

Original Article

# Rate of COVID-19 Infection in Patients With ST-Segment Elevation Myocardial Infarction

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## ABSTRACT

**Background:** The incidence of coronavirus disease 2019 (COVID-19) in patients with ST-segment elevation myocardial infarction (STEMI) has not been fully described.

**Methods:** All patients with STEMI undergoing primary percutaneous coronary intervention (PCI) in Ontario, Canada between March 1 and September 30, 2020 were included. Rates of positive COVID-19 tests from January 1, 2020 to the date of STEMI presentation were ascertained. For comparison, COVID-19 results were also evaluated in the adult Ontario population between January 1,

## RÉSUMÉ

**Contexte :** L'incidence de la maladie à coronavirus 2019 (COVID-19) chez les patients présentant un infarctus du myocarde avec élévation du segment ST (STEMI) n'a pas été entièrement décrite.

**Méthodologie :** Tous les patients atteints de STEMI ayant subi une intervention coronarienne percutanée (ICP) primaire en Ontario (Canada) entre le 1<sup>er</sup> mars et le 30 septembre 2020 ont été inclus. Les taux de tests positifs à la COVID entre le 1<sup>er</sup> janvier 2020 et le moment de la présentation du STEMI ont été vérifiés. Aux fins de comparaison, les résultats des tests de dépistage de la COVID-19 ont également été

Coronavirus disease 2019 (COVID-19) directly impacts the cardiovascular system, with data showing that up to 30% of infected patients have evidence of myocardial injury.<sup>1</sup> Case series have also highlighted that ST-segment elevations are encountered during presentation of patients infected with COVID-19.<sup>2</sup> As a result, several recommendations have been made to redesign ST-elevation myocardial infarction (STEMI) systems of care during the pandemic.<sup>3,4</sup> Yet to the best of our knowledge, the incidence of COVID-19 in patients with STEMI has not been fully described in an unselected population. Given that this information is essential for making informed decisions on rethinking strategies to manage STEMI, as most countries are battling subsequent waves of

the pandemic, our objective was to determine the incidence of COVID-19 in patients presenting to the hospital with STEMI. To put these results into perspective, we also compared the incidence with that of COVID-19 in the general population in Ontario, Canada.

We linked clinical, laboratory, and administrative databases at ICES (formerly known as the Institute for Clinical Evaluative Sciences) using unique encoded identifiers to construct a population-based cohort of adult residents in Ontario, Canada. The use of data in this project was authorized under section 45 of Ontario's Personal Health Information Protection Act, which does not require review by a research ethics board. We used the following: (i) the CorHealth Ontario Cardiac Registry, which included information on all patients undergoing cardiac invasive procedures; (ii) the Ontario Laboratory Information System, which captures all COVID-19 laboratory testing; and (iii) the Registered Persons Database, which contains demographic information on all Ontario residents. We identified all individuals presenting to an acute care hospital with STEMI who underwent cardiac catheterization from March 1, 2020 to September 30, 2020, and estimated

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**Ethics Statement:** The use of data in this project was authorized under section 45 of Ontario's Personal Health Information Protection Act, which does not require review by a research ethics board.

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2020 and September 30, 2020, using provincial laboratory testing data.

**Results:** There were 3606 unique patients presenting with STEMI and receiving PCI in Ontario, Canada during the study period. Sixteen patients (0.44%) tested positive for COVID-19. The background infection rate among all 12,448,541 Ontario residents was similar, at 0.34%.

**Conclusions:** The results of this population-based analysis suggest that proceeding with primary PCI with appropriate infection control practices is reasonable when community infection rates are low.

the COVID-19 infection rate and rate of positive testing (i) from January 1, 2020 to the date of STEMI presentation and (ii) 7 days after STEMI presentation. COVID-19 results were also evaluated in the entire adult Ontario population for January 1, 2020 to September 30, 2020.

We identified 3606 unique STEMI patients presenting in Ontario during the COVID-19 pandemic from March 1 to September 30, 2020. The mean age was 63 years (standard deviation: 12 years), and 72.1% were male. There were 1535 patients (42.6%) who had COVID-19 testing before or within 7 days after STEMI presentation. Sixteen patients (0.44%) tested positive for COVID-19. Of these, 9 patients (0.25%) tested positive before STEMI presentation, and 7 patients (0.19%) tested positive within 7 days after STEMI presentation. The test positivity rate in the STEMI population was 1.0%. Among all 12,448,541 Ontario residents, the COVID-19 infection rate adjusted for age and sex was 0.34%, and the test positivity rate was 2.2%.

In our study that examined an unselected cohort of STEMI patients during the pandemic in Ontario, we found that the incidence of COVID-19 infection was low compared with conventional knowledge, and only slightly higher than the general population. To date, only 2 other studies reported higher COVID-19 rates in STEMI patients—6.0% in Poland, and 3.7% in Belgium.<sup>5,6</sup> In addition to the lack of information regarding what proportion of the general population was infected at the time, several important differences should be noted. In the Polish study, patients with either confirmed or suspected COVID-19 were included, which might have led to an artificially higher infection rate.<sup>6</sup> In the Belgium study, data were not available from 27% of the interventional centers.<sup>5</sup>

Several potential limitations should be noted. Given that patients with STEMI were not routinely tested for COVID-19 in Ontario, it is conceivable that we have underestimated its true incidence. However, when we extended the testing window and examined COVID-19 results from the index event to October 31, very few patients (< 6) were later diagnosed. It is possible that patients with severe illness from COVID-19 who also had STEMI were not treated with percutaneous coronary intervention (PCI). However, Ontario has maintained policies to perform primary PCI without changes to routine care in practice, and we believe that deviations from these policies occurred only rarely in our study period. We were not able to capture STEMI patients with COVID-19 who died without first reaching the hospital for definitive care. Finally, these findings may not be generalizable

évalués au sein de la population adulte de l'Ontario entre le 1<sup>er</sup> janvier 2020 et le 30 septembre 2020 au moyen des données des laboratoires provinciaux.

**Résultats :** Pendant la période d'étude, 3 606 patients présentant un STEMI et ayant subi une ICP en Ontario (Canada) ont été recensés. Seize patients (0,44 %) ont reçu un résultat positif au test de dépistage de la COVID-19. Le taux d'infection parmi les 12 448 541 résidents de l'Ontario était similaire, soit 0,34 %.

**Conclusions :** Les résultats de cette analyse populationnelle portent à penser qu'il est raisonnable de procéder à une ICP primaire avec des mesures appropriées de contrôle des infections lorsque les taux d'infection dans la collectivité sont faibles.

to other areas with substantially different community prevalence rates of COVID-19.

In summary, although there have been substantial concerns that a high proportion of STEMI patients are infected with COVID 19, leading to recommendations of changes in STEMI systems of care, we found that the overall incidence of COVID-19 in patients presenting with STEMI is low, and similar or slightly higher than the incidence in the general population. This study provides new insight into the appropriate precautions necessary in managing STEMI patients undergoing primary PCI and suggests that it is reasonable to proceed with emergent PCI when community infection rates are low, within the framework of using appropriate infection control practices and personal protective equipment.

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### Disclosures

The authors have no conflicts of interest to disclose.

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