health. Specifically:

- On February 16, 2020, the Ministry of Health Emergency Operations Centre (which reported to the Chief Medical Officer of Health at that time and is responsible for co-ordination of the COVID-19 response) emailed health stakeholders, identifying that some hospitals wanted to test individuals for COVID-19 who had travelled to countries other than China and that this was against the Ministry's existing case definition. The email stated that specimens collected from those who had recently travelled to other countries with known COVID-19 cases were not eligible for testing, suggesting that recognizing jurisdictions other than mainland China would "create difficulties in laboratory testing."

- On February 21, 2020, 10 hospital epidemiologists sent a letter to the Chief Medical Officer of Health indicating that their hospitals would deviate from the case definition in order to test individuals from other countries with known COVID-19 cases. They recommended that Ontario should expand laboratory testing across the province either at Public Health Ontario's Toronto laboratory or at other local laboratories, and that resources should be immediately committed to preparing laboratories and stockpiling testing reagents before they are made unavailable by supply chain limitations. The letter also identified that it is likely that a single identified COVID-19 case of local, or community, transmission (meaning that the likely source of the transmission is not known) would likely take Ontario's COVID-19 testing volumes from less than a hundred tests per day to several thousand tests per day. That same day, the Ministry of Health Emergency Operations Centre emailed health stakeholders indicating that health-care providers could use their clinical judgment to determine the appropriateness of testing beyond the existing case definition.

- On February 26, 2020, Public Health Ontario issued a briefing note to the Chief Medical Officer of Health, indicating that "[f]or containment and mitigation, we must immediately expand testing for COVID-19 beyond [Public Health Ontario]" and that "[w]ith the increase in community transmission [in other countries], the need for testing capacity has increased." The briefing note also indicated that British Columbia

was already having hospitals perform some COVID-19 testing for the province and that other international jurisdictions, such as South Korea, were conducting far more testing.

- Also on February 26, 2020, 36 doctors specializing in microbiology and/or infectious diseases who were working in hospitals across Ontario sent a letter to the Chief Medical Officer of Health, indicating that "given the rapidly changing epidemiology, and the lead time (minimum 4–6 weeks) required to implement reliable testing and reporting," they "urge the Ministry of Health to act now to support, via the provision of coordination and resources, to roll out COVID-19 testing and result reporting at ALL hospital laboratories that have the appropriate equipment, expertise (clinical or medical microbiologists), lab personnel, and biosafety infrastructure to safely do so."

The Ministry began acting to ramp up testing capacity in March 2020. For example:

- The Ministry and Public Health Ontario established a working group for COVID-19 on March 2, 2020, which included specific laboratories capable of COVID-19 testing, to plan capacity expansion.
- The Ministry started surveying provincial laboratories in early March 2020 to understand where testing could be expanded beyond Public Health Ontario. Three hospital laboratories began testing in mid-March. On March 19, 2020 (three weeks after Public Health Ontario and doctors raised their concerns), the Ministry asked Ontario Health to develop a plan to expand COVID-19 laboratory testing capacity. One week later, on March 26, 2020, Ontario Health established Ontario's COVID-19 Provincial Diagnostic Network (Network)—an integrated provincial network of public, hospital and community laboratories to co-ordinate COVID-19 testing activities, such as facilitating the transfer of

specimens collected to laboratories as well as organizing the collection and reporting of COVID-19 test results from each laboratory on a daily basis.

- In late March 2020 (a month after Public Health Ontario and hospital experts raised their concerns), laboratory testing capacity was ramped up with assistance from community and hospital laboratories that had potential capacity or had already begun COVID-19 testing. On March 29, 2020, 13 laboratories performed approximately 4,400 tests, which helped to reduce the testing backlog to 7,200 tests from the peak backlog of about 11,000 tests on March 26, 2020 (see **Figure 8a**).

The Network continued to grow to increase capacity. As of August 31, 2020, 43 laboratories (seven public health laboratories, 33 hospital laboratories and three community laboratories) operating in the Network had the capacity to perform a total of approximately 41,000 tests per day. **Figure 12** outlines the daily capacity by type of laboratory.

While the Network has enabled a high level of collaboration between public health, hospital and community laboratories (including co-ordinating the transfer of specimens for COVID-19 testing from a laboratory with a large backlog to others that have excess capacity where deemed likely to result in faster laboratory test turnaround times), bringing it on board earlier would have helped Ontario organize and plan a cohesive response for COVID-19 laboratory testing much sooner.

4.1.5 Hospitals Did Not Rapidly Increase Laboratory Testing Capacity Due to Ambiguity and Uncertainty of Ministry Funding

Hospitals told us that they did not aggressively increase their laboratory testing capacity because the information they received from the Ministry about funding to support more testing was unclear on the amounts and the timing. While hospitals are

Figure 12: Daily COVID-19 Testing Capacity by Laboratory Type, March 29–August 31, 2020

Source of data: Ontario Health
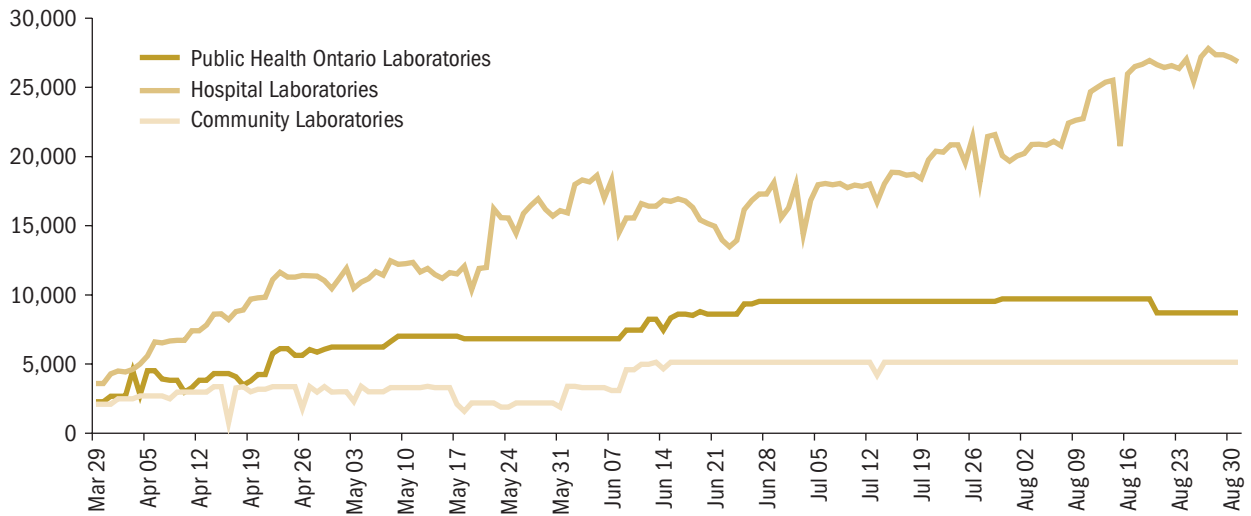
Note: March 29, 2020 was the first day that Ontario Health tracked this information.

able to reallocate resources from within their global budgets to increase laboratory testing capacity, hospitals need this funding to cover all hospital operations. A lack of clear and timely direction from the Province slowed the speed and amount of laboratory investment hospitals made.

As mentioned in **Section 4.1.4**, hospital laboratories had already begun developing their own COVID-19 testing capacity by late February 2020. They expressed their eagerness to increase their capacity so as to test more specimens faster. They shared with us how their turnaround time was affected by capacity being insufficient for demand. For example:

- One hospital laboratory's testing turnaround time for in-house samples was approximately 14 hours in June 2020. In contrast, when its capacity was exceeded in June 2020 and it had to send samples elsewhere for testing, its turnaround time increased to about 37 to 69 hours, depending on where the samples were sent.
- Another hospital laboratory redirected between 400 and 800 of the samples it received in late July and early August 2020

to a laboratory over 400 kilometres away because local capacity was overwhelmed. This contributed to an increase in its average turnaround time from under 24 hours to between 24 and 48 hours.

In order for hospital laboratories to significantly increase their capacity, they needed some assurance about what funding would be available to do so. Staff at several hospital laboratories informed us that at the time they wanted to begin or expand testing, there was no formal guidance on how and what testing equipment and supplies should be procured. These hospitals informed us that they perceived provincial direction on the guarantee of reimbursement for improving laboratory capacity to be vague or unclear (for example, it was not clear exactly what costs would be reimbursed, if there was a cap to costs, or how much capacity to add) which delayed their capacity growth. For example, while on March 26, 2020 the Ministry committed $3.3 billion to support hospitals, and on April 25, 2020 formally asked all hospitals to track their COVID-19–related expenses, it did not specify when the funding would be provided and how fully it was intended to cover laboratory capacity

expansion. In one case, Ontario Health indicated to a hospital in a letter dated August 10, 2020 only that "costs related to COVID-19 testing will be reimbursed through the funding model that is ultimately brought forward."

One hospital laboratory informed us that:

> [t]he COVID funding framework for hospitals does not provide sufficient clarity on reimbursement for capital and operating expenses incurred in providing COVID-19 testing and COVID-19 diagnostic support across regions. In an effort to cover all bases, provincial communications relating to hospital funding are often too generic to provide the reassurance necessary that all laboratory-related and broader testing system expenses will be funded.

Based on the cost information available at the time of our audit, hospitals submitted about $109 million in expense claims related to the incremental laboratory costs incurred up to July 31, while Public Health Ontario had submitted about $27 million in extraordinary costs up to June 30. The Ministry reimbursed hospital laboratory expenses incurred between March and April in September 2020, and reimbursed May through July hospital laboratory expenses in November. At the time of our audit, none of Public Health Ontario's incremental laboratory expenses had been reimbursed.

In contrast, Alberta's COVID-19 testing response was not constrained by funding pressures and was not vague about funding details. According to Alberta Precision Laboratories, a subsidiary of Alberta Health Services that co-ordinates laboratory functions, Alberta Health Services provided clear direction on target goals and timelines which allowed it to pursue the necessary investments to achieve those targets. British Columbia's Ministry of Health also communicated to laboratories that they should buy needed testing platforms and that costs would be fully reimbursed.

RECOMMENDATION 1

To enable laboratories to effectively and efficiently test specimens to meet the needs of Ontarians during the COVID-19 pandemic and other potential outbreaks in the future, we recommend that the Ministry of Health, in collaboration with Ontario Health:

- forecast COVID-19 testing needs, and identify new capacity opportunities within Ontario if further expansion is required;
- continue to track each laboratory's capacity against the target of 100,000 tests per day by the end of December 2020 and identify and take corrective action where shortfalls are anticipated;
- forecast for periods where backlogs may exceed provincial (or regional) daily laboratory testing capacity while identifying ways to eliminate, reduce and avoid them; and
- provide clear and timely communication to hospitals on funding related to COVID-19, including what laboratory equipment and supplies will be reimbursed.

MINISTRY RESPONSE

The Ministry agrees with this recommendation, and Ontario Health, which operates the provincial laboratory network, continues to forecast testing needs, track laboratory capacity against provincial capacity targets, and monitor laboratory network throughput and turnaround times.

The Ministry undertakes to provide clear and timely communication on funding for COVID-19 expenses, including funding for laboratory supplies and equipment.

RESPONSE FROM ONTARIO HEALTH

Ontario Health agrees with the recommendation and has already taken action on all items.

Based on modelling conducted by the Ministry, Ontario Health has established a process to accommodate surges in testing demand and

ensure additional laboratory capacity is available, should it be required. Ontario Health will continue to work with the Ministry to review forecasts and ensure appropriate surge options are in place.

Each week, the Provincial Diagnostic Network (Network) validates laboratory capacity against targets. Through this process, all laboratories identify their current capacity, as well as ability to meet future increased capacity needs. The Network plans to continue with this process.

Ontario Health continues to monitor on a daily basis the number of tests currently in progress versus specimens received, as well as turnaround time from test collection to results reported. Metrics have been identified to ensure early warnings of potential backlog of this flow and its potential to exceed lab capacity. Specifically, when lab volumes reach 75% of capacity, this is a signal to the laboratory and the Network to implement surge strategies.

Ontario Health has also developed funding agreements with each laboratory to support operational costs (health human resources and supplies), and ensure funding is provided on a monthly basis based on volumes of tests performed

4.2 Ministry Did Not Address Concerns Raised Years Ago About Improving Ontario's Laboratory Sector

Many jurisdictions in Canada and around the world have experienced similar challenges while expanding their COVID-19 testing capacity. These challenges include a global shortage of reagents (a key supply used for COVID-19 testing) and an increased global demand for COVID-19 testing equipment. Beyond those challenges, Ontario had its own unique ones, particularly as a result of having no focal point overseeing the entire laboratory sector. While the Ministry had been made aware

of these issues with Ontario's laboratory sector years ago, it did not implement any changes until COVID-19 happened. These concerns were raised by various parties, including:

- Public Health Ontario, which warned in 2017 of its inability to respond to a public health threat (see **Section 4.2.1**);
- the SARS Commission in 2004 (see **Section 4.2.2**);
- the Laboratory Services Expert Panel in a 2015 report (see **Section 4.2.3**); and
- the Office of the Auditor General of Ontario 2017 report on Laboratory Services in the Health Sector (see **Section 4.2.4**).

4.2.1 Ministry Took No Action in Response to Public Health Ontario's 2017 Warning of Its Inability to Respond to Potential Public Health Threats

Public Health Ontario receives the majority of its funding from the Ministry, which has not increased its base funding of about $148 million since 2013/14 (base funding covers operational expenses such as performing laboratory tests and purchasing laboratory equipment and supplies). The Ministry has not responded to Public Health Ontario's concerns about the insufficiency of this flat-lined funding, expressed twice in 2017:

- In its 2017/18 to 2019/20 Annual Business Plan, Public Health Ontario identified that its greatest risk was a "[l]ack of sustainable funding to continue to deliver on [its] mandate, including [its] ability to comprehensively respond to emerging public health threats," noting that such threats were highly likely to occur and were of high risk to the province.
- In January 2017, Public Health Ontario provided the Ministry with an overview of the financial challenges resulting from increases in the volume of laboratory testing. This overview indicated the importance of allowing Public Health Ontario "to keep pace with laboratory technological advances

that further derive efficiency and add value to the health care system." Public Health Ontario identified that it had hit a critical point, where volume growth and a flat-lined budget would make it impossible to continue to meet growing demand.

