Assessing the Relative Timeliness of Ontario's Syndromic Surveillance Systems for Early Detection of the 2009 Influenza H1N1 Pandemic Waves

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ABSTRACT

OBJECTIVES: Building on previous research noting variations in the operation and perceived utility of syndromic surveillance systems in Ontario, the timeliness of these different syndromic systems for detecting the onset of both 2009 H1N1 pandemic (A(H1N1)pdm09) waves relative to laboratory testing data was assessed using a standardized analytic algorithm.

METHODS: Syndromic data, specifically local emergency department (ED) visit and school absenteeism data, as well as provincial Telehealth (telephone helpline) and antiviral prescription data, were analyzed retrospectively for the period April 1, 2009 to January 31, 2010. The C2-MEDIUM aberration detection method from the US Centers for Disease Control and Prevention's EARS software was used to detect increases above expected in syndromic data, and compared to laboratory alerts, defined as notice of confirmed A(H1N1)pdm09 cases over two consecutive days, to assess relative timeliness.

RESULTS: In Wave 1, provincial-level alerts were detected for antiviral prescriptions and Telehealth respiratory calls before the laboratory alert. In Wave 2, Telehealth respiratory calls similarly alerted in advance of the laboratory, while local alerts from ED visit, antiviral prescription and school absenteeism data varied in timing relative to the laboratory alerts. Alerts from syndromic data were also observed to coincide with external factors such as media releases.

CONCLUSIONS: Alerts from syndromic surveillance systems may be influenced by external factors and variation in system operations. Further understanding of both the impact of external factors on surveillance data and standardizing protocols for defining alerts is needed before the use of syndromic surveillance systems can be optimized.

KEY WORDS: Public health surveillance; algorithms; influenza A virus, H1N1 subtype; outbreaks

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Syndromic surveillance systems rely on the use of pre-diagnostic data, such as from emergency department (ED) chief complaints, school absenteeism or pharmacy sales, to facilitate earlier detection of disease outbreaks compared with traditional diagnostic data such as from laboratories. Evaluations of such systems have frequently relied on the retrospective analysis of outbreaks or outbreak simulations using signals modeled after previous outbreaks that are introduced into existing surveillance data.¹⁻⁵ While these methods have shown the potential value of syndromic surveillance, the added value of syndromic surveillance compared to traditional, particularly laboratory, surveillance in supporting public health decision-making remains controversial.^{6,7}

During the 2009 influenza H1N1 pandemic (A(H1N1)pdm09), Ontario implemented a surveillance plan that included both traditional laboratory surveillance and syndromic surveillance. A post-pandemic survey of Ontario's 36 local public health units (PHUs) confirmed that public health staff viewed laboratory testing data as more reliable and accurate than syndromic data, as would be expected for diagnostic data.⁸ However, while a majority of survey respondents described ED data as "essential" for informing decision-making, laboratory data were perceived more frequently as being more "timely" and "essential" than syndromic data. Follow-up

interviews with epidemiologists and decision-makers from these PHUs showed that while syndromic data were valued for monitoring local influenza-like illness (ILI) activity and supporting communications, the data had limited impact on decision-making.⁹ Inconsistencies in methodological approaches in the use of syndromic surveillance, particularly for outbreak detection, were also

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Conflict of Interest: None to declare.

