The Global Public Health Intelligence Network and Early Warning Outbreak Detection

A Canadian Contribution to Global Public Health

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ABSTRACT

The recent SARS epidemic has renewed widespread concerns about the global transmission of infectious diseases. In this commentary, we explore novel approaches to global infectious disease surveillance through a focus on an important Canadian contribution to the area – the Global Public Health Intelligence Network (GPHIN). GPHIN is a cutting-edge initiative that draws on the capacity of the Internet and newly available 24/7 global news coverage of health events to create a unique form of early warning outbreak detection.

This commentary outlines the operation and development of GPHIN and compares it to ProMED-mail, another Internet-based approach to global health surveillance. We argue that GPHIN has created an important shift in the relationship of public health and news information. By exiting the pyramid of official reporting, GPHIN has created a new monitoring technique that has disrupted national boundaries of outbreak notification, while creating new possibilities for global outbreak response. By incorporating news within the emerging apparatus of global infectious disease surveillance, GPHIN has effectively responded to the global media's challenge to official country reporting of outbreak and enhanced the effectiveness and credibility of international public health.

MeSH terms: Public health surveillance; epidemics; news; world health; communicable diseases

La traduction du résumé se trouve à la fin de l'article.

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With the emergence of the Internet and 24/7 global news coverage of health events, radical transformations have occurred in the conditions for knowing and responding to global disease threats.¹⁻⁵ This commentary focusses on these developments, emphasizing a unique Canadian contribution – the Global Public Health Intelligence Network (GPHIN). Our commentary describes GPHIN and compares it to ProMED-mail, another global health surveillance initiative. We outline GPHIN's history and explore its development as a response to the global media's challenge to official country reporting of outbreak. Finally, we examine the significance of GPHIN for global health surveillance, emphasizing how it has disrupted national boundaries of outbreak notification, while creating new possibilities for global outbreak response.

The Global Public Health Intelligence Network

GPHIN is a central player in a new development in global health surveillance: using unverified news information for public health response to disease outbreak. The first initiative of this kind was ProMED-mail, launched in 1994 as the communication system of the Program for Monitoring Emerging Diseases. Since October 1999, it has operated as an official program of the International Society for Infectious Diseases.⁶⁻⁸ ProMED-mail is a network that links individuals who feed outbreak information into the system through e-mail. ProMED-mail operates a public website and an e-mail list with some 30,000 subscribers globally who pay no fee to belong (ProMED-mail interview, July 27, 2005, personal communication). Information posted on ProMED-mail, including media reports, online summaries and local observer reports, is moderated by volunteer experts in human, plant and animal diseases.⁹

GPHIN, by contrast, is a secure, Internet-based restricted access system for outbreak alert that deals with news information about public health events of potential international significance. Rather than relying on subscriber input, GPHIN gathers information on disease outbreaks and other public health events by monitoring global media sources on a 24 hour a day, 7 days a week basis. GPHIN's two

primary sources of outbreak information are the global news services *Factiva* and the Arab language *Al Bawaba*. These services operate as news aggregators that provide multiple sources of information through a single access point. Factiva, for example, aggregates news information from nearly 9,000 sources in 22 languages.¹⁰

GPHIN is committed to breadth and timeliness of information. It is an early warning system that seeks to bring to the attention of its users as wide a range of information about potential disease outbreaks as close to the time of outbreak as possible. Unlike ProMED-mail, GPHIN is not a public system. Subscription is restricted to organizations with an established public health mandate and varies according to such factors as organizational size and the number of users. Subscribers access GPHIN information through a restricted website and also receive GPHIN alerts through e-mail.*

The breadth of GPHIN information is suggested by the topical focus of its reports which, in addition to suspected outbreaks of infectious disease, have included such items as suspected streptococcal-infected pork products in China, unusual increases in trash dumping in India, and even suspected Al Qaeda training camps in Honduras (GPHIN interview #11, September 26, 2005, personal communication).

