Incident Cancer Detection During Multiple Waves of COVID-19: The Tsunami After the Earthquake

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ABSTRACT

No population-based study exists to demonstrate the full-spectrum impact of COVID-19 on hindering incident cancer detection in a large cancer system. Building upon our previous publication in *JNCCN*, we conducted an updated analysis using 12 months of new data accrued in the pandemic era (extending the study period from September 26, 2020, to October 2, 2021) to demonstrate how multiple COVID-19 waves affected the weekly cancer incidence volume in Ontario, Canada, and if we have fully cleared the backlog at the end of each wave.

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As of August 29, 2022, COVID-19 has infected more than 601 million people worldwide, with the death toll exceeding 6.4 million. However, some of the devastating consequences of COVID-19 are only now emerging. Non–COVID-19 care, including cancer care, has been disrupted. Notably, cancer detection has declined dramatically.[1] Cancer types that depend heavily on routine screening for early detection were most impacted, because screening programs were suspended for months.[2] Delayed cancer diagnosis leads to delayed treatment, wherein even a 4-week delay can negatively impact survival.[3]

In our previous publication in *JNCCN*,[1] we examined the fluctuation of cancer incidence volume over the first 6 months of the pandemic (March–September 2020) in Ontario, Canada, a universal healthcare system with 14.7 million residents. Those early results suggested that, as of September 26, 2020, an expected 450 adults each week, or 12,601 adults in total, were not diagnosed with cancer during the pandemic.

Since the end of that study, COVID-19 has continued to evolve in Ontario. A new wave in early January 2021 led the government to declare a second provincial state of emergency. With 12 months of new data, we can now evaluate the change in weekly cancer incidence volume beyond the first wave of COVID-19 and calculate the total backlog of missed diagnoses. This is critical for short-term public health measures and long-term health system planning.

In an updated cohort including 455,572 adults newly diagnosed with cancer in Ontario, we observed an overall 7.8% relative reduction in weekly reported cancer incidence volume in the pandemic period (n=133,102; March 15, 2020–October 2, 2021) compared with the prepandemic period (n=322,470; September 25, 2016–March 14, 2020). When the first COVID-19 wave hit Ontario on March 15, 2020, mean cancer incidence volume declined immediately by 35% during that week, then increased at 1.2% per week in

the next 10 months, but never fully recovered to prepandemic levels. As a result, an expected 12,066 cancer cases were missed at the end of the first COVID-19 wave. During the subsequent second/third waves (January 10, 2021, onwards), cancer incidence decreased by 0.9% for each week compared with the week prior. As of October 2, 2021, the cumulative (all waves) backlog of undetected cancer cases when comparing to prepandemic levels amounts to 16,192, meaning that an expected 16,192 adults in total were not diagnosed with cancer due to the pandemic. When compared with the prepandemic rate of 1,782 cases diagnosed per week, this reflects a backlog equivalent to 9 weeks. Overall, cancer incidence volume was inversely associated with the number of COVID-19–related hospitalizations (Figure 1).

These data reflect the reality of managing a pandemic in a healthcare system. When strained with a sudden increase in hospitalizations, the system was unable to continue with even the most urgent diagnostic and therapeutic procedures for patients with cancer. These many missed cancer diagnoses and delays in treatment will underlie a wave of incident cancers with potentially advanced disease in the next 1 to 2 years—the tsunami after the earthquake.[4]

Although delaying non–COVID-19 care seemed necessary, care reductions to preserve capacity was not as universal or as severe in other jurisdictions compared with Ontario.[5]

The factors behind the observed decrease in cancer diagnoses were multifactorial—at the individual level, the fear of being exposed to COVID-19 has prevented many patients from attending periodic examinations and other in-person physician visits that could have detected early signs of cancer. Although telemedicine was quickly adopted by cancer care providers, whether diagnosis was affected by this shift in care modality is unclear. The results from our analysis also suggest that, at a hospital level, inpatient occupancy may be negatively associated with cancer diagnosis volume. Finally, at the system level, the effective closure of organized cancer screening programs for an extended period of time (2 months in Ontario) has reduced, and will continue to impact, the diagnosis of screen-detected cancers and may also contribute to excess mortality of these cancers in this decade.[6] As we rebuild our system to continue tackling COVID-19 and prepare for the next pandemic, we must think about repairing beyond the damage caused by COVID-19 to improve both structures and processes of care.