In response to these concerns, the Ministry instructed Public Health Ontario to develop a plan to modernize its operations and determine where efficiencies could be realized. In December 2017, Public Health Ontario delivered a Laboratory Modernization and Pressure Management Plan (Laboratory Modernization Plan) to the Ministry (see **Appendix 5**). The Laboratory Modernization Plan included initiatives such as the regional consolidation of laboratory operations, implementing electronic laboratory test ordering, shifting routine health tests to other laboratories, and establishing a capital funding stream to fund yearly equipment replacement and technological investments. Public Health Ontario estimated that implementing this plan would result in significant savings (from $200,000 in the first year to almost $8 million in year 4 of implementation).

Public Health Ontario submitted to the Ministry an updated Laboratory Modernization Plan in 2018 and a similar plan in 2019. As part of the 2019 Ontario Budget, the government announced that it would streamline Public Health Ontario, which included modernizing the public health laboratory system; however, no funding or approvals were provided for this to occur. Meanwhile, the volume of laboratory tests increased by about 25%, from 5.1 million tests in 2013/14 to 6.4 million in 2019/20. **Figure 13** shows Public Health Ontario's funding and the number of tests performed between 2013/14 and 2019/20.

In 2019/20, the Ministry actually reduced Public Health Ontario's base funding by over $13 million (or about 9%) from the previous year's funding. While the Ministry did reinstate the $13 million on September 23, 2019 (on a one-time basis for 2019/20 only), the Ministry then reduced its budgeted base funding again for 2020/21 by $5 million (or about 3%) in comparison with 2019/20's post-reinstatement base funding. On April 24, 2020, the Ministry reinstated the $5 million on a one-time basis for 2020/21.

Figure 13: Public Health Ontario's Base Funding from the Ministry of Health and Number of Tests Performed by Public Health Ontario Laboratories, 2013/14–2019/20

Source of data: Public Health Ontario
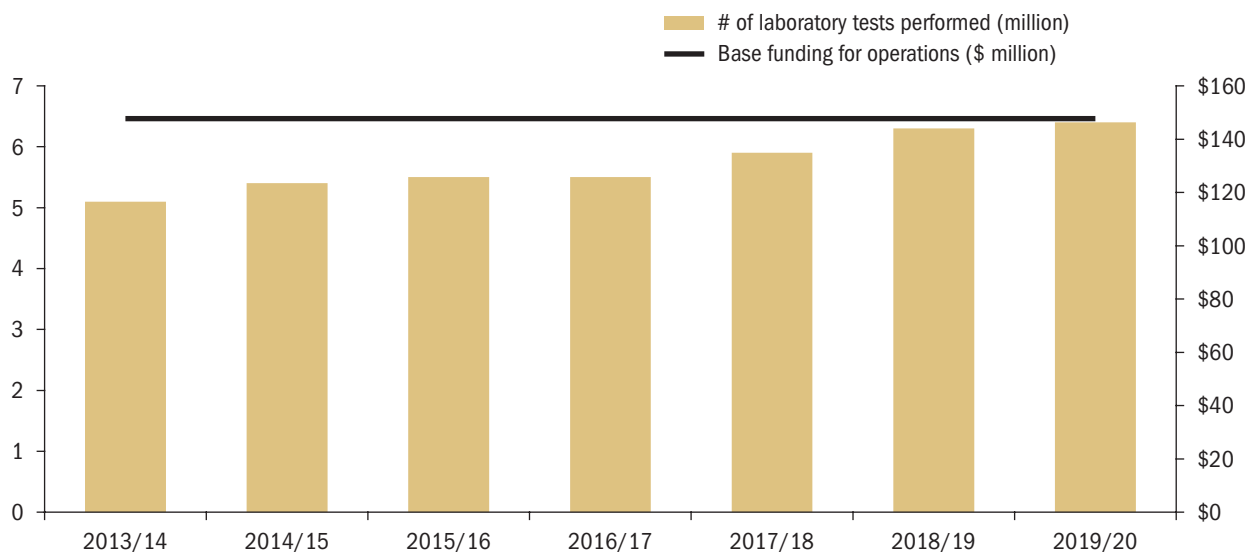
Note: Excludes Health Promotion Resource Centres funding $3.6 million a year, which was discontinued in 2019/20, and funding for Toronto laboratory occupancy and other costs.

Public Health Ontario reduced its labour force across the organization over the past decade, making it less equipped to do the level of testing needed for COVID-19 as quickly. For example, between 2014/15 and 2019/20, Public Health Ontario decreased its full-time-equivalent staff (FTEs) by 120, with a further 10 FTE cuts planned in 2020/21. This will result in a total decrease of 130 FTEs (or 13%) from the 2014/15 staffing level of approximately 970 FTEs. These cuts included positions such as epidemiologists and staff who work directly in Public Health Ontario's laboratories.

With reduced staff and supplies going into the pandemic, Public Health Ontario had to ramp up its resources in a short time frame. From April 1, 2020 to August 31, 2020, Public Health Ontario hired 76 new staff, including 45 laboratory attendants, eight data-entry operators, as well as other laboratory, and back-office staff. Further, additional temporary resources in its Health Protection and Corporate areas were hired to support the COVID-19 response. Public Health Ontario estimated that 500 additional FTEs will be required in 2020/21 to respond to increased COVID-19 testing, including 100 data entry operators, 250 medical laboratory attendants and 150 medical laboratory technologists.

4.2.2 Ministry Repeated SARS Laboratory Testing Mistakes

Public Health Ontario was established in 2008 in response to lessons learned from SARS in 2003, during which laboratories were dealing with the same issues (to a lesser magnitude) as now in 2020 with COVID-19. However, the Ministry has not prevented the same laboratory testing mistakes from recurring.

In particular, the failure by the Ministry to adequately fund Public Health Ontario's laboratories (see **Section 4.2.1**) mirrors past failures during the 2003 SARS pandemic. A 2004 report by the SARS Commission noted the following:

During SARS, the provincial laboratory in Toronto quickly became swamped with specimens. Like other parts of the health care system, it lacked surge capacity—resources to deal with the expanded demands of an outbreak like SARS. One expert described the lab as "under-funded and under resourced" prior to SARS. Consequently, many of the Ontario specimens had to be sent for testing to the National Microbiology Laboratory in Winnipeg and to private and hospital labs in Toronto.

Furthermore, the aforementioned cuts to research staff at Public Health Ontario (see **Section 4.2.1**) echo problems observed during SARS. The Ontario's Expert Panel on SARS and Infectious Disease Control noted an:

> ongoing and significant concern that existing core scientific medical and research capacity at the Ontario public health laboratory is far short of what is needed.

Ontario's experience during both SARS and COVID-19 has demonstrated that Ontario's laboratory system is not well equipped to respond to a pandemic. It is underfunded and inadequately staffed and supplied. Had the Ministry approved Public Health Ontario's Laboratory Modernization Plan and/or increased Public Health Ontario's resources earlier, Public Health Ontario would have been able to increase its laboratory testing capacity further and faster.

4.2.3 Ministry Did Not Follow Recommendations by Experts in 2015 on the Need for Central Oversight over Laboratory Services

A 2015 report by the Laboratory Services Expert Panel (Expert Panel), commissioned by the Ministry to review and make recommendations on Ontario's community laboratory sector, identified the need for central oversight over laboratory services. Specifically, the Expert Panel noted that:

- "[t]here is currently no focal point in government providing direction for laboratory services in an integrated and authoritative manner"; and
- "a number of fragmented funding, planning and management functions are taking place in several units and at varying levels across the Ministry."

The Expert Panel recommended that Ontario establish a focal point for laboratory program leadership. However, in our Office's 2017 audit of Laboratory Services in the Health Sector, we noted that the Ministry only partially implemented this recommendation. It established a Laboratories and Genetics Branch in September 2015 to fund and oversee community laboratories. However, no action had been taken to establish a focal point for all laboratory service providers (including hospital laboratories and Public Health Ontario laboratories). As a result, the different laboratories still operate in silos, with varying accountabilities and governance. **Figure 14** identifies the differences in oversight and funding responsibilities for each type of laboratory.

4.2.4 Ministry Did Not Follow Recommendations by Our Office in 2017 on Reforming Ontario's Laboratory Sector before COVID-19

Apart from the issue noted in **Section 4.2.3**, Our Office's 2017 audit also noted the Ministry's fragmented management of the laboratory sector, which resulted in the following issues:

Figure 14: Key Ministry Departments Responsible for Funding and Overseeing Ontario's Laboratory Sector
Prepared by the Office of the Auditor General of Ontario
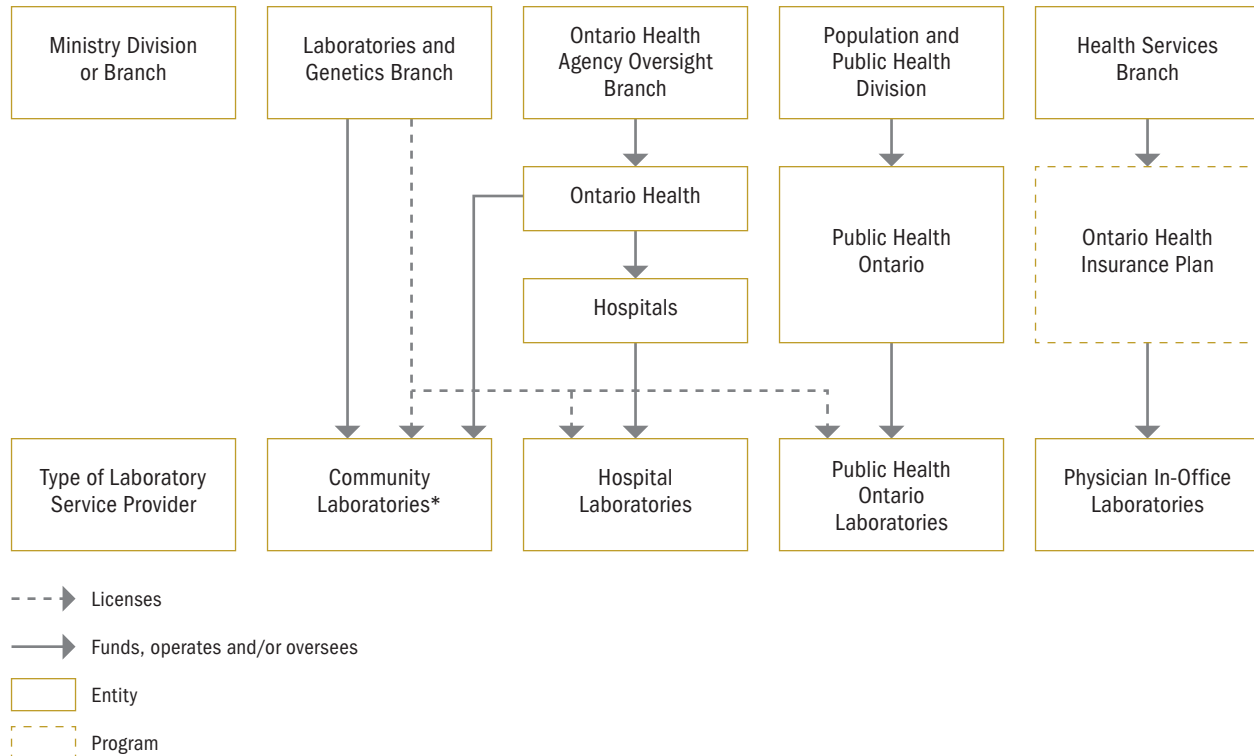
* Agreements for community laboratories' services have historically been with the Ministry of Health. Pursuant to a Delegation of Authority issued by the Ministry, Ontario Health has assumed responsibility for the management and oversight of COVID-19 laboratory testing services provided by community laboratories. Ontario Health entered into agreements with them effective August 1, 2020.

- Hospitals were reducing the number of laboratory tests they performed, sending the tests they did not perform to Public Health Ontario and community laboratories.
- Some hospital laboratories could be performing some of the test analysis done by Public Health Ontario because faster turnaround of test results by in-hospital labs could reduce the time patients are in hospitals.
- Some community laboratories had the capability to perform more tests, but the Ministry did not allow them to do so.

We recommended that the Ministry of Health analyze the capabilities and responsibilities of the different laboratory service providers (community, hospital and Public Health Ontario) to determine if any changes were needed with respect to the types of tests each provider performs and, accordingly, the amount of funding each provider receives.

Our 2019 follow-up on this audit report noted that little progress had been made to address this recommendation. We followed up again in August 2020 and found that there had still been no progress: a business case to implement changes had been put on hold.

It was not until late March 2020, when COVID-19 was overwhelming Ontario's laboratory system, that the Provincial Diagnostic Network was established under Ontario Health to facilitate co-ordination between different types of laboratories (see **Section 4.1.4**). For community laboratories, licences for COVID-19 testing were awarded to four providers between March 19 and March 31, while the Ministry received applications for these licences between March 16 and March 30. While two of these community laboratories were able to begin testing in late March, the other two laboratories did not begin COVID-19 testing until April 12 and April 24, respectively, due to the duration of the validation process to actually begin performing COVID-19 testing.

In contrast, other jurisdictions already had laboratory networks in place prior to COVID-19. They did not need to expend time and effort like Ontario did on setting up province-wide processes, freeing up resources to focus on combating the spread of COVID-19. For example:

- Alberta Health Services oversees, co-ordinates and manages a formal laboratory network that has been in place for over a decade (with some evolution of structure over that period). It can assemble and reallocate teams to where they are most needed, which would not be possible were laboratories operating independently and in silos.
- At the onset of COVID-19, British Columbia quickly engaged a private-sector laboratory to leverage alternative COVID-19 testing capacity. It then began developing a process to track testing workloads and capacity across the province so it could redirect samples and balance the workload. Between January and August, 2020, British Columbia's average laboratory test turnaround time was 23 hours or within a day. As identified in **Section 4.3.3**, 55% of Ontario's COVID-19 laboratory tests took two or more days receive the result from after specimen collection.

RECOMMENDATION 2

To better co-ordinate activities and resources in Ontario's laboratory sector to meet the needs of Ontarians during the COVID-19 pandemic and future outbreaks, we recommend that the Ministry of Health:

- immediately review Public Health Ontario's Laboratory Modernization and Pressure Management Plan and consult with Public Health Ontario to determine and provide the level of base funding that would allow Public Health Ontario to fulfil its mandate, which includes performing COVID-19 testing and regular studies to assess the prevalence of COVID-19 in Ontarians; and
- collaborate with Ontario Health to work expediently and effectively with representatives from the different types of laboratories

regularly through the Provincial Diagnostic Network (Network) to share information and best practices, understand concerns and challenges, collate laboratory statistics into reports to measure system performance, and resolve issues to help the Network operate sustainably.

MINISTRY RESPONSE

Given COVID-19's impact on laboratory activities, and the increased capacity required from all Public Health Ontario-run public health laboratories, the previously approved public health laboratory plan is currently on hold.