In selecting items from the nearly inexhaustible volume of news information available to it, GPHIN is guided, in the first instance, by the terms of the revised International Health Regulations.¹¹ The IHR framework identifies as being of global concern those infectious disease outbreaks with the potential to cross national borders.¹¹ The revised IHR move past the earlier limited focus on three reportable diseases – yellow fever, plague, and cholera – to encompass all “public health emergencies of international concern.”¹² Taking its cue from this expanded conception of global health, the GPHIN system scans six key areas for news of outbreak: infectious diseases, biologics, and chemical, environmental, radioactive, and natural disasters. In practice, GPHIN will report news of any event connected to the possibility of

future international disease outbreaks, whether natural or the result of suspected bioterrorism.

The selection and management of news information posted on the GPHIN system involve a combination of technological and human judgement. GPHIN’s automated scanning system uses a custom-built taxonomy of key words and Boolean search syntaxes to identify items of potential relevance. The automated system also filters out duplicates and establishes relevancy scores for news items on the basis of values assigned to key words. Items with a relevancy score below an established value are discarded. The automated process of scanning, filtering for relevancy and categorizing information is evaluated and supplemented by GPHIN’s seven human analysts. In assembling and posting reports on the GPHIN system, analysts rely on a knowledge of international infectious disease trends as well as the broader political and economic context of the regions where potential outbreaks have been reported (GPHIN interview #11, September 26, 2005, personal communication).

In its early phases, GPHIN retrieved approximately 4,000 news items per week, of which roughly one half were posted on its website.¹³ With the establishment of the multilingual GPHIN II in November 2004, that volume has increased dramatically. GPHIN now scans online news items in all official languages of the World Health Organization (WHO) and, through automated translation software, offers “gisted” translations of non-English articles into English, and English articles into Russian, French, Spanish, Arabic, and Chinese. An informal estimate of GPHIN’s current operations suggests that, on average, GPHIN processes anywhere from 2,000 to 3,000 news items per day, of which approximately one quarter to one third are discarded as irrelevant or duplicates (GPHIN interview #11, September 26, 2005, personal communication).

GPHIN history

Two of the key figures in the development of the Global Public Health Intelligence Network were Drs. Rudi Nowak and Ronald St. John, both physicians and public health specialists working out of Health Canada in Ottawa at the time the initiative was launched. The impetus for GPHIN

arose in the mid-1990s when they and other public health officials became concerned that the speed of health reporting in the news media was undermining the credibility and authority of public health to manage outbreak. GPHIN personnel trace the origin of the GPHIN concept to the 1994 epidemic of pneumonic plague in Surat, India (GPHIN interview #2, July 26, 2004, personal communication). Public health officials at Health Canada and the WHO found that CNN International, set up in 1985 to broadcast global news 24/7,¹⁴ was quicker in reporting the initial stages of the epidemic than public health officials anywhere, including the government of India.¹⁵ Through their e-mail exchanges with a Surat physician at the outset of the outbreak, the founders of GPHIN recognized the surveillance potential of new forms of online information that could outpace official country notification. In contrast to ProMED-mail, they decided to base GPHIN on electronic monitoring of online news sources which they deemed would provide information on outbreak faster than e-mail communications requiring medical monitoring.

GPHIN does not systematically validate the information it posts. In response to this problem, GPHIN developers worked collaboratively with the WHO to create a mechanism for verifying its output. The WHO was the only possible organization to supply verification since it alone has the international diplomatic mandate to make inquiries of its national members. In 2001, Health Canada and the WHO entered into an agreement that GPHIN would supply the WHO with monitoring data and the WHO would engage in “outbreak verification” through its official country contacts (GPHIN interview #1, July 26, 2004, personal communication).² This agreement consolidated GPHIN’s involvement in WHO’s Global Outbreak Alert Response Network (GOARN), formally launched in 2000 to coordinate responses to outbreaks of potential international public health significance.^{16,17} It also put in place an alternative to time-consuming epidemiological reporting from local to national to international authorities. As a member of GPHIN observed: “We were squashing the pyramid down to a flat plain in which information could come from any particular place at any time. And gov-

* Detailed information on subscriptions can be obtained by e-mailing GPHIN-RMISP@phac-aspc.gc.ca.

ernments were no longer in control of their information.” (GPHIN interview #2, July 26, 2004, personal communication).