Table 1. Description and Key Features of Data Sources Analyzed

Data	Source	Description	Values Used in Analysis	Time Frame	Date Used in Analysis
Reference: Laboratory-confirmed A(H1N1)pdm09 cases	Public Health Ontario Laboratories (PHOL)	Ontario's PHOLs performed the majority of testing during A(H1N1)pdm09 (84% of cases detected in Wave 1 and 69% in Wave 2). ²⁴ Testing was restricted to hospitalized patients with ILI and patients at high risk for complications from June 4, 2009 onwards.	1. Daily counts of laboratory-confirmed A(H1N1)pdm09 cases. Analyzed overall and by age group.*	April 1, 2009 to January 31, 2010	Second of two consecutive days of confirmed cases entered into PHOL database.
Telehealth	Ministry of Health and Long-Term Care (MOHLTC)	A MOHLTC service where free telephone consultation is provided by registered nurses to callers seeking health advice or general health information. Calls are classified into three syndromes (respiratory, gastrointestinal and fever/ILI) based on the clinical support guideline(s) selected by the nurse that best describe the caller's complaint. Calls are classified as respiratory if one of the following guidelines are selected: colds, congestion, croup, ear congestion, ear discharge, ear ache, hoarseness, multiple respiratory symptoms, sinus infection, sore throat, cough or wheezing (other than asthma). Calls are classified as fever/ILI if either the fever or influenza-like-illness guideline is selected.	1. Daily total calls received 2. Daily counts of calls classified as "respiratory" 3. Daily counts of calls classified as "fever or ILI". Analyzed overall and by age group.*	April 1, 2009 to January 31, 2010	Date of telephone consultation.
Antiviral prescriptions	Public Health Agency of Canada (PHAC)	Participating pharmacies transmit prescription sales data, such as for influenza antiviral drugs, to Rx Canada. The data were provided on a weekly cycle to PHAC. Data represent over 85% of sales at pharmacies in Ontario.	1. Counts of new prescriptions filled for antiviral drugs† for influenza. Analyzed overall and by age group.*	April 1, 2009 to December 31, 2009	Date prescription was filled.
School absenteeism (note: each of the 8 systems were different)	8 public health units (PHU)	Custom surveillance systems to measure elementary (kindergarten to grade eight) school absenteeism were developed and operated by selected PHUs.	1. Total counts of children absent from school (8 PHUs) 2. Counts for absenteeism due to illness (1 PHU) 3. Counts for absenteeism due to respiratory illness (1 PHU). 4. All cause absenteeism rates (8 PHUs).	Variable: Wave 1: April 1-June 19/24, 2009 (2 PHUs) Wave 2 varied by PHU: Most were from September 5-December 18, 2009, January 4-29, 2010.	Date of child's absence.‡
Emergency department (ED) visits	11 PHUs	Custom surveillance systems to monitor ED visits and chief complaints were developed and operated by selected PHUs.	1. Total daily all-cause visit counts to EDs (11 PHUs) 2. Total daily visit counts to EDs for respiratory symptoms (7 PHUs) 3. Total daily visit counts to EDs for "fever/influenza like illness" (9 PHUs). Analyzed overall and by age group where data provided.*	April 1, 2009 to January 31, 2010 (3 systems did not start until October 1, 2009).	Date of visit to ED.

* 10-year age groups are defined as 0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80+. Age was reported by the patient. For example, if a parent called Telehealth about his/her 6-year-old child, the call would be recorded as age 6 and thus classified as "0-9".

† 99.6% of the prescription drugs were oseltamivir, 0.4% were zanamivir. Repeat prescriptions were excluded.

‡ For school absenteeism, weekends, statutory holidays and professional development days were treated as missing data and thus excluded from the analysis. On a typical week, Monday was seen as the day after Friday. No data were collected for July, August and late December due to scheduled holiday breaks.

noted and may have influenced perceptions of timeliness and usefulness. Similar inconsistencies have been described previously.¹⁰

Having noted variations in the operation and use of syndromic surveillance systems in Ontario, we obtained data collected during A(H1N1)pdm09 from federal, provincial and local syndromic surveillance systems as well as laboratory data from Public Health Ontario Laboratories (PHOL). The purpose of this study was to examine the timeliness of these different syndromic systems for detecting the onset of both the spring and fall pandemic waves relative to laboratory surveillance from the provincial and PHU perspective when a standardized analytic algorithm was used.