Once the COVID-19 outbreak is contained and risks are mitigated for the people of Ontario, the Ministry will consider how to move forward with the modernization process in order to make the important changes we need to strengthen our public health services.

In the meantime, the Ministry will continue to work closely with Public Health Ontario to identify funding mitigation strategies.

Ontario Health continues to lead the Provincial Diagnostic Network.

RESPONSE FROM ONTARIO HEALTH

Ontario Health agrees with the recommendation and has already taken action on the recommendation of working with laboratories through the Provincial Diagnostic Network (Network).

The Network's operations committee manual is regularly updated and available to all Network members online. This manual includes laboratory performance guidelines and best practices. Network members meet regularly (twice a week, or daily when capacity concerns are identified) to share information, collaborate and review data. Additional meetings also take place with laboratories that process and analyze large volumes of tests for the Network. Operational data (e.g., number of tests received, tests completed and turnaround times) are provided by the

Network on a daily basis based on data collected from Network members.

4.3 Test Results Slow to Reach Public Health Units, Resulting in Delays in Case Management and Contact Tracing

Between January 26 and August 31, 2020, Ontario laboratories conducted nearly 3 million COVID-19 tests. However, Ontario has yet to meet the Ministry's time targets for test results to be reported to public health units and for case management to begin after specimens have been collected.

4.3.1 Time Lag Between Specimen Collection and Case Management Too Long to Reduce Community Transmission of COVID-19

Between March 2020 and August 2020, it took an average of 4.25 days between the time when specimens were collected for laboratory testing and the time when public health units began case management for individuals whose specimens tested positive for COVID-19. Specifically, it took an average of 2.75 days for a positive result to be reported to a public health unit from when the specimen was collected, and another average 1.5 days for case management to start (see **Figure 15**).

The average time to complete COVID-19 laboratory testing and start case management by month shows an improving trend, but is still problematic. As shown in **Figure 15**, in March 2020 it took about 5.5 days for case management to begin from when a specimen was collected. This had improved to 2.75 days in August 2020.

Since urban and densely populated regions in Ontario (such as Toronto, Peel, Ottawa and York Region) had more COVID-19 cases, these regions also had a higher demand for laboratory testing and need to perform case management and contact tracing for more individuals. As shown in **Figure 2**, between March and August 2020, the

Figure 15: Time from Collecting Specimen for COVID-19 Testing to Starting Case Management for Individuals Testing Positive, March–August 2020

Source of data: Public Health Ontario
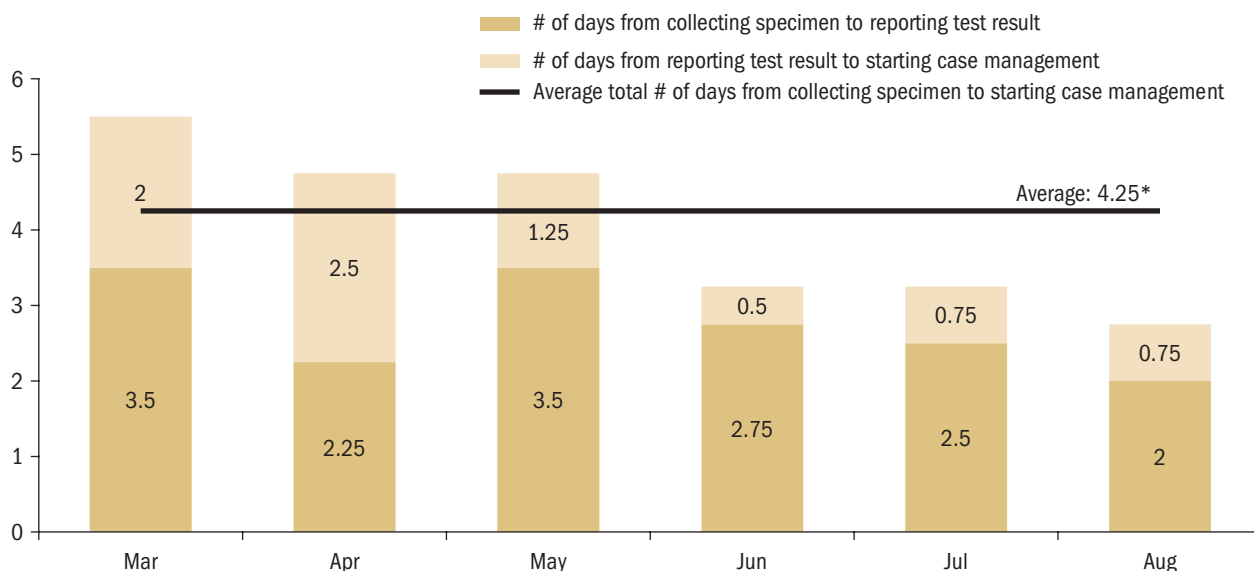
Note: Results are rounded to the nearest quarter day. As there were less than 25 cases in January and February combined, details for these months were not included in the chart.

* This breaks down into an average of 2.75 days from collecting specimen to reporting a positive test result and another 1.5 days from reporting test result to starting case management.

average time to complete COVID-19 testing and start case management in these urban and densely populated regions was also longer (ranging from 3.25 days in Ottawa to 5.75 days in Toronto) than all other regions in Ontario (2.75 days). This indicates that turnaround times and backlogs are largely driven by regional differences across Ontario, such as regional laboratory capacity compared with the demand for testing in that region, with higher turnaround times often occurring in Ontario's more populated cities and regions.

As previously noted, a July 2020 study published in The Lancet Public Health medical journal showed that the potential of an infected individual to transmit COVID-19 to others could be reduced by 80% if case management and contact tracing were to begin immediately after the individual showed symptoms and received a positive COVID-19 laboratory test result. The study modelled how that percentage lowers depending on the time lags between these key events:

(1) when a specimen is collected from an individual with symptoms of COVID-19 for testing;

(2) when a positive laboratory test result is reported to the individual's public health unit; and

(3) when case management and contact tracing begins.

A time lag of one day between (1) and (2) and another time lag of one day between (2) and (3) lowers the prevention of transmission to 60%. A time lag of two days between (1) and (2) and another time lag of two days between (2) and (3) lowers the prevention of transmission to 39%.

The modelling specifies that three or more days between (1) and (2) will result in an infected person transmitting COVID-19 to at least one other person even if there is no time lag between (2) and (3) (i.e., even if case management and contact tracing begins right away).

As shown in **Figure 15**, given that between March and August 2020, Ontario's average time lags have been almost three days between specimen collection and laboratory test result being reported to a public health unit and more than one day a public health unit learning about a positive COVID-19 case and beginning case management activities, this modelling suggests that Ontario has failed to prevent a high percentage of COVID-19 transmission. Overall, less than 34% of individuals who tested positive for COVID-19 had a laboratory test completed and case management initiated within one day each between March and August 2020.

After the completion of our audit work, we reviewed September and October data and identified that the average time to complete COVID-19 laboratory testing and start case management after specimen collection remained long. For example, the average time to perform these activities for positive COVID-19 patients was 3.75 days in September 2020 (two days from specimen collection to reporting a positive COVID-19 laboratory test result and 1.75 days from reporting a positive test result to starting case management with the affected person) and 3.25 days in October 2020 (2.25 days from specimen collection to reporting a positive COVID-19 laboratory test result and one day from reporting a positive test result to starting case management with the affected person). This time was generally longer in urban areas over these two months, such as Ottawa (an average of 4.5 days), York Region (an average of 2.25 days), Peel Region (an average of 3.25 days), and Toronto (an average of four days), compared to all other public health regions (an average of 2.25 days). Overall, the province did not meet the case management performance target in September and October, with an average of only about 75% of individuals who tested positive for COVID-19 being contacted within 24 hours.

4.3.2 Case Management Began Weeks After Specimen Collection in over 1,000 Cases, Reducing Its Effectiveness

Case management includes the essential intended outcome of the isolation of a person for the 14 days experts cite as the period when the person is infectious. Case management serves little purpose if it begins more than 14 days after an infected person's specimen is collected. Between January and August 2020:

- About 1,560 cases were first contacted by their public health units between eight and 14 days after specimen collection (i.e., at or later than the halfway point of the time when the person should have been in isolation to prevent transmission others).

- About 1,120 cases were first contacted by their public health units 15 or more days after specimen collection (meaning that the infected person may have been at large infecting others throughout their 14-day infectious period).

- In the case of a 30-year-old female in Peel Region, 20 days elapsed between when her specimen was collected (on May 4) and the laboratory reported the positive test result to her public health unit (May 24). Another five days elapsed between when the public health received the result (May 25) and it started case management (May 30). The total time between specimen collection and the start of case management was 26 days. This is related to the confusion in reporting responsibilities discussed in **Section 4.6.2**.

- In the case of a 65-year-old female in Toronto, one month elapsed between when her specimen was collected (on April 15) and the public health unit started case management (May 15). In this case, the problem lay with the public health unit, which received the test result just a day after specimen collection, on April 16.

The reasons for these delays included:

- COVID-19 tests of specimens taken were backlogged because of limited laboratory testing capacity (as discussed in **Section 4.1.2**).
- Information on specimens was recorded manually, slowing turnaround time, because electronic ordering was not available (this is discussed in detail in **Section 4.4.1**).
- Asymptomatic testing overwhelmed the laboratory system and increased turnaround time (this is discussed in detail in **Section 4.4.2**).
- Laboratories faxed or mailed test results to public health units, which resulted in redundancies, confusion and delays in case management and contact tracing (this is discussed in detail in **Section 4.4.3**).
- Ontario's public health information system was outdated and not equipped for efficient and effective case management and contact tracing (this is discussed in detail in **Section 4.5.1**).

4.3.3 Laboratory Test Turnaround Times Have Not Consistently Met Provincial Targets

Ontario Health established two targets for laboratory testing:

- 60% of test results are to be reported to the Ontario Laboratory Information System (OLIS) within one day of specimen collection.
- 80% of test results are to be reported to the OLIS within two days of specimen collection.

As shown in **Figures 16a** and **16b**, the one-day target has never been met and the two-day target was only met in July 2020. Overall, between March 2020 and August 2020:

- Only about 45% of tests were reported within one day of specimen collection, missing the target by 15%.
- About 77% of tests were reported within two days of specimen collection, missing the target by 3%.

Figure 16a: Percentage of COVID-19 Laboratory Tests Completed on the Same Day as or the Day Following Specimen Collection, March–August 2020
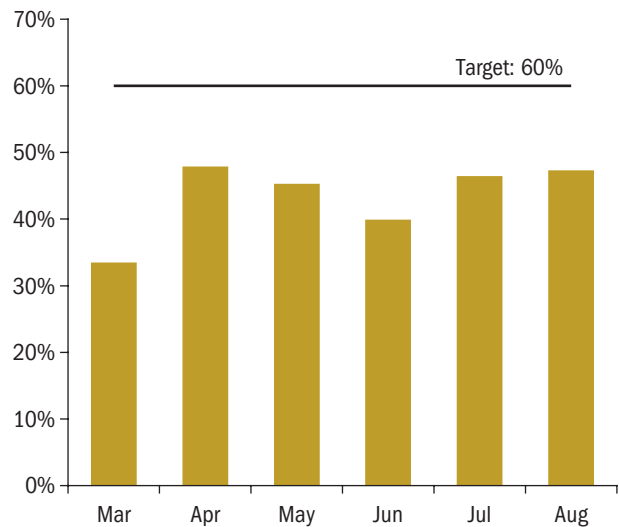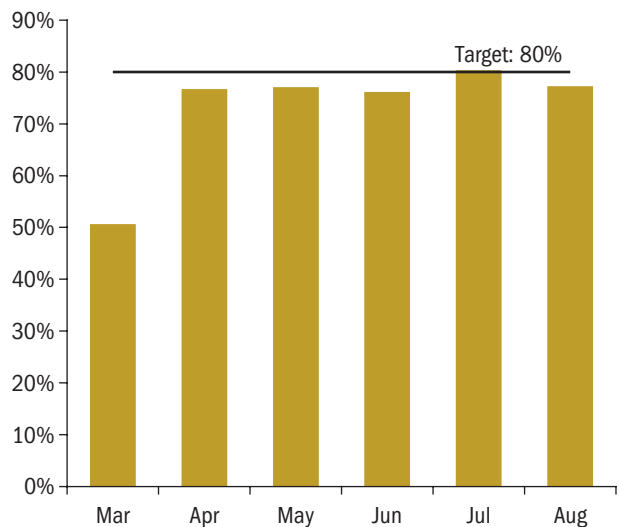
Source of data: Ontario Health

Note: Turnaround is calculated from the time when the specimen was collected to the time when the laboratory test result was reported on the Ontario Laboratory Information System. As there were less than 25 cases in January and February combined, details for these months were not included in the chart.

Figure 16b: Percentage of COVID-19 Laboratory Tests Completed within Two Days Following Specimen Collection, March–August 2020

Source of data: Ontario Health

Note: Turnaround is calculated from the time when the specimen was collected to the time when the laboratory test result was reported on the Ontario Laboratory Information System. As there were less than 25 cases in January and February combined, details for these months were not included in the chart.