GPHIN and global health surveillance

The significance of GPHIN for global health surveillance is partly suggested by how its reports have mobilized other networks within GOARN. For example, in the case of Severe Acute Respiratory Syndrome (SARS), the first alert of unusual respiratory illness in Guangdong Province, China, was issued by GPHIN in November 2002 and put the WHO Global Influenza Surveillance Network on alert. A later February 2003 GPHIN report of respiratory disease among health care workers in Guangdong triggered an urgent alert to GOARN members, and prompted official confirmation from the Chinese Ministry of Health of an outbreak of 300 cases of respiratory disease, with 5 deaths. The Chinese report led the WHO to alert its collaborating laboratories and activate its influenza pandemic plans.¹⁸

The full significance of GPHIN, however, lies beyond any specific set of outbreak reports. The sheer volume of outbreak information it provides has helped change the way global health surveillance is organized and carried out. GPHIN currently supplies approximately 40% of the WHO's early warning outbreak information.¹⁸ The incorporation of this new source of information within the apparatus of global health surveillance has helped revitalize international monitoring of outbreak. At the same time, it has weakened government secrecy and control over the reporting of domestic outbreaks and provided the WHO with new forms of leverage in its efforts to encourage member states to confirm and act on outbreaks occurring within their borders (Interview with D.L. Heymann, WHO, September 20, 2005, personal communication). The timeliness of GPHIN information has also meant changes to global outbreak response capacity. By dramatically reducing the duration between the detection and reporting of outbreak, GPHIN has strengthened the WHO's international epidemic field response.¹⁶ The WHO no longer relies passively on out-of-date official sources of reporting; it now has knowledge of outbreaks while they are occurring. This new time sensitivity of surveillance has enabled

the WHO, through GOARN, to assemble international teams with the goal of intervening in local outbreaks to prevent the spread of infectious disease.

CONCLUSION

In this article, we have drawn attention to an under-recognized role that Canada plays in the field of global public health – the surveillance activities of the Global Public Health Intelligence Network. GPHIN has created a new methodology for global health monitoring that combines human expertise with cutting-edge technological developments in disease surveillance, including state-of-the-art automated translation and innovative electronic text searches. While it has operated since 1998 and is Canada's leading edge contribution to global public health governance, it lacks a secure funding base.

By internalizing health news within global health surveillance, GPHIN has made it more difficult for nations to conceal information about outbreaks of potential international significance. GPHIN's online early warning outbreak combined with WHO verification has responded to the challenge of new forms of global health media and enhanced the effectiveness and credibility of international public health to name and act on infectious disease outbreaks.

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RÉSUMÉ

L'épidémie récente de SRAS a renouvelé la crainte généralisée que des maladies infectieuses ne se propagent dans le monde entier. Dans le présent commentaire, nous analysons de nouvelles approches de surveillance mondiale des maladies infectieuses par le biais d'un important outil canadien dans ce domaine : le Réseau d'information sur la santé mondiale (RISM). Ce réseau est une initiative d'avant-garde qui mise sur la capacité d'Internet et sur la nouvelle possibilité d'obtenir une couverture mondiale en temps réel de l'actualité du domaine de la santé pour créer un système d'alerte rapide en cas de flambée épidémique.

Nous décrivons ici le fonctionnement et l'évolution du RISM, que nous comparons à ProMED-mail, un autre outil en ligne de surveillance mondiale de la santé. Nous faisons valoir que le RISM a été la cause d'un changement important dans la relation entre la santé publique et l'actualité. En contournant la hiérarchie de notification officielle, le RISM a créé une nouvelle technique de surveillance qui a perturbé les frontières nationales de notification des épidémies tout en ouvrant de nouvelles possibilités d'intervention mondiale en cas de flambée. En intégrant l'actualité dans le nouvel appareil de surveillance mondiale des maladies infectieuses, le RISM a réussi à relever le défi lancé par les médias aux organes nationaux de notification officielle des épidémies, tout en améliorant l'efficacité et la crédibilité de la santé publique internationale.