METHODS

Data sources

Our survey of Ontario's PHUs found that the most frequently used syndromic surveillance systems in Ontario during A(H1N1)pdm09 were based on ED visit and school absenteeism data.⁸ Thus, we requested aggregated data from the 18 PHUs that reported using these syndromic surveillance systems for the period April 1, 2009 to January 31, 2010, of which 13 (72%) provided data (11 provided ED visit and 8 provided school absenteeism data). Participating PHUs represented 66% of Ontario's population, with greater repre-

Figure 1. A comparison of the epidemic curve of all laboratory-confirmed A(H1N1)pdm09 cases detected at PHOL based on specimen collection date* and daily aggregate counts of new antiviral prescriptions for influenza and calls to Telehealth, April 2009-January 2010, Ontario

* Average time between specimen collection date and result entry date for laboratory-confirmed cases is 6 days.

sensation among urban populations (75% versus 46% of rural) because syndromic surveillance is more common in PHUs with larger populations.^{8,11} We also requested centrally collected Telehealth data from Ontario's Ministry of Health and Long-Term Care (MOHLTC) and antiviral prescription data from the Public Health Agency of Canada (PHAC) to perform Ontario-wide and PHU-level analyses. Telehealth is a MOHLTC service where free telephone consultation is provided by registered nurses to callers seeking health advice or information. Antiviral prescriptions were initially filled at community pharmacies using the usual supply chains. However, as demand exceeded supply, the MOHLTC released its stockpile and began distributing antivirals free to community health centres on October 19, 2009 and to pharmacies on October 22, 2009.¹²

From PHOL's database, we also requested data on laboratory-confirmed cases of A(H1N1)pdm09. PHOL detected 76% of laboratory-confirmed cases in Ontario. Initially, cases were detected using a combination of endpoint reverse transcriptase (RT) polymerase chain reaction (PCR) for the influenza A virus matrix gene and sequencing analysis; after May 15, 2009, cases were detected using a novel, more sensitive, real-time RT-PCR assay for the virus developed by PHOL.¹³ The sensitivity and specificity of this novel real-

time RT-PCR assay were evaluated using 185 specimens collected in Ontario from May 1 to May 14, 2009. Results from this novel assay were compared against a modified 'gold standard', which was defined as a positive result by either sequencing analysis or by the original RT-PCR method used before May 15. The sensitivity and specificity of this novel assay were 99.2% and 94.6-98.1%, respectively.¹⁴ The average length of time between specimen collection and entry into the laboratory information system/notifying PHUs was 6 days for laboratory-confirmed cases. Descriptions and key features of these data sources are provided in Table 1.

Data analysis

For syndromic data, we used the C2-MEDIUM method of analysis from the US Centers for Disease Control and Prevention's Early Aberration Reporting System (EARS) version 5 to identify when an alert would have been observed as a signal of outbreak detection.¹⁵ The C2 method calculates the mean and standard deviation from the number of events (or counts) -9 to -3 days before the day of interest (total seven days), and issues a flag when the observed value exceeds the expected value by three standard deviations.¹⁵ We chose the C2 method because many of the local syndromic surveillance systems were newly created during A(H1N1)pdm09 and

Table 2. Significant Dates of A(H1N1)pdm09-related Events in Ontario*

Date	Event
April 20, 2009	First reports of severe respiratory illness originating in Mexico.
April 24, 2009	First A(H1N1)pdm09 positive specimens are submitted to Public Health Ontario laboratories.
April 26, 2009	A(H1N1)pdm09 cases reported in Mexico, US, and Canada (in Nova Scotia and British Columbia); MOHLTC issues a media release advising all persons returning from Mexico with ILI symptoms to contact either their family physician or Telehealth.
April 28, 2009	First lab-confirmed cases of A(H1N1)pdm09 in Ontario reported.
April 29, 2009	MOHLTC: Lab testing not recommended for ambulatory patients or patients without a travel history to Mexico who present in EDs.
April 30, 2009	MOHLTC: Lab testing recommended for patients presenting with ILI and a history of travel to Mexico or contact with a confirmed case within 7 days of onset of symptoms.
May 3, 2009	MOHLTC: Outpatients should be tested who have ILI within 7 days of close contact with a person who is a confirmed case of H1N1 or within 7 days of travel to Mexico. Patients should be tested in those cases where they are hospitalized for ILI, expected to be admitted through the ED with ILI, or meet the outpatient criteria previously described.
May 25, 2009	First A(H1N1)pdm09 death in Ontario.
June 4, 2009	MOHLTC: For ambulatory care settings and EDs, laboratory testing is only required for clinical management of hospitalized cases of ILI or where patients are at high risk for complications from influenza, and not for mild illness.
June 11, 2009	World Health Organization declares worldwide pandemic; Ontario revises laboratory testing guidelines – only for hospitalized patients or those at high risk for complications from influenza.
June 14-27, 2009	Wave 1 peaks in Ontario.
September 24, 2009	Ontario announces Influenza Vaccine Rollout for Seasonal and A(H1N1)pdm09 vaccines.
October 21, 2009	Health Canada approves pandemic A(H1N1)pdm09 vaccine for Canadians.
October 24, 2009	10-year-old previously healthy Eastern Ontario girl dies.
October 26, 2009	Ontario begins mass H1N1 immunization program, starting with first-priority groups; 13-year-old Toronto child dies.
Oct 25-Nov 7, 2009	Wave 2 peaks in Ontario.
November 19, 2009	Ontario opens up immunization program to the entire population.
Dec 2009/Jan 2010	A(H1N1)pdm09 activity decreases in Ontario.