Figure 17: Percentages of Positive COVID-19 Laboratory Tests Completed within One Day and Two Days of Specimen Collection, by Public Health Unit, January–August 2020

Prepared by the Office of the Auditor General of Ontario
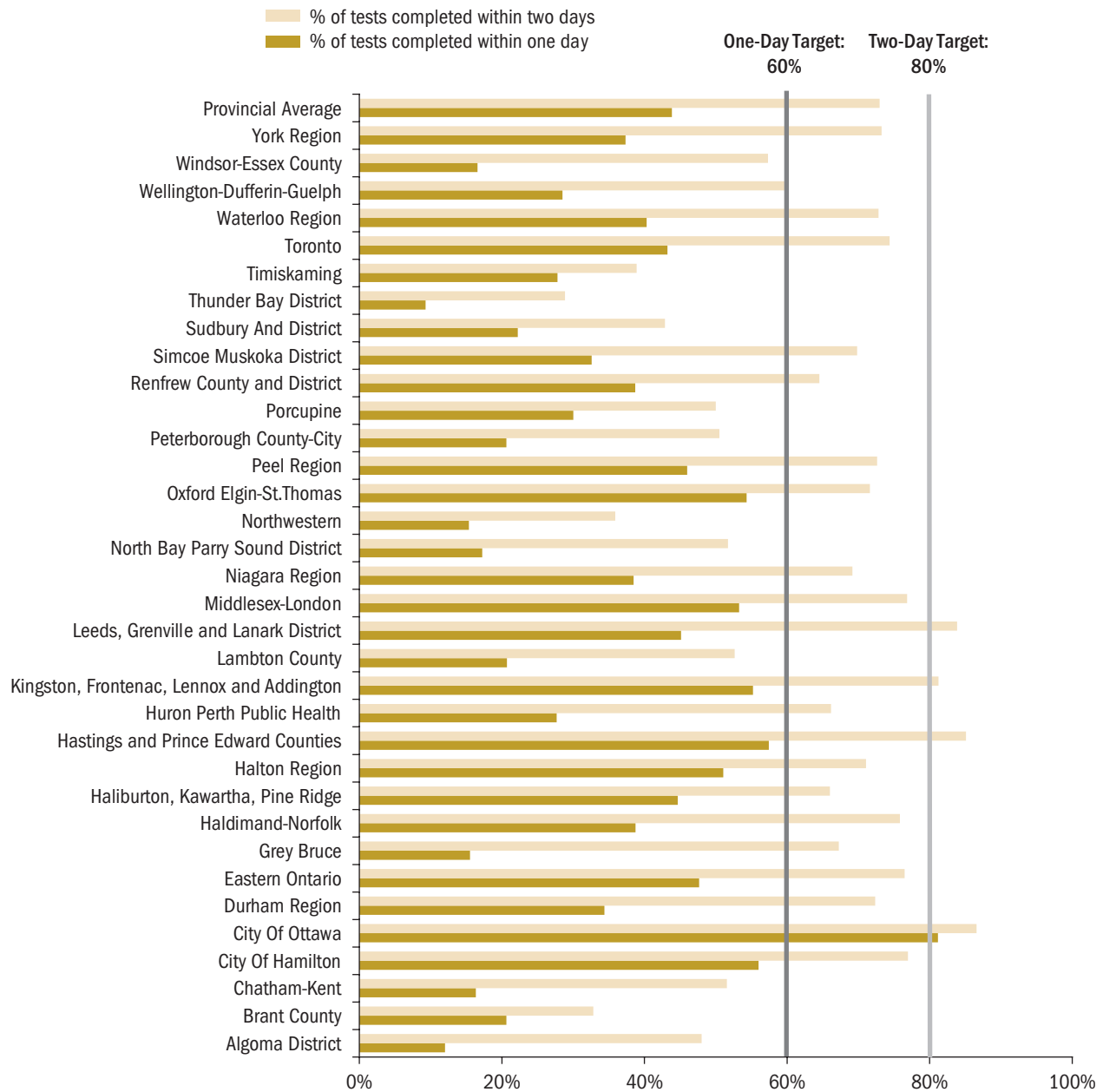
Note: Percentages in this figure were calculated based on data provided by Public Health Ontario.

As shown in **Figure 17**, laboratory test turn-around times varied across public health units for positive COVID-19 test results. Between January and August 2020:

- the first target was met for only one public health unit: 81% of positive test results were sent to Ottawa within one day of specimen collection; and

- the second target was met for only four public health units: more than 80% of positive results were sent to each of Hastings & Prince Edward Counties; Kingston, Frontenac, Lennox & Addington; Leeds, Grenville and Lanark District; and Ottawa within two days of specimen collection.

While insufficient capacity (See **Section 4.1**) has contributed to Ontario not having more timely COVID-19 laboratory tests, the Ministry has also not taken more timely action on previous advice they received that would have improved laboratory turnaround times (See **Section 4.4**). Most notably, allowing asymptomatic testing of individuals who were low risk for having COVID-19 (as they are not knowingly involved in any COVID-19 breakout, close contact to a known COVID-19 case or live in an area with a high prevalence of COVID-19 in the community) increases the number of tests that need to be performed, which results in actual positive tests taking longer to be confirmed (See **Section 4.4.2**).

4.3.4 Case Management and Contact Tracing Have Not Always Begun by Provincial Target Deadlines

The Ministry established two targets for case management and contact tracing:

- 90% of individuals are to be reached for case management within one day of the public health unit being notified of their positive test results. (The Ministry started measuring public health units' performance against this target on May 1.)
- 90% of the close contacts of cases are to be reached for contact tracing within one day of the public health unit being notified of them by the individual who tested positive. (The Ministry started tracking public health units' performance against this target on May 12.)

According to the data up to August 31, 2020, the province as a whole had achieved the second target, but not the first. Specifically:

- About 80% of individuals were contacted for case management within one day of the public health unit being notified of their positive test results, missing the target by 10% (see **Figure 18**). For the remaining 20% of individuals with positive results, 8% were contacted within two days, and 12% were

contacted more than two days after the public health unit's receipt of the test results.
- 92% of the close contacts of cases were contacted for contact tracing within one day of the public health unit being notified of them by the individual who tested positive, performing better than the target by 2% (see **Figure 19**).

At the regional level, not all public health units had met these targets:

- Four public health units (Ottawa, Peel, Toronto and York Region) had not met the first target (see **Figure 18**).
- Four public health units (Peel, Simcoe Muskoka, Thunder Bay and Windsor-Essex County) had not met the second target (see **Figure 19**).

RECOMMENDATION 3

To curb the spread of COVID-19 and any future infectious diseases by quickly identifying cases and their contacts, and advising them to isolate from others while they are infectious, we recommend that the Ministry of Health, in collaboration with Ontario Health:

- continue to monitor the timeliness of laboratory testing, case management and contact tracing against targets at the provincial and regional levels on a regular basis (daily or weekly); and
- take immediate action on a region-by-region basis to address the root causes (such as insufficient local equipment, human resources and supplies) contributing to the regional delays in meeting the established targets at a minimum.

MINISTRY RESPONSE

The Ministry agrees with this recommendation. Ontario Health continues the daily and weekly monitoring of the timeliness of laboratory testing, and tracks performance against provincial targets for turnaround time (80% of tests turned

Figure 18: Percentages of COVID-19 Cases Reached within 24 Hours of Public Health Unit Being Notified, by Public Health Unit, January–August 2020

Prepared by the Office of the Auditor General of Ontario
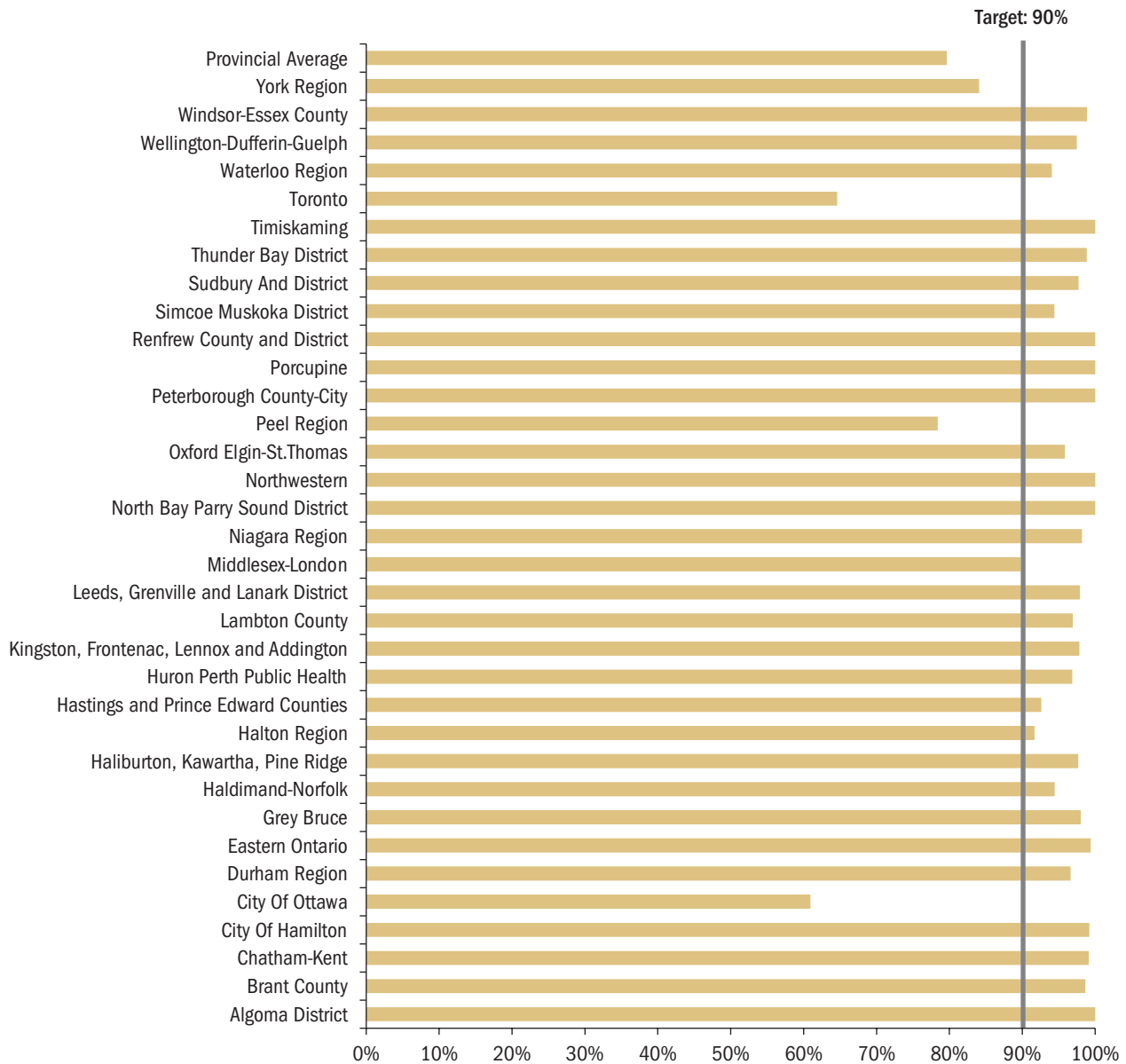
Note: Percentages in this figure were calculated based on data provided by Public Health Ontario.

around within two days, and 60% within one day) at provincial and regional levels.

The Ministry and Public Health Ontario continue daily and weekly monitoring of targets related to case and contact management for each region, and for the province. The Ministry is working with health units across the province

to continually identify and add resources to help them reach established targets. Additional resources and other improvements to case and contact management helped public health units reach 89% of cases in 24 hours between May and mid-October, and 90% from July to mid-October. In addition, as the Report states, public

Figure 19: Percentages of Close Contacts of COVID-19 Cases Reached within 24 Hours of Public Health Unit Being Notified, by Public Health Unit, May 12–August 2020

Prepared by the Office of the Auditor General of Ontario
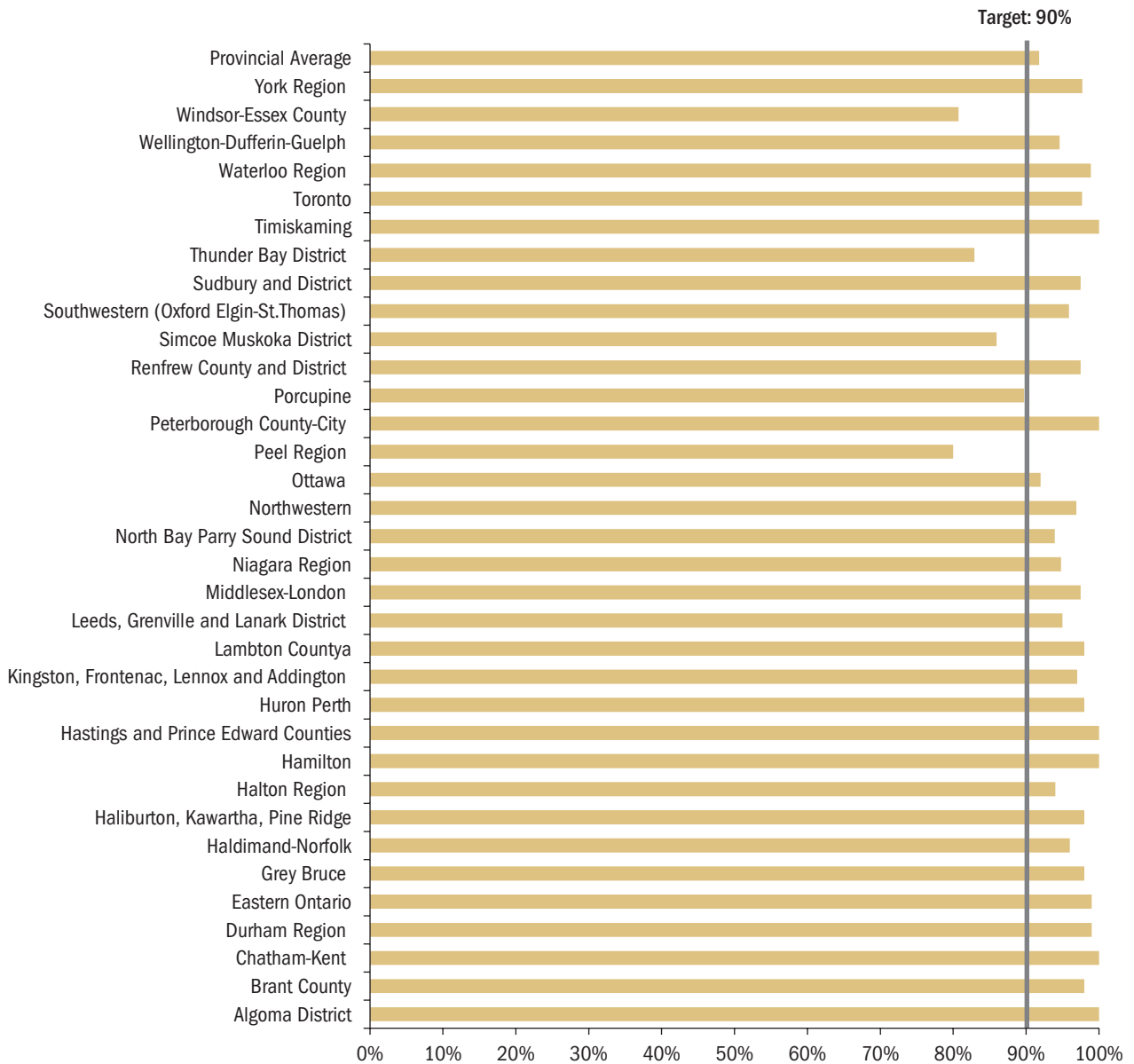
Note: The Ministry of Health started tracking each public health unit's performance against the target on May 12, 2020. Percentages in this figure were calculated based on data provided by Public Health Ontario.

health units reached 92% of close contacts within 24 hours of being identified.

