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We declare no competing interests.

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## The effect of seasonal respiratory virus transmission on syndromic surveillance for COVID-19 in Ontario, Canada



Emerging evidence suggests that syndromic surveillance systems can predict outbreaks of COVID-19 with high spatial and temporal resolution.<sup>1–3</sup> These methods can be used as early warning systems to guide regional decisions about public health policy. Tools include passive methods (eg, tracking health-care encounters) and more active participatory surveillance, whereby individuals self-report symptoms by telephone or internet.<sup>2–4</sup> It is unknown whether circulating seasonal respiratory viruses affect the performance of surveillance tools for COVID-19, although symptomatic overlap makes it a theoretical concern.<sup>5</sup> We investigated the role of test positivity for non-SARS-CoV-2 respiratory viruses on two independent COVID-19 syndromic surveillance systems in Ontario, Canada.

We included COVID-19-like illness as recorded by self-reported symptoms from Outbreaks Near Me. We also recorded visits to emergency departments for respiratory infection from the Acute Care Enhanced Surveillance system, provincial COVID-19 case counts, and percent positivity for other respiratory viruses as reported by Public Health Ontario, from April 20 to Nov 1, 2020. COVID-19-like illness was defined according to the US Centers for Disease Control and Prevention surveillance case definition for COVID-19.<sup>6</sup> The Acute Care Enhanced Surveillance system uses validated machine learning algorithms to categorise visits to emergency departments into clinical syndromes.<sup>7</sup> See appendix (pp 1–2) for a full description of data sources and syndromic definitions.

We compared the weekly (ie, by International Organization for Standardization date week) number of reported COVID-19 cases against the proportion of Outbreaks Near Me respondents with COVID-19-like illness and the proportion of all visits to emergency departments for respiratory infection. Separately, we plotted the percent positivity for other respiratory viruses over the same time period (ie, weeks 17–44). We reported Pearson's correlation coefficients before and after the uncoupling of syndromic tools to COVID-19 cases. Data were analysed in R (version 4.0.1) in the RStudio software environment (version 1.1.463). The study was approved by the Research Ethics Board of the University of Toronto, Toronto, ON, Canada, and a waiver of informed consent was granted because the data were collected for purposes of public health surveillance.

There were strong positive correlations between COVID-19 cases and both COVID-19-like illness ( $r=0.86$ ) and visits to emergency departments for respiratory causes ( $r=0.87$ ) up to and including week 40. Subsequently, from weeks 41 to 44, there were strong negative correlations between COVID-19 and both COVID-19-like illness ( $r=-0.85$ ) and visits to emergency departments for respiratory causes ( $r=-0.91$ ; appendix p 3). We also observed a rise in enterovirus or rhinovirus percent positivity from weeks 35 to 39, to a peak of 22.8% in week 39, and a subsequent fall

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in weeks 39–44 (appendix p 3). Total weekly visits to emergency departments rose from weeks 17 to 28 but were stable between weeks 28 and 39 (appendix p 4).

Two methods of syndromic surveillance showed strong positive correlation with confirmed COVID-19 case counts before and during a rise in circulating enterovirus or rhinovirus. However, as positivity for enterovirus or rhinovirus fell in late September, 2020, syndromic signals became uncoupled from COVID-19 cases. Although these signals seemed to be tracking COVID-19 cases closely in weeks 34–40, the rise in syndromic cases in this period reflected rapidly rising enterovirus or rhinovirus disease activity rather than COVID-19. As total visits to emergency departments were stable in weeks 28–39, this increase in the syndromic proportion was not explained by denominator changes. Respiratory visits to emergency departments and self-reported symptoms tracked closely with COVID-19 cases early in the pandemic when other respiratory viral activity was low. With other viruses well suppressed by a prolonged spring lockdown, COVID-19 most likely accounted for a greater share of all infectious respiratory symptoms during this time period (ie, weeks 17–34).

Even mild seasonal respiratory viruses, such as rhinoviruses, have considerable syndromic overlap with COVID-19.<sup>5</sup> The absence of an envelope might explain why rhinoviruses have spread so easily despite ongoing public health measures.<sup>8</sup> This finding suggests that regional transmission of seasonal respiratory viruses can complicate the interpretation of surveillance data for COVID-19. To accurately track and forecast COVID-19 disease activity, it is essential that surveillance systems incorporate testing data for other circulating respiratory viruses.

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## Congenital malformations in sub-Saharan Africa—warnings of a silent epidemic?

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SARS-CoV-2 has tragically shown the cost of a global pandemic. Only a few years earlier, the outbreak of Zika virus in Brazil and elsewhere in South America caught

the international community by surprise. There was no epidemiological surveillance for Zika virus established at the time, since the African-origin virus was previously