* Refs. 12,25-27.

A(H1N1)pdm09 = 2009 H1N1 pandemic; ED = Emergency department; MOHLTC = Ontario Ministry of Health and Long-Term Care.

consequently, did not have baseline data from previous years which is required with other methods.¹⁶ Additionally, we felt this approach was a standardized, moderately sensitive method that could be easily implemented by PHUs. To minimize the number of false-positive flags, and recognizing that it may not be feasible for PHUs from a resource perspective to respond to every flag,¹⁷ we defined a positive C2 alert as when C2 flags occurred on two consecutive days, with the second day considered as the alert date.

To assess timeliness of syndromic data sources for outbreak detection, we compared syndromic alerts to laboratory data. We defined the laboratory alert date as the second of two consecutive days on which a confirmed A(H1N1)pdm09 test result for the PHU/province was entered into PHOL's database, which also notifies the PHU/province of the confirmed test result. We chose the second day because it would indicate confirmed transmission in the jurisdiction. As a sensitivity analysis, we also analyzed the laboratory-confirmed case data (based on the date of specimen collection) using the C2 method.

As the goal of our analysis was to evaluate the ability of syndromic surveillance systems to detect an outbreak relative to laboratory surveillance from a local and provincial perspective, only limited modifications were made to the data received. These modifications included treating days as missing if there was low reporting (e.g., defined as days where less than 75% of schools reported) or known transmission errors which resulted in incomplete data. Laboratory, Telehealth and antiviral data were analyzed for Ontario overall and for each PHU separately, stratified by size of population (>400,000 or ≤400,000, with individuals assigned to a PHU based on their residence). With the exception of school absenteeism data, all data were analyzed as overall counts and by 10-year age groups. As males and females were equally affected by A(H1N1)pdm09, sex-specific information was not requested.

In addition to using the C2 method, we also examined school absenteeism data using an alerting threshold of 5% absenteeism because our interviews with syndromic surveillance users identified this method as common practice.⁹

Due to the variation in syndromic systems used by Ontario's PHUs, we present findings for each PHU that provided syndromic data, as well as Ontario-wide results from analysis of Telehealth and antiviral data. PHUs are anonymized in adherence with an agreement with PHUs that they would not be identified in any publicly available publications or presentations. Acknowledging that events captured by surveillance systems can be affected by external factors such as the media and other A(H1N1)pdm09-related events, a summary of these events is provided in Table 2.

Ethics approval for this study was obtained from the Office of Research Ethics, University of Toronto.

RESULTS

Laboratory-confirmed A(H1N1)pdm09 case counts for Ontario from April 2009 to January 2010 are shown in Figure 1, along with calls to Telehealth and filled antiviral prescriptions for the same time period as a comparison. In Wave 1, respiratory-related calls to Telehealth and antiviral prescriptions increased prior to the rise in laboratory-confirmed cases, while in Wave 2 these data sources show similar trends to those of the laboratory.

Wave 1 (April 1 to August 31, 2009)

Comparisons in time between alert dates from laboratory data and syndromic surveillance for Wave 1 are provided in Figure 2a.