RESPONSE FROM ONTARIO HEALTH

Ontario Health agrees with the recommendation and has already taken action on all items. Ontario Health will continue to monitor the timeliness of laboratory testing and report results daily. Turnaround times for each region are provided weekly. Ontario Health carefully analyzes the root causes that inhibit laboratories from reaching target turnaround times and capacity.

Ontario Health works with all laboratories and regions to consider logistical and transportation improvements, including strategically directing specimens upfront to laboratories across the Provincial Diagnostic Network to ensure tests are sent to laboratories that have capacity and that appropriate load balancing is achieved. Staffing capacity is also analyzed on a weekly basis and compared to planned recruitment numbers, to ensure laboratories are on track to hire the expected number of staff by identified dates.

4.4 Ministry Was Late to Implement Solutions that Would Have Sped Up Laboratory Testing and Improved Case Management and Contact Tracing

The Ministry did not address concerns related to laboratory testing, case management and contact tracing that had been raised by Public Health Ontario, experts in the laboratory sector and our Office in the past.

A number of recommendations have been made over the past decade to the Ministry to improve laboratory testing, such as those made by Public Health Ontario and the Laboratory Services Expert Panel (Expert Panel). They include enabling electronic ordering (e-ordering) of laboratory tests and integrating the Ontario Laboratory Information System (OLIS) with the integrated Public Health Information System (iPHIS). However, the Ministry began to implement these recommendations only after the onset of the COVID-19 pandemic by empowering Ontario Health to organize and improve Ontario's laboratory system. The Ministry has also not implemented a recommendation made by the Testing Strategy Expert Panel (which was set up by the Ministry and reports to the Chief Medical Officer of Health) regarding the testing of asymptomatic visitors to long-term-care homes.

4.4.1 Lack of Electronic Ordering Delayed Laboratory Testing

One of the main reasons that COVID-19 laboratory test turnaround times have remained long and have missed targets is the manual, paper-based testing process. This not only takes more time than a process with more electronic or digital elements, but it also is more prone to error.

Specifically, manual processing is done when:
- the assessment centre collects a specimen from an individual for testing: a paper form is generally used to record the individual's personal information and to identify the health-care practitioner and public health unit to which the test result is to be sent; and
- the laboratory receives the specimen: the information on the paper form is manually entered into the laboratory's information system so that the test result can be reported into OLIS; and
- the test result is obtained: the test result is faxed or mailed to the appropriate health-care practitioner and public health unit.

For over a decade, various experts, as well as our Office, have identified the benefits of an electronic test ordering system, but Ontario has yet to put one in place. Specifically:
- Our Office's 2009 Special Report on Ontario's Electronic Health Records Initiative noted that if OLIS were equipped to allow health-care practitioners to order laboratory tests and view the results electronically, duplicate data entry could be avoided, and the system would reject incomplete or erroneous test requisitions. OLIS was designed in the 1990s to include this function, but it is still not available.
- A 2015 report by the Laboratory Services Expert Panel (Expert Panel) (a commission to review and make recommendations on Ontario's community laboratory sector) recommended that the Ministry should "[r]emove impediments to e-ordering/e-signature

and expedite implementation with appropriate safeguards" in order to "streamline processing and reduce errors in laboratory requisition and handling."

- Our Office's 2017 audit of Laboratory Services in the Health Sector followed up on the Expert Panel's recommendation. We found that the recommendation was still in the process of being implemented, with the Ministry having just begun policy development and with e-ordering being at an early design stage.

- In 2017, the Public Health Ontario's Laboratory Modernization and Pressure Management Plan requested Ministry funding to enable electronic requisitions from community laboratories, to interface OLIS with other laboratory information systems and to implement scanning technology to reduce manual data entry. This funding has not been provided (see **Section 4.2.1**).

Electronic ordering of COVID-19 tests would save laboratories from having to spend time manually entering into their systems the information already captured by the assessment centre's form. Manual entry has to be done for every test, so thousands of documents are entered each day. This manual data entry is both time-consuming and expensive:

- At the time of our audit, Public Health Ontario employed about 96 full-time-equivalent staff members in its data entry department, and had incurred over $170,000 from April to August 2020 just for data entry related to COVID-19. Public Health Ontario is planning to expand its COVID-19 testing throughout 2020/21, and it expects it will need to hire approximately 100 additional employees for data entry throughout the fiscal year, up from about 65 full-time-equivalents as at March 31, 2020.

- Ontario's target of building capacity of 100,000 tests per day by the end of 2020 (see **Section 4.1.3**) will require laboratories to employ over 300 clerks just for data entry

(equivalent to about 2,500 hours of data entry every day). This will cost laboratories about $75,000 per day (or over $27 million per year) based on Public Health Ontario's average hourly rate for data entry clerks.

Also, when paper forms are missing information, case management is stalled. We found a case where a public health unit received a positive COVID-19 test result on March 22, 2020, but the paper where the result was recorded was missing the individual's phone number, address and health card number. The public health unit eventually reached the individual on April 12. However, the individual did not receive any public health instructions for three weeks while the public health unit was searching for the individual's contact information. This time could have also been spent providing case management to other individuals.

In the absence of electronic test ordering, some laboratories developed their own solutions. For example, London Health Sciences implemented an e-ordering system between assessment centres across Southwestern Ontario and its hospital laboratory. Through this system, the ordering party completes a web form and prints the requisition with an accompanying barcode. The requisition is sent together with the specimen to the hospital laboratory, where staff scan the barcode without having to transcribe any information. This has reduced the time required to handle a specimen by 10 to 12 times (from three to five minutes to 15–30 seconds), resulting significant time and cost savings as well as enabling expanded laboratory capacity.

It took until July 7, 2020, for Ontario Health to enter into a $6.5 million contract with an IT company to automate and modernize key components of its information systems. The additions include e-ordering and will streamline the data flow between assessment centres and laboratories. The goal of the project is to establish a central provincial system that generates a complete, accurate and timely record of COVID-19 test information. At the time of our audit, this project was only operational

at three assessment centres (out of 148 centres) and none of the 43 laboratories. Ontario Health targeted expanding these benefits to 20 additional assessment centres and nine laboratories by end of September 2020, with plans to expand further thereafter to a total of 60 assessment centres and 17 laboratories in 2021.

4.4.2 Asymptomatic Testing of People with no Known COVID-19 Exposure Overwhelmed Laboratory System and Increased Turnaround Time

On May 24, 2020, the province announced the expansion of testing for asymptomatic Ontarians, indicating that Ontarians "will not be turned away" but "just show up to a testing centre and they will test you, no matter if you're showing symptoms or you aren't showing symptoms." In the week following this announcement, visits to assessment centres increased by approximately 120% (see **Figure 20**).

The Testing Strategy Expert Panel (Panel), which reports to the Chief Medical Officer of Health, is responsible for providing evidence-based recommendations to inform the province-wide testing strategy for COVID-19. Members of the Panel informed us that, since their first meeting on April 5, 2020, they have never recommended that asymptomatic persons who are not contacts of persons with COVID-19, or part of outbreak investigations, be tested for COVID-19.

On July 5, 2020, the Panel recommended to the Chief Medical Officer of Health that Ontario limit its asymptomatic testing. Specifically, asymptomatic testing should not be performed in low-prevalence, low-risk populations (that is, for people with no known exposure to individuals who tested positive for COVID-19), and it should ultimately be stopped for the general population. The Panel statements included the following:

- "there are potential negative consequences of high-volume asymptomatic testing," including "[r]educing available laboratory capacity and increasing test turnaround times," "adversely affecting access to care for true positive cases" and "delaying subsequent contact tracing/outbreak management which impacts the ability to reopen the economy safely"; and

Figure 20: Daily Number of Visitors to Assessment Centres in Ontario Before and After the Province Announced Asymptomatic Testing

Source of data: Ontario Health
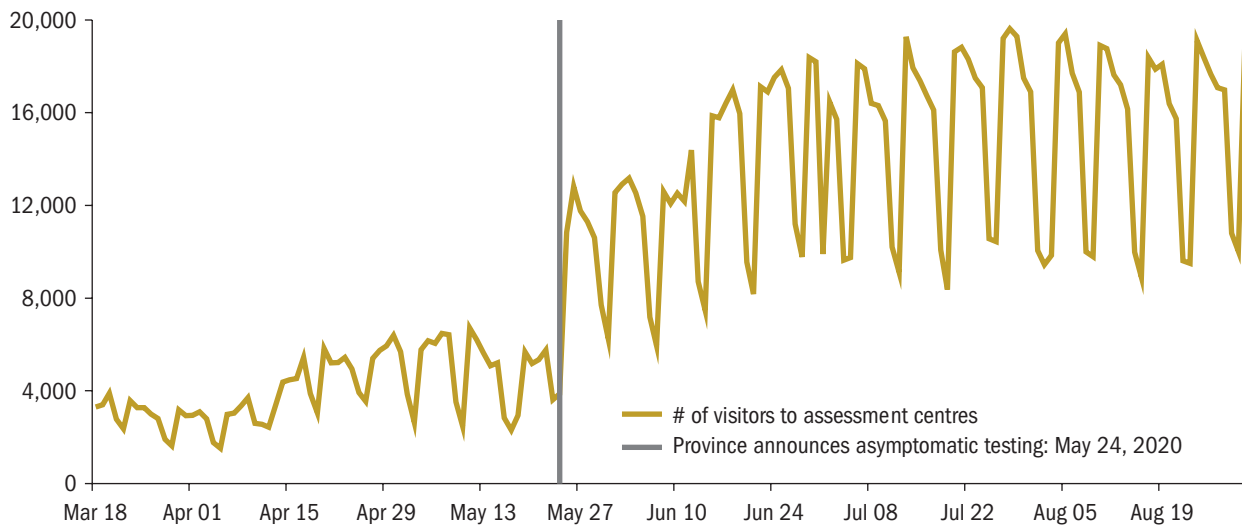
Note: Troughs are due to lower assessment centre visits on weekends and holidays.

- "very few jurisdictions in low prevalence settings have sustained, continuous asymptomatic testing," including Australia, Finland, France, Germany, Hong Kong, Japan, Netherlands, New Zealand, Singapore, South Korea, and British Columbia.

The Panel also identified that very few positive cases of COVID-19 had emerged from Ontario's low-prevalence testing campaign.

On September 18, the Council of Ontario Medical Officers of Health, comprising the Medical Officers of Health and the Associate Medical Officers of Health at Ontario's public health units, also expressed concerns about asymptomatic testing. It indicated that, based on the evidence and experience so far, asymptomatic testing "has proven to be cost ineffective and, given the resources and nature of the follow-up required, is almost certain to do more harm than good."

After reviewing the results of in-province asymptomatic testing campaigns, Ontario discontinued widespread asymptomatic testing on September 24, more than two months after discontinuation was recommended by the Panel. On September 24, Ontario's Associate Chief Medical of Health said that any "average person out there who is not exposed to a case, who is not part of an outbreak, has no symptoms, should not be going for testing. There's no value. In fact, what we found is when there's very little COVID in that group, what we end up with is false positives, which just complicates things even more." While members of the general public who were asymptomatic could no longer obtain a COVID-19 laboratory test, assessment centres and participating pharmacies continued collecting the specimens for COVID-19 testing of certain asymptomatic individuals, such as residents of and workers at homeless shelters and other congregate settings. The criteria governing which individuals can be tested at assessment centres and pharmacies respectively is publicly available and has been revised over time.

Other jurisdictions either decided against widespread asymptomatic testing earlier than Ontario did or never implemented it in the first place. For example:

- British Columbia never encouraged its residents to go for COVID-19 testing if they were asymptomatic and had no known COVID-19 exposure. The British Columbia Centre for Disease Control (BCCDC) published its recommendation against widespread asymptomatic testing on August 20, 2020. It concluded that "testing of asymptomatic individuals outside of an outbreak scenario is likely to be of low yield, and is not an effective use of health system resources, and is therefore not recommended." The BCCDC further indicated that "a significant amount of resources would be required to test individuals who are asymptomatic and very unlikely to be infected with [COVID-19]" and "routine testing of those who are asymptomatic would significantly impact laboratory testing costs and finite limits on testing."

- Alberta limited testing asymptomatic individuals with no known COVID-19 exposure to only pharmacies on September 17. It had found that such testing had identified only about seven positive COVID-19 cases for every 10,000 people tested (meaning that less than 0.1% of those tested were positive).

Excluding asymptomatic people from testing frees up testing capacity, which results in faster overall laboratory turnaround times. In an analysis on capacity prepared by Ontario Health in June 2020, it found that if the Network operates at less than or equal to 75% of its capacity, the average laboratory test turnaround times are 33% faster than when operating above 75% capacity. This is for various reasons, such as having the excess capacity to handle unanticipated equipment downtime without having to reroute specimens to other laboratories.

4.4.3 Faxing and Mailing Test Results Creates Redundancies and Confusion, and Delays Case Management and Contact Tracing

Despite the plan in the 1990s for OLIS to enable users to remotely view test results through an electronic portal as soon as they are available, COVID-19 test results in 2020 are still being faxed and mailed to public health units for case management and contact tracing.

The reason laboratories do not rely on OLIS as the means for public health units to obtain test results is that the data in OLIS is incomplete or inaccurate. This is a result of the following:

- **OLIS is not integrated with the province's public health information system.** Our Office's 2007 audit of Outbreak Preparedness and Management identified that public health units had to be notified by phone of disease outbreaks because OLIS was not linked to the province's integrated Public Health Information System (iPHIS). At that time, the Ministry informed us that it was in the process of connecting the two systems and expected this to occur in 2009; a decade letter, this had still not occurred. Section 4.5 provides details on other iPHIS deficiencies.

- **Not all laboratories enter test results into OLIS.** While laboratories are expected to enter test results into OLIS, there is no legal requirement to do so. As of December 2019, 170 laboratories were using OLIS, and four more were added during the COVID-19 pandemic. As of August 31, 2020, beyond these 174 laboratories, another 12 laboratories, which collectively conduct over 3.5% of tests performed in the province, were not entering data into OLIS.

- **Not all test results are recorded in OLIS.** OLIS will reject a test result if mandatory accompanying information (such as a health card number or date of birth) is missing. OLIS rejects about 1% of laboratory test results for this reason. Only test results that are on OLIS

will be viewable to individuals through the COVID-19 Test Results Viewer website.

These data quality issues have prompted laboratories to fax most test results to public health units. By August 31, 2020, Public Health Ontario's laboratories had performed about 943,000 COVID-19 tests, and in the majority of cases used faxing to communicate test results to the appropriate public health units and the health-care practitioners caring for the individuals tested. If a fax fails to go through (due to hardware, network connectivity or other technical issues), the fax machine will retry every five minutes for about five hours. If the fax still fails to go through or the recipient is not set up to receive faxes, the laboratory test results are printed and mailed through Canada Post. Public Health Ontario mailed about 224,000 of its laboratories' test results, and is unable to determine how many of these were due to failed faxes.