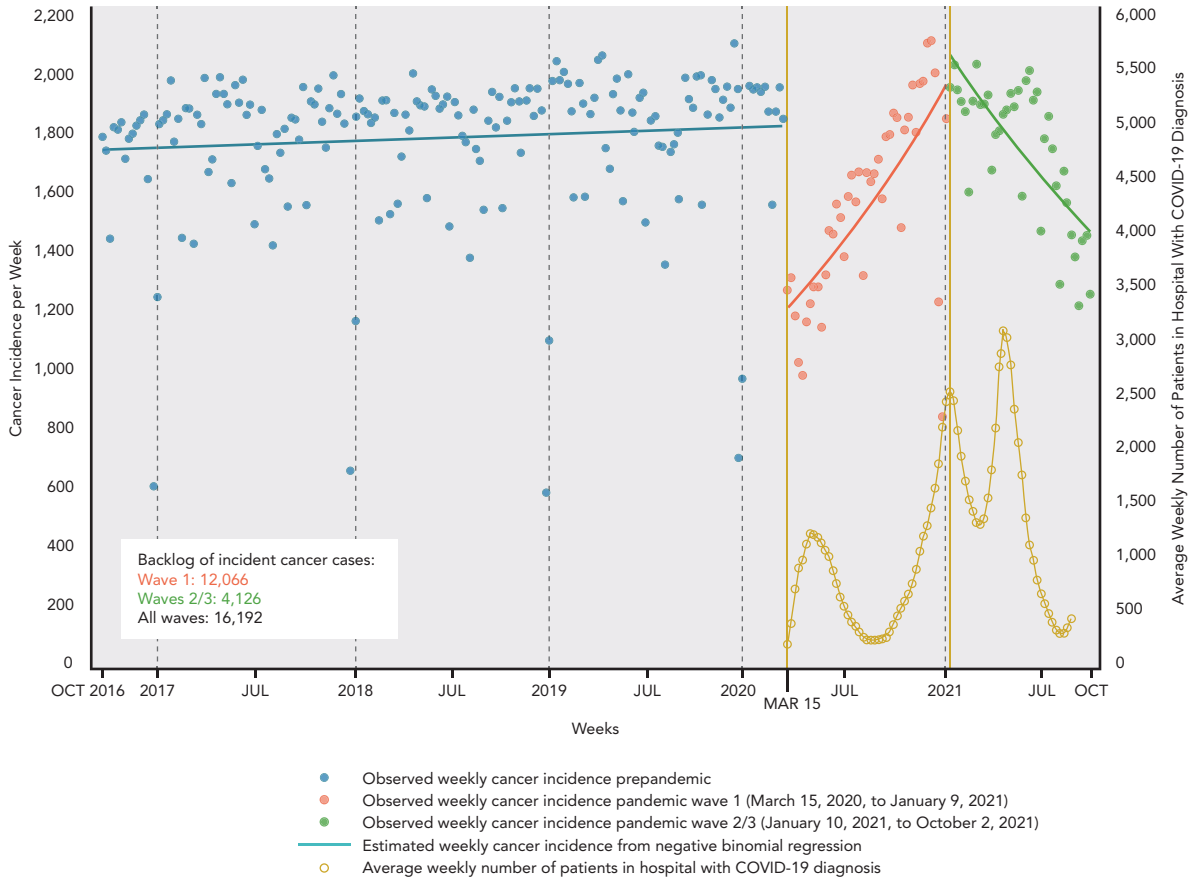

Figure 1. Weekly cancer incidence and COVID-19–related hospitalizations in Ontario, Canada (September 25, 2016–October 2, 2021). Cancer incidence data were obtained from the Ontario Cancer Registry. COVID-19–related hospitalizations were extracted from the Canadian Institute for Health Information. These datasets were linked using unique encoded identifiers and analyzed at ICES.

A system is required to rapidly deploy cost- and labor-intensive hospital resources in response to a public health catastrophe such as a global pandemic. Our results suggest that outpatient activities that are key to confirming a cancer diagnosis, including screening, diagnostic imaging, and biopsy, were vulnerable to the reallocation of resources designed to preserve inpatient capacity. To minimize this collateral damage to the cancer system during subsequent waves of COVID-19 or the next health system disruption, high-level strategic shifts in hospital funding are required to enhance pre-crisis planning. For example, decision-makers should consider investing in cancer modular treatment facilities with proven resistance to the shock of a pandemic, similar to the cancer surgical hubs coordinated by the National Health Service (NHS) in the United Kingdom. This also includes organizing infrastructures and health human resources to create emergency capacity for cancer diagnostic activities, such as building virus-protected rooms that can sustain in-person cancer examinations, utilizing non-frontline workers (eg, those with strong teaching, research, or administrative roles) to assume clinical responsibility under emergency circumstances, and training the workforce to deliver coordinated pathology services, including virtual triage combined with same-day imaging. For the current pandemic, hospital leaders need to dedicate financial and human resources to encourage patients to attend their appointments. A multistep communication plan that involves social media campaigns will help the health system more quickly find the missing patients with cancer.[7]

The COVID-19 pandemic also calls for a thorough inspection of low per-capita–level hospital resources, because these may represent future targets for priority funding. Taking Canada as an example: Canada's number of hospital beds per thousand population has been decreasing over the past 4 decades, decreasing from 6.8 in the early 1980s to 2.5 in 2019.[8] In fact, Ontario had the fewest beds per thousand population (2.2) in the world as of December 2019.[9] Furthermore, in 2020 just before the pandemic, Canada's capacity for diagnostic imaging ranked low among Organisation for Economic Co-operation and Development (OECD) countries (15 CT and 10 MRI scanners per million population).[8] Decisions to fund these resources need to be informed by evidence regarding the incremental benefit of increased healthcare expenditures on patient outcomes, including cancer detection.

Beyond the broad consideration of strengthening structures of care, it is imperative to use what we already have in the system to optimize the process of care. This may be the most important lesson learned from the pandemic for health system leaders and policymakers. There are numerous opportunities for productivity gains in healthcare delivery using evidence-based solutions. For example, existing policy interventions that target both primary care providers (eg, financial incentives) and the public (eg, health campaigns and targeted screening reminders) should be expanded to increase early, proactive cancer detection via screening. Conversion to an electronic-based platform of referrals that enables single-entry models of care and centralized waitlists may help new patients see an oncologist and receive treatment faster.[10] An increased commitment to improving operative and perioperative efficiency, such as strategic adjustments to physician scheduling, can enhance the cost-effective use of inpatient resources and improve patient outcomes. These changes in structures and processes of care could bolster our healthcare system so that when the next crisis occurs we are more prepared to protect the health of all.

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