Laboratory Surveillance

PHOL detected 3,403 A(H1N1)pdm09 cases across Ontario during Wave 1, of which the specimens for the first cases were submitted on April 24. Provincially and for four large PHUs, the first laboratory alert of two consecutive days of positive isolates was on May 4. Alerts for the smaller PHUs did not occur until June, which reflects the geographical spread of A(H1N1)pdm09 from urban centres to smaller, more rural regions.

Syndromic Surveillance

The earliest alert was detected from Telehealth respiratory calls for Ontario and large PHU 1, where C2 flags were observed over four

Figure 2. A comparison of time (in days) between syndromic surveillance alert (C2) dates and the laboratory alert date (second day of two consecutive confirmed cases) for Ontario, and for participating public health units (PHUs) who experienced alerts† during: a) Wave 1 of the pandemic in Ontario and b) Wave 2 of the pandemic in Ontario

a) Wave 1

LG indicates PHUs serving a population size >400,000 and SM indicates PHUs who serve a population size ≤400,000. †Five of the nine participating large PHUs and three of the four participating small PHUs did not experience a syndromic alert in the first wave.

b) Wave 2

LG indicates PHUs serving a population size >400,000 and SM indicates PHUs who serve a population size ≤400,000. * For LG PHU 1, antiviral and ED ILI data alerted; for LG PHUs 4 and 9, antiviral and school absenteeism alerted; for SM PHU 1, ED ILI and school absenteeism alerted.

days from April 26 to April 30 (alert date April 27). This alert occurred one week prior to the laboratory alert, and one day after a MOHLTC media release advising all persons returning from Mexico with ILI symptoms to either contact their family physician or call Telehealth (Table 2). Telehealth fever/ILI data did not alert for Ontario with all ages combined, but alerted on April 28 for the 40-49 year old age group and on April 29 for both the 20-29 and 30-39 age groups.

For antiviral prescription sales, an Ontario alert was observed on April 28, one day after the Telehealth respiratory alert and two days after the first cases in Canada were reported (Table 2). Around this time, and before laboratory alerts, local alerts were also seen in three large PHUs, and a week later in one small PHU, while no alerts were seen in the other PHUs.

Fewer local syndromic surveillance systems were established and operational during Wave 1 than Wave 2, thus limiting our comparisons with laboratory data. Among six PHUs that provided ED visit data, respiratory visit data alerted for large PHU 3 six days before the laboratory alert, and total visits alerted for small PHU 3 one month after the laboratory (data not shown). Among the two PHUs with school absenteeism data, one alerted one month after the laboratory.

Wave 2 (September 1, 2009 to January 31, 2010)

Comparisons in time between alert dates from laboratory and syndromic surveillance for Wave 2 are provided in Figure 2b.

Laboratory Surveillance

3,230 A(H1N1)pdm09 cases were laboratory-confirmed by PHOL, with the first two consecutive days of PHOL notices of confirmed cases for Ontario on September 17-18. For both large and small PHUs, alerts from laboratory data occurred between October 2 and October 27 with a similar general trend in geographical spread as Wave 1 from urban centres to rural regions.

Syndromic Surveillance

Telehealth respiratory data alerted for Ontario on September 7, corresponding to 11 days before the first laboratory alert, while fever/ILI data alerted 36 days after the laboratory. Locally, only large PHU 5 had a respiratory alert during peak A(H1N1)pdm09 activity (occurring four days before the PHU's laboratory alert), whereas no fever/ILI alerts were detected during this time.

Antiviral prescription sales data for Ontario alerted on October 22, 34 days following the laboratory alert. Locally, two large and one small PHU had antiviral alerts which preceded their laboratory alerts by 5-6 days, while the remaining PHU-level alerts occurred after (Figure 2b).

For all-cause ED visits, five of the eleven PHUs experienced C2 alerts. Large PHU 7 alerted on September 7 (36 days before the laboratory alert) while all other alerts were 4-25 days after the laboratory in October. Similarly, all six PHUs with either ILI-specific or respiratory symptom ED visit data alerted 4-13 days after the laboratory (Figure 2b).