Under the *Health Protection and Promotion Act*, assessment centres and hospitals are also required to report COVID-19 test results to public health units. This results in public health units receiving multiple copies of the same test result, all via fax. For example:

- One public health unit noted that it received, by fax, two to four copies of the same test result on average, and in some cases up to seven copies.

- Another public health unit indicated that it receives duplicate results often and can receive the same test result up to six separate times.

- A third public health unit reported receiving multiple copies of the same result from both a laboratory and hospital assessment centre three times each day on average.

Public health units informed us that this has created significant administrative burdens. As they explained:

- Laboratories generally sent faxes to public health units in batches, requiring staff to go through the consolidated file containing multiple laboratory records and manually separate

them. Some public health units identified receiving 100 or more files in a batch.

- Staff were then required to review each duplicate fax to ensure all positive results were identified and actioned. They had to manually review the cases and compare them with their own records to ensure there was no duplication. The burden was even greater with asymptomatic testing, as staff had to sort through up to thousands of test results. It can be harder to find the positive results that require immediate case management among a large number of negatives, which were received during asymptomatic testing expansion.

We found an example of a positive COVID-19 case that was investigated twice by different case investigators at the same public health unit. The positive test result was reported on March 24, and the first instance of case management took place between April 1 and April 8. On May 22, a different case investigator from the same public health unit initiated the second instance of case management. The second investigator did so after checking for the case in iPHIS and not being able to find any record of the first instance of case management. Only later did public health unit staff obtain paper records from the first case investigator as evidence that the case had already been managed in April. This incident is an example of a paper-based system contributing to wasted resources and time that should have been used for other cases.

Laboratories in other jurisdictions do not fax or mail test results to their equivalents to Ontario's public health units. For example:

- In Nova Scotia, notification of test results (both positive and negative) prior to June 2020 was by phone call from Public Health. In early June, Nova Scotia changed its notification process by sending negative results through email for a substantial proportion of those tested (people with Nova Scotia health-card numbers or student IDs). With this email system, negative results

are emailed to people tested within minutes of entering test results into the laboratory information system. All positive results are automatically sent to Public Health through its electronic health records and are also emailed to Public Health within the province's Health Authority. These helped Nova Scotia to maintain an average testing turnaround time from arrival to the laboratory to reporting the result to within 24 hours.

- Alberta has an automated laboratory reporting system; positive test results are seamlessly fed into the provincial contact tracing and surveillance system and sent to ordering physicians immediately. Both positive and negative cases are contacted by an autodialer to quickly inform them of their status.

While the COVID-19 Test Results Viewer website contains both positive and negative COVID-19 laboratory test results, it may not be accessible by those who do not have access to a computer with an Internet connection or who are not comfortable with using a computer. This can result in delays in a person knowing their test result, which may cause anxiety for the person waiting for their result, and can potentially result in someone who is positive for COVID-19 not self-isolating.

At the time of our audit, the Ministry had purchased a new case and contact management system (see **Section 4.5.3**). This system interfaces with the Ontario Laboratories Information System to provide test results to public health units and ordering physicians in real time to eliminate the need for public health unit staff to re-enter faxed laboratory results into IPHIS.

RECOMMENDATION 4

In order for laboratory testing, case management and contact tracing to be performed as quickly as possible so as to prevent and reduce transmission of COVID-19, we recommend that the Ministry of Health (working collaboratively with Ontario Health as necessary) to expediently:

- implement electronic test ordering across all laboratories and assessment centres in Ontario;
- act on expert advice, including advice on which Ontarians should be eligible for COVID-19 testing;
- clearly communicate to the public who should and should not be tested for COVID-19, including the reasons why asymptomatic Ontarians with no known exposure should not be prioritized for testing;
- investigate for potential implementation the use of an autodialer system like Alberta's to report all COVID-19 laboratory test results to Ontarians as soon as test results are known; and
- integrate the Ontario Laboratories Information System with the integrated Public Health Information System (or other systems used by public health units to perform COVID-19 case management and contact tracing).

MINISTRY RESPONSE

Policy decisions on eligibility for public testing are made based on a number of inputs, including expert advice. On September 24, the Ministry revised its testing guidance and eligibility to reflect advice from the provincial Testing Expert Panel.

Testing eligibility is communicated via guidance available on the Ministry website, and is also supported by public communication efforts.

The Ministry and Ontario Health have directly integrated COVID-19 results in the Ontario Laboratories Information System (OLIS) with the provincial public health Case and Contact Management solution. Work is ongoing with assessment centres and laboratories to improve the quality, timeliness and completeness of COVID-19 results in OLIS, which is essential to ensure that public health units can conduct case management and contact tracing

as quickly as possible to prevent and reduce transmission of COVID-19.

RESPONSE FROM ONTARIO HEALTH

Ontario Health agrees with this recommendation and has already taken action.

While Ontario does not use an autodialer, Ontario has developed the COVID-19 Test Results viewer, a mobile-friendly website that allows Ontarians to receive their COVID-19 test results directly through their mobile device or computer via **http://covid19.ontario.ca**. The viewer went live in April 2020. To date, over 1.7 million Ontarians have accessed the application to view their test results. In October 2020, there were approximately 120,000 Ontarians accessing the service through the COVID-19 Test Results viewer daily, with peak volumes of 270,000 distinct patients searching for COVID-19 laboratory test results. The Ontario Laboratories Information System (OLIS) has been integrated with the integrated Public Health Information System (iPHIS) since April 2020, providing extracts of COVID-19 test results twice daily. Ontario Health will continue to improve the integration between OLIS and iPHIS in order to provide complete, accurate and timely test results that all public health units can use and rely on. In addition, OLIS is integrated with the new Public Health's Case and Contact Management system, providing all COVID-19 test results from the OLIS every 30 minutes. The integration was introduced as part of the Case and Contact Management system implementation and has been in place since July 2020.

4.5 Ontario's Public Health Information System Is Outdated and Contains Numerous Long-Standing Deficiencies, Creating Challenges and Inefficiencies for Case Management and Contact Tracing

Even though the integrated Public Health Information System (iPHIS) has been in place for almost 15 years, it does not function efficiently and effectively. As a result, unless public health units develop their own systems (which some, such as Middlesex-London Public Health, Ottawa Public Health and Toronto Public Health, have done), they have to rely on paper records for case management and contact tracing.

4.5.1 IT Deficiencies Identified Years Ago with the Provincial Public Health System Negatively Impacted Public Health Units During the COVID-19 Pandemic

Our discussions with public health units identified the following long-standing deficiencies with iPHIS:

- **It is difficult for users to link close contacts to a COVID-19 case in order to identify the source of likely COVID-19 transmission.** iPHIS requires users to access several sub-menus and different pages to link an individual to their close contacts. Beyond making it harder to train new users on how to use iPHIS, this can make it harder to effectively associate the likely source of COVID-19 transmission between individuals. As of August 31, for about 25% of all COVID-19 cases in iPHIS, the epidemiologic linkage was non-existent, missing or unknown, meaning it was not clear how or where these people contracted COVID-19. Epidemiologic linkage is needed to understand disease transmission and inform case management and intervention and mitigation strategies. While the lack of a linkage can be due to a number of factors

(including someone contracting COVID-19 from someone who was never tested, making it very challenging for the public health unit to link the case), the complexity of navigating the system has likely contributed to it.

- **It is difficult for users to write case progress notes.** iPHIS does not easily allow users to take progress notes, which are important to document the details of a call with an individual with COVID-19 or their close contacts. Such details include their symptoms, whether they are complying with self-isolation requirements, and their interactions with others. Public health units must therefore rely on paper files, which is inefficient, and some (Middlesex-London Public Health, Ottawa Public Health and Toronto Public Health) have resorted to developing their own information systems.

- **It is difficult for users to attach electronic files to a COVID-19 case.** iPHIS has limited functionality for attaching electronic documents, such as PDFs of test results and email correspondence, to case and contact files. As a result, public health units resort to paper filing systems for these documents, which is not only inefficient but also increases the risk that files are lost or assigned to the wrong case or close contact. Case management and contact tracing are further delayed when this happens.

- **It is difficult for users to access iPHIS remotely.** Some public health units identified challenges with only staff working on site being able to easily access iPHIS. This hinders staff working remotely and limits the ability of public health units to share staff with each other to handle capacity issues at overburdened regions.

These deficiencies in iPHIS forced public health units to develop their own ways to manage the high volume of cases and close contacts, such as:

- **Developing own systems:** The Toronto, Ottawa and Middlesex-London public health

units developed and implemented their own case management and contact tracing systems in April 2020 after receiving approval from the Ministry. Overall, these public health units incurred about $71,000 each in costs, and each of them on average devoted one month to develop and implement the systems in the middle of the pandemic in March and April.

- **Relying on paper records:** Some public health units, such as Peel Region and York Region, did not develop their own comprehensive case management and contact tracing system (like Toronto, Ottawa and Middlesex-London did). Instead, they relied on paper records and computer programs (such as Excel spreadsheets) to manage case and close contact information. They found that these manual methods, though inefficient and labour-intensive, were still superior to iPHIS.

4.5.2 Ministry's Progress in Enhancing Ontario's Public Health Information System Limited Despite 25 Years of Recommendations

While iPHIS can record the number of cases related to a reportable infectious disease, its functionality for case management and contact tracing is limited. In particular, it does not easily allow for cases to be linked to their close contacts, and it cannot manage the large amount of contact information it needs to be able to process. This has been noted in various reports, including those from our Office. For example:

- As early as 1997, our Office's Public Health Activity audit recommended that the Ministry obtain additional information on the results of contact tracing by Boards of Health for tuberculosis and sexually transmitted diseases. The report also noted that very few public health units used performance measures to assess their effectiveness—such as, for example, the number of patients or

contacts participating in any stage of contact tracing for a sexually transmitted disease. At that time, the Ministry indicated that it would enhance the information system to allow for more in-depth monitoring of contact tracing.

- In 2003, our Office conducted another audit of Public Health Activity and found that the Ministry still had not enhanced its information system. The Ministry responded that it would implement iPHIS to obtain more information on the results of contact tracing.
- In 2004, the interim report of the SARS Commission Report identified that public health units expressed concerns that iPHIS, which the Ministry was then planning to implement, was not capable of managing contact information. In the same year, the final report by the SARS Expert Panel recommended that the Ministry fully implement the technology supports necessary for contact tracing by June 30, 2004. If this could not be accomplished through design modifications to iPHIS, other suitable information technology platforms should be used.
- In 2007, our Office conducted an audit on Outbreak Preparedness and Management. We noted that the Ministry did fully implement iPHIS in December 2005, completing a key initiative recommended by experts after SARS. In our 2009 follow-up on the 2007 audit, the Ministry indicated that it would replace iPHIS with a new information system for communicable disease and outbreak management by 2011, but this did not occur by that time.
- In 2014, our Office conducted an audit of Ontario's Immunization program and assessed the Ministry's implementation of a new information system for immunization records. The system (Panorama) was developed by the federal government and British Columbia for disease surveillance. At the time, the Ministry planned to also implement Panorama's outbreak and investigation

module to replace the older iPHIS outbreak module to better assist public health units in managing outbreaks. As the implementation of this module was not complete, our Office recommended that the Ministry assess the costs and benefits of implementing the system's outbreak and investigation components to determine if it meets the Ministry's needs. In response to the recommendation, in 2018 the Ministry completed an evaluation of the outbreak and investigation module and determined it did not provide any improvements over iPHIS for managing case and contact information on reportable diseases.

It was not until March 2020, with the spread of COVID-19, that the Ministry, while in a crisis situation of having to either substantially upgrade iPHIS or replace it with a new case management and contact tracing system, began to address the problems. The Ministry has chosen to replace iPHIS, as explained in **Section 4.5.3**.

4.5.3 Ontario Continues to Update its New IT System for Case Management and Contact Tracing to Address Challenges and Improve its Operations

Given the challenges public health units were experiencing in using iPHIS (see **Section 4.5.1**), the Ministry started working on an alternative IT system for case management and contact tracing in early June 2020. The new system continues to evolve with new features and functions based on feedback from the public health units and Public Health Ontario.

On June 4, 2020, the Ministry received approval to obtain the case management and contact tracing management system (System) used in the state of Massachusetts. By June 15, the Ministry had secured licences and services to customize the system for use in Ontario and to deploy it across the 34 public health units and Public Health Ontario at a cost of about $10 million. The System was developed by Salesforce (a private-sector software

company) using feedback from public health units. The new System includes the following key features to address some of the deficiencies of iPHIS (see **Section 4.5.1**):

- integration with Google Maps to identify the name and location of places an individual has visited;
- the ability to record progress notes and upload documents for every known COVID-19 case and contact;
- the ability to link close contacts to each known COVID-19 case;
- integration with OLIS to allow case management and contact tracing to begin immediately;
- remote accessibility through cloud-computing software, enabling authorized employees at any location with a valid Internet connection to use the System;
- the ability to allocate investigation work for a new case to a case manager electronically;
- the ability to allocate investigation work from one public health unit to another public health unit with spare capacity to assist.

The System was first utilized by four public health units (Peel; Grey Bruce; Kingston, Frontenac, Lennox and Addington; and Halton) on July 13, 2020. An additional nine public health units (York; Porcupine; Durham; Haliburton, Kawartha, Pine Ridge; North Bay Parry Sound; Renfrew; Thunder Bay; Wellington-Dufferin-Guelph; and Lambton) had been added by July 31, 2020. Another 18 public health units had joined by August 20, 2020.

The Ministry's plan for the three remaining public health units—Middlesex-London, Ottawa and Toronto— is to have them phase in the new System throughout the fall of 2020. The Ministry intends to eventually adapt the System for all reportable diseases, eliminating the need for iPHIS.

While the new system does have a number of benefits over iPHIS, public health units informed us of the following challenges in the early stages of implementing the new System:

- Public health units received duplicates of laboratory test results, as they were faxed in addition to being transferred electronically to the System from OLIS. The Ministry informed us that it has since worked with public health units to make improvements to the System to reduce the number of duplicate test results received. Laboratory results submitted to OLIS also had some errors and missing or incomplete data, and these were transferred to the System. This requires public health units to still rely on faxes instead of using the System only.

- The Ministry worked with public health units to implement changes, but early on some features and functions were not clearly and fully communicated to the public health unit staff, making it hard for staff to adapt some of the new functionality.