Among school absenteeism data, four out of eight PHUs had alerts on October 27 and one on October 24, 3-22 days after the corresponding laboratory alerts (Figure 2b). The school alerts occurred 1-2 school days after the high-profile deaths of two previously healthy children and coincided with the beginning of Ontario's mass immunization program (Table 2). Alert dates when

using a 5% absenteeism threshold were earlier than C2 alert dates for all but one PHU. Relative to alerts from laboratory data, alerts from two PHUs occurred earlier (by five days and one day, respectively) while another PHU had an alert on the same day. The remaining five PHUs alerted 4-23 days after the laboratory.

In our sensitivity analysis applying the C2 method to laboratory data, C2 alerts occurred later than alerts based on consecutive cases in both waves by 12 to 31 days, thus making C2 alert dates more similar to alert dates from syndromic data. C2 laboratory alerts were absent in many PHUs, particularly those with fewer cases.

Analysis of the laboratory and syndromic data by age group did not offer any timeliness advantages. Alerts often occurred on the same day as the all-age alerts, demonstrating consistency of alerts.

DISCUSSION

The purpose of this study was to examine the timeliness of different syndromic systems relative to positive laboratory testing from a provincial and local PHU perspective using a standardized analytic algorithm. From this perspective, we were unable to show that any one syndromic surveillance system was consistently more timely in detecting the outbreak than laboratory surveillance. These findings support perceptions from our survey and interviews^{8,9} that information from syndromic surveillance was less timely and accurate compared to laboratory surveillance during A(H1N1)pdm09. However, we note variability in the results. Relative to the laboratory alerts, the timing of C2 alerts from the various syndromic surveillance systems varied between the two waves of A(H1N1)pdm09 as well as within the same type of syndromic data source. Recognizing that sample size may affect the power of the C2 method to detect outbreaks, analysis of timeliness by the size of the population does not explain this variability.

Although Telehealth respiratory call data for Ontario alerted before the laboratory in both waves, few alerts occurred at the PHU level. Telehealth and antiviral results also appear to be related to other factors. The Wave 1 alert for Telehealth respiratory calls is likely an artifact of the media coverage of the MOHLTC-issued press release advising all persons returning from Mexico with ILI symptoms to contact either their family physician or Telehealth. Similarly, while a significant increase in antiviral sales after April 26 caused C2 flags on April 27 and 28, prior sales are comparable to those seen during the summer months between Waves 1 and 2, and may reflect prescriptions for prophylactic use of influenza antivirals.

For ED surveillance, alerts did not occur for all PHUs, and only one PHU had an alert before the laboratory in each wave, the Wave 2 alert being 36 days in advance. For both total and symptom-related visits, most alerts occurred within a week after the laboratory alert, with two occurring more than two weeks later. Retrospectively, the severity of illness from A(H1N1)pdm09 was mild relative to previous influenza seasons, and together with other factors that could affect ED visit volumes, such as the opening of influenza assessment centres, this may contribute to the absence and variability in timing of alerts. As other published results have demonstrated the potential of ED surveillance systems to detect influenza earlier than traditional laboratory-based testing,^{3,18-20} further study of ED surveillance systems is warranted.

For school absenteeism, other evaluations have shown that absenteeism rates during A(H1N1)pdm09 correlate well with, but

not earlier than laboratory data.^{21,22} In our analysis using C2 alerts, school absenteeism was less timely than laboratory data, whereas using a 5% absenteeism threshold showed variable results. Noting that the school absenteeism alerts occurred shortly after the high-profile deaths of two children and when the vaccine became available, we hypothesize that the school absenteeism alerts were due to parents not sending their children to school to avoid exposure to the virus or to attend vaccination clinics.

The lack of standardization of syndromic surveillance operations in Ontario may contribute to our findings. Interviews with PHU epidemiologists and decision-makers revealed variability in the use, definition and collection of syndromic data during A(H1N1)pdm09, including definitions of ILI and respiratory illness.⁹ Since surveillance normally relies on standard methods and practices, the variation in alert dates observed may be due to the variation in system operations. As recognized previously, this study supports the need for standardized protocols for outbreak detection and response when using syndromic surveillance systems.¹⁰

Limitations of this study are recognized. Using detection algorithms based on seasonally adjusted baseline estimates may improve accuracy. However, because historical data were not available, we chose to use the EARS C2 method which uses a seven-day baseline period. We recognize that with EARS' use of a relatively short, moving baseline, slow increases over long periods are unlikely to result in an alert.¹⁶ Analyses at smaller scales than the PHU level may also be more sensitive to spatial and temporal anomalies and less affected by external influences. Furthermore, before the analyses were started, we defined alerts as two consecutive flags in order to improve the specificity of the algorithm (at a cost of its sensitivity). This was done because the high frequency of false alerts from syndromic surveillance is a concern,^{2,23} and investigating every alert could be costly to PHUs from a resource perspective.

While the laboratory data were found to be more timely than some syndromic surveillance sources in this study, it should be noted that restrictions to laboratory testing as the pandemic progressed to testing only hospitalized patients or those at high risk for complications from influenza may have limited the utility of laboratory data to monitor A(H1N1)pdm09 and influence local decisions. As previously described, we found that syndromic data were described by public health staff as useful for improving awareness of local ILI activity, supporting communications, and monitoring the health care system.⁹

Our evaluation also focused exclusively on influenza and ILI during A(H1N1)pdm09. Use of syndromic surveillance for other conditions such as gastrointestinal illness may lead to different results.

In conclusion, our findings demonstrate the degree to which syndromic surveillance systems produced variable results during A(H1N1)pdm09. External factors such as media releases and variation in the operation of syndromic surveillance systems may contribute to this variability. To optimize the use of syndromic surveillance systems, standardized protocols for defining and responding to alerts, with consideration for the influence of external factors, is required.

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RÉSUMÉ

OBJECTIFS : À partir des résultats de recherches antérieures sur les écarts dans le fonctionnement et l'utilité perçue des systèmes de surveillance syndromique en Ontario, nous avons évalué, à l'aide d'un algorithme analytique standardisé, la rapidité avec laquelle les différents systèmes syndromiques ont détecté l'apparition des deux vagues de la pandémie de grippe H1N1 de 2009 (A(H1N1)pdm09) par rapport aux données des épreuves de laboratoire.

MÉTHODE : Les données syndromiques, plus précisément les visites aux services d'urgence locaux et l'absentéisme dans les écoles, ainsi que les appels à Télésanté (une ligne d'assistance téléphonique provinciale) et les ordonnances d'antiviraux, ont été analysées rétrospectivement pour la période du 1^{er} avril 2009 au 31 janvier 2010. Nous avons utilisé la méthode de détection des aberrations C2-MEDIUM du logiciel EARS des Centers for Disease Control and Prevention des États-Unis pour déceler les hausses supérieures aux prévisions dans les données syndromiques, et nous les avons comparées aux alertes des laboratoires, définies comme étant les avis de cas de grippe A(H1N1)pdm09 confirmés au cours de deux journées consécutives, pour évaluer la rapidité relative des systèmes de surveillance syndromique.

RÉSULTATS : Durant la 1^{re} vague, des alertes de niveau provincial ont été détectées, dans les ordonnances d'antiviraux et les appels pour problèmes respiratoires à Télésanté, avant les alertes des laboratoires. Durant la 2^e vague, les appels pour problèmes respiratoires à Télésanté ont aussi précédé les alertes des laboratoires, mais les alertes locales liées aux visites aux urgences, aux ordonnances d'antiviraux et aux taux d'absentéisme dans les écoles ont varié dans le temps par rapport aux alertes des laboratoires. Il a aussi été observé que les alertes déclenchées par les données syndromiques coïncidaient avec des facteurs externes, comme les communiqués.

CONCLUSIONS : Les alertes des systèmes de surveillance syndromique peuvent être influencées par des facteurs externes et des variations dans le fonctionnement des systèmes. Il faudrait pousser la recherche sur deux plans : l'impact exercé par les facteurs externes sur les données de surveillance et la normalisation des protocoles de déclenchement des alertes, avant de pouvoir optimiser l'utilisation des systèmes de surveillance syndromique.

MOTS CLÉS : surveillance sanitaire; algorithme; virus A de la grippe sous-type H1N1; flambées épidémiques