- The System did not provide notification when transferring case management and contact tracing records between public health units, increasing the risk that individuals with COVID-19 and their contacts would not be contacted because public health units would not know which cases and contacts they were now responsible for. Public health units could continue to use the referral functionality in iPHIS, but this requires monitoring two systems simultaneously, which can cause confusion.

- Since three public health units (Middlesex-London, Ottawa and Toronto) have not started using the System, the System does not have complete, province-wide information relating to case management and contact tracing. The Ministry informed us that some functions of the System (such as case referral) were made available to Toronto and Ottawa as of October 23, leaving only Middlesex-London with no current access to the System. Public health units therefore still need to monitor other Ministry systems to see if the Middlesex-London public health unit has transferred any cases to them for follow-up. (This occurs, for example, when a case resides in a different public health unit from the one that initiated case management.) As of August 31, 2020, those three health units were responsible for almost 50% of all COVID-19 cases (38% are located in Toronto, 9% in Ottawa and 2% in Middlesex-London). This makes the System much less useful in helping public health units understand how cases may be linked. This also creates inefficiencies in surveillance at the provincial level.

Overall, public health units have expressed that there is value in the new System and it fixes many challenges that existed with iPHIS. However, challenges with the System still exist and public health units are continuing to work with the Ministry and providing feedback to improve the System.

RECOMMENDATION 5

To provide public health units with an IT solution that can capture timely, accurate and complete information for performing case management and contact tracing during COVID-19 and for other reportable diseases, we recommend that the Ministry of Health cost effectively and expediently:

- obtain guidance from public health units on the requirements for the public health information system to enable effective and efficient case management and contact tracing;

- incorporate these requirements into the design and functional operation of a provincial case management and contact tracing system to be used by all public health units;

- complete the rollout of the new case and contact management system (System) to all public health units; and

- continue to obtain feedback from public health units on the System to understand their implementation challenges in order to identify and implement solutions and other necessary features to be added.

MINISTRY RESPONSE

The Ministry agrees with this recommendation and has worked closely with public health units and Public Health Ontario to define the system requirements to support effective and efficient case management and contact tracing for COVID-19 and to balance the requests across the varying (and sometimes competing) local requirements and provincial priorities.

The Ministry has used these requirements to configure, refine and enhance the new provincial public health Case and Contact Management (CCM) solution

As of August 20, 2020, 31 out of 34 health units are using the new CCM solution for COVID-19. As of October 23, Toronto and Ottawa are using the new CCM solution for some activities, such as generating outbreak numbers and case referrals. The Ministry is working with the Toronto, Ottawa and Middlesex-London health units to fully transition from their local systems to the provincial system.

The Ministry continues to solicit feedback on CCM from health units through several forums and working groups to understand implementation challenges and to continue to improve the system through agile and iterative enhancement releases. As an example, near-real-time integration of laboratory results was implemented, minimizing the need for laboratories to fax results and for the health units to re-key data. The implementation of guided workflow scripts has helped case investigators and contact tracers to be more efficient. The Virtual Assistant tool enables citizens to securely complete digital surveys, further reducing the manual data entry in health units and supporting prioritization of contact outreach. In turn, the Ministry provides opportunities for the health units to understand provincial requirements, to collaborate on best practices and to learn process improvements from other health units and jurisdictions.

4.6 Provincial Guidance on Case Management and Contact Tracing Needs More Clarity

We found that Ministry guidance on case management and contact tracing activities was not always met, and that these activities were not always done consistently. We also noted that numerous COVID-19 cases were not being referred for case management and contact tracing due to confusion over reporting responsibilities.

4.6.1 Provincial Guidance on Case Management and Contact Tracing Needs To Be Clearer

Given the challenges of using iPHIS, identified in **Section 4.5.1**, public health units used their internal systems or paper records to track their case management and contact tracing activities. Our review of a sample of 100 COVID-19 cases and their associated close contacts, which were reported by four public health units (Middlesex-London, Ottawa, Peel and Toronto) between March 1 and June 30, 2020, found that while public health units had processes and procedures in place for managing the cases and tracing the close contacts, Ministry guidance was not always followed and inconsistencies occurred because the guidance was not clear enough on what should be done in certain specific situations. These variations indicated that Ministry guidance needs to be improved to ensure consistency across Ontario.

Guidance Not Sufficiently Clear on How Often to Contact COVID-19 Positive Cases and Their Contacts, and Which Individuals To Speak To

Public health units did not complete case management directly with 13 of the 100 COVID-19 case files we sampled, for the following reasons:

- In one case, the individual with COVID-19 was not willing to participate in the case management process, which is voluntary.

In two other cases, the public health unit was unable to reach the individual. In one case, the individual lived in a shelter for which no telephone number or address had been recorded; the shelter had a COVID-19 outbreak, so the individual was transferred to a hotel. After numerous attempts to contact the individual over 10 days, the public health unit closed the case file.

In 10 other cases, the public health unit did not speak directly to the individual who had tested positive for COVID-19, but instead to the individual's spouse, parent or caregiver.

Based on our review of these samples, we noted that the Ministry's guidance is not clear on how frequently the individual with COVID-19 needs to be contacted and when it is appropriate to contact someone else other than the individual with COVID-19. Specifically:

We found that public health units contacted cases at different frequencies. The Ministry's guidance states that cases must be monitored daily and that at minimum, "they must be called on the phone within 24 hours from when the public health unit was notified of the case, as well as on day 7 and day 14 of the isolation period." In our sample, individuals were contacted on average five times, but this ranged from once to 21 times. We noted that this generally was as a result of testing delays or an inability for public health units to start case management faster as a result of not having enough staff available to perform case management, resulting in late first contact of cases, such as during the mid-point of the case's self-isolation period.

The Ministry's guidance on case management specifies certain circumstances when the case investigator can speak to a case's household contact or family member instead of the individual: if the individual is too ill to be interviewed, has died or is a child. However, there is no guidance on who the case investigator should have spoken with when the individuals were hospitalized, and we noted

that different case investigators took different approaches for a sample of 40 case files. For 26 of the cases, the investigator spoke directly with the individual, while for the other 14, the investigator spoke with the individual's spouse or a relative, even to identify the individual's close contacts. Generally, public health units will be able to obtain more accurate information from speaking directly with the individual rather than someone else.

Guidance Not Sufficiently Clear on How Often to Speak to Close Contacts of Persons Testing Positive for COVID-19, and Which Individuals Need to Be Spoken to When Contact Tracing

In our 100-case-file sample, the average number of close contacts per individual with COVID-19 was three. The number ranged from zero to 37. We noted instances where the public health units did not follow Ministry guidance on how often to reach out to close contacts. We noted other instances where the public health units did not attempt to reach out to all close contacts directly. Specifically:

The Ministry guidance states that close contacts should be contacted a minimum of three times (at the beginning, middle and end of the contact's isolation period). However, we found that this varied among the public health units. While they spoke with the close contacts three times on average, this ranged from once to 26 times. The public health units gave us four main reasons for why 29% of close contacts who were reached less than three times: the contact had no symptoms and was at low risk of contracting COVID-19; the first contact was made late during the mid-point of the contact's self-isolation period; the close contact also tested positive for COVID-19 and was transferred to a case manager; and the public health units devoted their limited staff resources to the higher-priority activity of case management.

The public health units did not attempt to reach out to 31% of the close contacts of

individuals who tested positive for COVID-19. This was mainly because the contact lived in the same household as the individual with COVID-19. The public health units delivered information only through the individual with COVID-19 instead of directly speaking with the close contact or close contacts. Ministry guidance does not specify whether or not this practice is acceptable and sufficient.

4.6.2 Confusion Over Reporting Responsibilities Resulted in Numerous COVID-19 Cases Not Being Referred for Case Management and Contact Tracing

We noted one incident between March and late May 2020 where 485 COVID-19 cases were not reported to public health units, according to a review of the incident performed by Ontario Health. This was because Mount Sinai Hospital's laboratory, which received the specimens from William Osler Health System's assessment centre, incorrectly believed that the assessment centre's ordering physician was solely responsible for reporting the test results to public health units; the laboratory therefore did not report the results. The confusion over who must report was understandable given what legislation and policies state regarding reporting.

The *Health Protection and Promotion Act* specifies that both the ordering physician (who submits the specimen for testing) and the laboratory operator have the duty to report communicable diseases to the public health unit where the tested individual resides. The Provincial Diagnostic Network led by Ontario Health also indicated that "[t]he submitter may accept responsibility for notifying [the public health unit]. The performing laboratory remains accountable for the reporting to [the public health unit]; however, [the] performing lab and submitter may arrange to shift this responsibility to the submitter; this must be clearly communicated." Several laboratories had shifted the reporting responsibility to the submitter to share the heavy workload imposed by COVID-19.

In late May 2020, Peel Public Health notified William Osler Health System that it had been contacted by individuals who had tested positive for COVID-19 and that their specimens had been collected at the William Osler Health System assessment centre. The assessment centre had informed the individuals of their positive test result, and the individuals in turn contacted Peel Public Health on their own initiative for contact tracing. Peel Public Health asked that William Osler Health System investigate what happened, since it had no record of these individuals.

Once the issue was discovered in May, William Osler Health System identified many potentially unreported COVID-19 cases that had been tested at Mount Sinai Hospital's laboratory. Over 97% of the potentially unreported cases resided in one of Toronto, Peel or York public health units. It was determined that 485 cases were not known to these public health units and had not been recorded in the case management system. The public health units did eventually follow up on these cases, but only long after the target timelines for case management and contact tracing. For example, 202 of the 485 cases (42%) were for people that had a specimen collected in March and April, meaning case management (and contact tracing) did not occur for these people for about one month or longer after they were tested for COVID-19.

To determine whether this was an isolated involving this one assessment centre and one laboratory, and to prevent its recurrence, Ontario Health's Provincial Diagnostic Network asked all affiliated laboratories to confirm that similar miscommunication had not occurred and that all cases had been reported to the appropriate public health units. The Provincial Diagnostic Network also requested the laboratories to attest that they had documented and clarified with assessment centres their reporting responsibilities.

If reporting responsibilities had been well-defined and well-communicated to stakeholders in the first place, this confusion and the resulting under-reporting of cases could have been avoided.

RECOMMENDATION 6

To avoid confusion and inconsistencies with regard to case management and contact tracing, we recommend that the Ministry of Health expediently:

- collect and confirm information from public health units on how they perform case management and contact tracing;
- continue to update its guidance on case management and contact tracing based on the information collected, including further clarity on when, if ever, it is acceptable to not speak directly with the person with COVID-19 when managing their case and to not speak directly with those living with the person when tracing their contacts;
- provide updated guidance on case management and contact tracing process to all necessary stakeholders;
- communicate public awareness around case management and contact tracing process; and
- work with Ontario Health to provide laboratories with clear guidance on their reporting responsibilities to help ensure all COVID-19 cases are reported to public health units.

MINISTRY RESPONSE

The Ministry agrees with this recommendation and continues to strengthen its guidance and to update information based on scientific advice from Public Health Ontario and feedback from public health units.

The Ministry is working to standardize processes and expectations for case and contact management, enhanced by the new IT system using scripts, common workflows and business processes. Ontario's case and contact management guidance is available online at **http://www.health.gov.on.ca/en/pro/programs/publichealth/coronavirus/docs/contact_mngmt/management_cases_contacts.pdf** and updates to guidance are broadly communicated to health units.

4.7 Collaboration, Communication and Specimen Collection Strategy for Assessment Centres Need Improvements

4.7.1 No Formal Collaborative Network, Similar to the Laboratory Network, Has Been Created for Assessment Centres

Assessment centres are not linked or led by a province-wide network as was set up for laboratories (the Provincial Diagnostic Network) to help co-ordinate and organize their services (see **Section 4.1.4**). Such a network would be valuable for timely sharing of concerns and best practices, and for implementing best practices expediently.

We noted the following best practices that were developed independently by certain of Ontario's 148 assessment centres but were not shared across the province:

- Multiple assessment centres are using a "drive-through" model. They highlighted that this model requires less staff, less personal protective equipment and less cleaning, and can accommodate more tests than a walk-in model. Staff at one centre indicated that with the same number of registered nurses, the drive-through model was able to collect five times the number of specimens than a walk-in centre. Also, staff working in walk-in centres have to change their gloves and gowns between each patient, whereas staff only need to change gloves and clean contact points of reusable PPE between patients tested at drive-throughs. While this model may not be appropriate for all assessment centres, such as those with low volumes or physical space restrictions, there has been no provincial analysis of the optimal collection method for each assessment centre.
- London Health Sciences Centre/St. Joseph's Health Care London were able to design and deploy a "virtual waiting room" application originally designed for ambulatory care at its assessment centres. Staff at these centres

enter each individual's name and phone number into their system upon arrival. The individual will then be called into the assessment centre once it is their turn for an assessment and specimen collection. This enables social distancing, since people are not physically standing in line.

- Two assessment centres in London stay open up to an hour longer than their advertised hours as needed. This allows them to finish testing overflow visitors rather than turning them away.

- Previously, when William Osler Health System's assessment centre had too many visitors near the end of a day, it provided those it couldn't assess and collect specimens for with redeemable passes to be seen early the next day. This helped prevent patients from leaving and not returning for a test (this practice was discontinued and now William Osler Health System visits are appointment-only, matching the rest of the Province).

Under an assessment centre network, such operational innovations and best practices could be adopted by other assessment centres. While as of October 6, 2020, Ontario had assessment centres operate by appointment-only instead of a walk-in model, there is still value in identifying and sharing of best practices. At the time of our audit, Ontario Health had not regularly reviewed the appropriateness of each assessment centre's operating hours and staffing in relation to the populations they serve. A network could do this analysis regularly to identify which centres could remain open longer, how centres could operate more efficiently and ensure that there is appropriate assessment centre capacity to collect specimens for testing across Ontario. Staff at all eight assessment centres we spoke to indicated that a formal network of assessment centres to share best practices and help onboard new assessment centres would have been beneficial to respond to COVID-19, and some have tried to do this informally on a regional basis throughout the pandemic.

The Provincial Diagnostic Network for laboratories has established targets for laboratory test turnaround times. It also collects data from laboratories to determine progress against the targets. Similar performance tracking and benchmarking is not occurring for assessment centres. We noted that wait times varied significantly from one assessment centre to another, depending on the day and time, and the centre's location. In some instances, wait times were up to eight hours. However, complete data on wait times across the province has not been collected and no wait-time targets have been set.

4.7.2 Assessment Centres Were Given Little Notice on Changes to Testing Eligibility Criteria, and the Changes Resulted in Long Wait Times

As discussed in **Section 4.4.2**, the Province announced expanded testing on May 24, 2020 saying that no one seeking a COVID-19 laboratory test would be turned away.

Assessment centres learned a change would be forthcoming just the day before, on May 23, via a memo from Ontario Health. The memo said only that the expansion would occur in the next few days. Staff at all eight assessment centres we spoke with told us they were caught off guard by the May 24 announcement and were not able to staff up to meet the demand surge. Wait times increased as a result, with some individuals being turned away despite the province's assurance that this would not happen. Staff at one assessment centre indicated that on the first full day the centre was open after the announcement, phone calls increased more than threefold (not including those that could not get through). Its swab usage more than doubled from the day before the announcement.

Centres need lead time to prepare for changes to their operations if they are to serve Ontarians in a timely and safe manner. If changes are not communicated far sufficiently in advance of an implementation date, the centres' capacity for testing will be overwhelmed until it can adjust.

4.7.3 Expansion of Specimen Collection to Pharmacies Yields Little Benefit and Significant Costs

On September 25, 2020, Ontario made specimen collection for COVID-19 tests available at over 50 pharmacies for specific groups of asymptomatic Ontarians such as farm workers and residents, workers or visitors of long-term care homes. While this decision helped alleviate demand at Ontario's assessment centres by providing alternate collection points, the Ministry informed us that to reduce the burden of this testing on Ontario's laboratory testing capacity, all specimens collected in pharmacies were sent to a company in California for testing. Each of these tests cost $105 to process, and transporting these specimens thousands of kilometres away increased the turnaround time for results, delaying any necessary case management and contact tracing for positive tests. The Ministry informed us that it planned to bring this testing back into the province since laboratories have now resolved their testing backlogs and have available capacity.

The expansion of testing to pharmacies, specifically as it relates to who can be tested in pharmacies, also does not fully address the recommendations submitted by the Testing Strategy Expert Panel (Panel). As identified in **Section 4.4.2**, on July 5, 2020, the Panel recommended to the Chief Medical Officer of Health that Ontario limit its asymptomatic testing. This included the Chief Medical Officer of Health strongly consider removing the testing requirement for visitors to long-term-care homes. The Panel specifically noted there is "low clinical and scientific value" for testing visitors to long-term care homes. Visitors are currently expected to be tested for COVID-19 within the 14 day-period before their visit. It is possible that a person who is tested in that period and receives a negative result will subsequently be exposed to COVID-19. As a result of their negative test result, however, they may not maintain the physical distancing and other public health precautions necessary to protect the people around them.

As of October 31, 2020, asymptomatic visitors to long-term care homes can continue to be tested in Ontario pharmacies (at a cost of $42 per test that is paid by the Ministry to the pharmacy.)

While Alberta also began widespread specimen collection through pharmacies for its asymptomatic population on July 30, its situation was different from Ontario. Alberta Health Services informed us that the benefits of collecting specimens through pharmacies included improving access and convenience for Albertans, while helping to collect enough specimens to use its available laboratory capacity at the time. In contrast, Ontario already had approximately 65,000 laboratory tests that were not yet resolved when the government announced the expansion of specimen collection to pharmacies on September 25, so it had to incur costs and delays associated with out-of-country testing (which we noted was still the only way Ontario was testing these specimens in mid-November).

4.7.4 Assessment Centre Data Collection Could Assist in More Quickly Identifying the Likely Source of Transmission

Currently, specific information on where and how an individual could have contracted COVID-19 is collected only through case managers talking to the individual as part of case management. There is an opportunity for some of this information to be collected earlier in the process by the assessment centre or pharmacy that collects the COVID-19 specimen. This would be especially helpful at assessment centres, which deal with symptomatic individuals, but could also be helpful at pharmacies to expedite contact tracing if a test result is positive.

Currently, assessment centres and pharmacies record, for each individual who has come in for specimen collection, information such as their name, their address, their date of birth, their Ontario Health Insurance Plan number, what symptoms they are experiencing and when the symptoms started. This information enables the individual's COVID-19 laboratory test result to be relayed to the

public health unit where the individual resides and to the individual, and enables the public health unit to reach an individual who has tested positive to begin case management and contact tracing.

Some of the information collected through case management (such as a person's activity prior to developing symptoms, how and where they think they might have contracted COVID-19, and details of people they have been in close contact with in the period around them developing symptoms) could be collected prior to the start of case management.

For example, as discussed in **Section 4.7.1**, as of October 6, 2020, all assessment centres moved to an appointment-only operating model. As part of the scheduling of an appointment, it would be possible to collect some of this additional information, whether through an online form (if the appointment scheduling is online) or via telephone (if people have to call for an appointment).

If this information is already collected at the specimen-collection stage, case management could potentially proceed more quickly provided a system is set up to relay the information to public health units for those who test positive. Earlier collection of this information could also make it easier to identify outbreaks sooner, which could lead to faster outreach to other people who may have been infected.

RECOMMENDATION 7

For specimen collection and laboratory testing services to be available and delivered in a safe, expedient and cost-effective manner, we recommend that the Ministry of Health work collaboratively with Ontario Health as necessary to:

- provide sufficient notice and clear communication when changes are being made to specimen collection and laboratory testing that gives impacted stakeholders enough time to prepare;
- establish an assessment centre network to collect and assess data on the operations of each centre, identify best practices (includ-

ing for hours of operation, staffing and operating model), share of information and best practices, and provide supports that will help centres evaluate and address challenges as soon as possible;

- regularly review both the appropriateness of different locations for specimen collection and groups of people to be tested for COVID-19 in comparison to available laboratory capacity; and
- investigate opportunities to collect additional information from individuals who seek a COVID-19 test (such as how and where they believe they contracted COVID-19) as part of the appointment booking process for specimen collection at assessment centres and pharmacies.

MINISTRY RESPONSE

The Ministry agrees with this recommendation. In the context of pandemic response, policy decisions on specimen collection and laboratory testing often need to be made quickly; however, the Ministry undertakes to provide early and clear communication of policy changes to impacted stakeholders.

The Ministry, with Ontario Health, regularly reviews data, including testing positivity and testing rates across the province, to inform decisions on additional locations for specimen collection, including expansion of assessment centres as well as pharmacies and other specimen collection centres.

RESPONSE FROM ONTARIO HEALTH

Ontario Health agrees with the recommendation of sharing best practice and data across assessment centres.

While Ontario Health does not currently co-ordinate the provincial network of more than 140 assessment centres (over 160 at the time of this response in November 2020), this work does occur on a regional level. Each region

works closely with local assessment centres through communities of practice to identify best practices, share information and provide support. A regional approach allows for variation that is responsive to local needs, which enables specimen collection to be planned and implemented according to the needs of the specific population. To ensure collaboration across regions, each region has identified Assessment Centre and Testing Lead(s) who collaborate with each other to support provincial-level knowledge-sharing. Regional leads regularly review specimen collection strategies against local needs, particularly as they evolve, and work with regional partners to revise and/or expand specimen collection strategies accordingly. These new collection strategies are communicated with the laboratory network to ensure laboratories can prepare for the adjustments in volumes from different locations.

Ontario Health will explore any available opportunities to collect information on a voluntary basis from individuals seeking a COVID-19 test as part of the appointment booking process for assessment centres.

Appendix 1: Ontario Laboratories (and Laboratory Networks) Conducting COVID-19 Testing, as of August 31, 2020

Source of data: Ontario Health

Laboratory Provider Type	Location or Service Provider	Laboratory Provider Type	Location or Service Provider
Public Health Ontario	1. Hamilton		23. Mackenzie Health[2]
	2. Kingston		24. Markham Stouffville Hospital[2]
	3. London		25. North Bay Regional Health Centre[2]
	4. Ottawa		26. Peterborough Regional Health Centre[2]
	5. Thunder Bay		27. Quinte Health Care[2]
	6. Timmins		28. Royal Victoria Regional Health Care[1]
	7. Toronto		29. Sault Area Hospital[2]
Hospital or Hospital Network[1]	8. Brant Community Healthcare System[2]		30. Shared Hospital Laboratory
	9. Eastern Ontario Regional Laboratory Association		31. Sinai Health System
	10. Grand River Hospital		32. Sioux Lookout Meno Ya Win Health Centre[2]
	11. Grey Bruce Health Services[2]		33. Southlake Regional Health Centre[2]
	12. Guelph General Hospital[2]		34. Sunnybrook Health Sciences Centre[2]
	13. Halton Healthcare		35. Thunder Bay Regional Health Sciences Centre[2]
	14. Hamilton Regional Laboratory Medicine Program		36. Trillium Health Partners
	15. Headwaters Health Care Centre[2]		37. Unity Health Toronto
	16. Health Sciences North		38. Weeneebayko Area Health Authority[2]
	17. Hospital for Sick Children		39. West Parry Sound Health Centre[2]
	18. Humber River Hospital[2]		40. William Osler Health System[2]
	19. Kingston Health Sciences Centre	Community[3]	41. Alpha Laboratories Inc.
	20. Lake of the Woods District Hospital[2]		42. Dynacare
	21. Lakeridge Health[1]		43. LifeLabs
	22. London Health Sciences Centre		

1. On August 31, Collingwood General and Marine Hospital had been added to the Ontario Laboratory Network but began COVID-19 testing after this date.
2. These providers perform lower volumes of testing to support their own hospital or health centre rather than servicing provincial volumes.
3. One community laboratory (Bio-Test) had briefly performed COVID-19 testing prior to August 31, but was not providing it on August 31. It has since resumed testing.

Appendix 2: COVID-19 Cases and Deaths by Province and Territory, as of August 31, 2020

Prepared by the Office of the Auditor General of Ontario

Province/ Territory	Population	Total Cases	Total Deaths	Cases per 100,000 Residents	Deaths per 100,000 Residents*
ON	14,723,497	42,421	2,812	288	19
QC	8,572,054	62,492	5,760	729	67
BC	5,142,404	5,790	208	113	4
AB	4,417,006	13,902	239	315	5
MB	1,378,818	1,214	14	88	1
SK	1,179,618	1,619	24	137	2
NS	977,043	1,085	65	111	7
NB	781,024	191	2	24	0
NL	522,994	269	3	51	1
PE	159,249	44	0	28	0
NT	45,201	5	0	11	0
YT	41,980	15	0	36	0
NU	38,966	0	0	0	0

* Numbers are rounded to the nearest whole number. As a result, some provinces and territories identified as having zero deaths per 100,000 residents did have COVID-19 deaths.

Appendix 3: Audit Criteria

Prepared by the Office of the Auditor General of Ontario

1.	Lessons learned from past pandemics (including Severe Acute Respiratory Syndrome (SARS)) and expert reports were implemented to prepare Ontario's laboratory testing, case management and contact tracing capacity for future pandemics.
2.	COVID-19 laboratory testing, case management and contact tracing capacity was continuously updated and adjusted accordingly to allow Ontario to effectively reduce COVID-19 transmission.
3.	COVID-19 laboratory testing, case management and contact tracing performance is monitored against performance targets and corrective action is taken where targets are not met.

Appendix 4: Summary of Changes in Ontario's COVID-19 Testing Eligibility, January–September 2020

Prepared by the Office of the Auditor General of Ontario

Date	Notable Change in Case Definition and Testing Guidelines
Jan 24	Probable Case definition established. Probable cases include those with a fever above 38° Celsius and cough or breathing difficulty and evidence of severe illness progression. To be a probable case, a person must have recently travelled to Wuhan, China, had close contact with a confirmed or probable case, or had close contact with a person with acute respiratory illness who travelled to Wuhan, China.
Jan 31	Evidence of severe illness progression and breathing difficulty removed from case definition. Travel to Wuhan, China replaced by travel to Hubei Province (Wuhan), China.
Feb 7	Breathing difficulty added back to case definition. Travel to Hubei Province (Wuhan), China replaced by travel to mainland China.
Feb 26	Travel to mainland China replaced by travel to an impacted area (which was continuously updated thereafter as COVID-19 spread worldwide).
Apr 8	Initial testing guidance released specific to individuals in certain settings and those belonging to certain priority populations. Settings include hospitals, long-term-care and retirement homes, and remote/isolated/rural/ indigenous communities. Priority populations include health-care workers, caregivers, care providers and first responders.
Apr 14	Setting-specific testing guidance added for congregate living situations (including prisons and correctional facilities) and emergency child-care-centre workers
May 11	Case definition symptoms (i.e., fever and cough) are broadened to "symptoms compatible with COVID-19." Close contact with probable case removed from case definition (close contact with confirmed case remains). Close contact with a person with acute respiratory illness who travelled to an impacted area is removed from case definition. Lived or worked in an area with a known COVID-19 outbreak is added.
May 14	Testing guidance added, indicating that testing should be considered for all symptomatic Ontarians. Asymptomatic testing is not recommended unless testing as part of outbreak management. Guidance added for those living in the same household as caregivers, as well as those living with emergency child-care-centre workers (despite the latter not yet being provided specific guidance as a priority population).
May 28	Asymptomatic contacts of confirmed cases should be tested. Discussion of general asymptomatic testing is removed. Added setting-specific guidance related to facility transfers, workplaces and community settings. Added priority-population-specific guidance for emergency child-care-centre workers.
Jun 2	Testing guidance related to prisons and correctional facilities removed from guidance for congregate living settings and institutions.
Aug 6	Added back to testing guidance that asymptomatic Ontarians should generally not be tested aside from those who are contacts of confirmed cases and those who are outbreak-related. Added priority-population-specific guidance for students and workers in schools.
Aug 14	Removed from testing guidance the statement that asymptomatic Ontarians should generally not be tested. Removed discussion of testing for asymptomatic Ontarians linked to an outbreak.
Sep 24	Added back to testing guidance that asymptomatic Ontarians should generally not be tested aside from those who are contacts of confirmed cases, those linked to an outbreak, and specified high-risk populations.

Appendix 5: Public Health Ontario's Lab Modernization and Pressure Management Plan

Source of data: Public Health Ontario

1.	Testing Menu Modernization	Determine which high-volume/routine tests can be shifted to other lab capacity within the system.
2.	Regional Siting Strategy	Reduce the number of regional labs consistent with the new testing menu and within the context of the Integrated Transportation Strategy.
3.	Business Process Automation and Re-engineering	Identify business processes that can be automated and re-engineered to create greater efficiencies in the system.
4.	Integrated Transportation Strategy	Develop a plan to integrate transportation of specimens across the lab system, with particular attention to the north.
5.	Financial Analysis and Funding Approaches	Estimate the financial implications of the plan, including estimates for one-time transition funding, bridge funding and ongoing financial requirements alongside a detailed due diligence rationale. Specifically, the plan identifies the need to revise Public Health Ontario's funding streams by increasing base funding, providing separate capital funding and other temporary funding.

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