**Using social media for disease surveillance**

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**Editor's Note:** Dr. John Brownstein works at the Children’s Hospital in Boston on public health surveillance. This post is part of the Global Innovation Showcase created by the New America Foundation and the Global Public Square.

By John Browstein – Special to CNN

In late 2002, a financial report from a Chinese pharmaceutical company noted a strange increase in emergency room visits in Guangdong Province for acute respiratory illness. A flurry of local news reports of a respiratory disease among healthcare workers emerged, while online there was buzz of an unusual outbreak in Guangzhou. It took several long weeks before the government announced the illnesses were due to the severe acute respiratory syndrome, or SARS. If harnessed properly, early epidemic intelligence collected online could have helped contain what later became a global pandemic.

Since that time, the Internet has fundamentally changed global health surveillance—by circumventing censorship, dramatically reducing the time required to recognize outbreaks and supporting wide distribution of health information. We are now in an era where epidemic intelligence flows not only through government hierarchies but also through informal channels, ranging from press reports to blogs to chat rooms to analyses of Web searches. Collectively, these sources provide a view of global health that is fundamentally different from that yielded by disease reporting in traditional public health infrastructures.

While the concept of Internet-based surveillance has now gained broad recognition, the concept itself is not new. Organizations have been working within this paradigm for the last 15 years. ProMED, a publicly available reporting system based on a trusted social network of ‘disease detectives,’ started in 1994. In 1997, the Global Public Health Intelligence Network (GPHIN) was launched. GPHIN software retrieves relevant articles from news aggregators every 15 minutes and disseminates that information to government subscribers. ProMED and GPHIN’s state of the art reporting techniques proved crucial in the early stages of the SARS outbreak.

More recently, the explosion of online news and social media has brought a new era of disease surveillance. In 2006, working in the Computational Epidemiology group at Children’s Hospital Boston and Harvard Medical School, Clark Freifeld and I developed the HealthMap system: an online platform that mines informal sources for disease outbreak monitoring. The freely available Web site healthmap.org and mobile app 'Outbreaks Near Me' deliver real-time intelligence on a broad range of emerging infectious diseases for a diverse audience, which includes local health departments, governments, clinicians and international travelers.

HealthMap is unique in that it brings together disparate data sources, including online news aggregators, eyewitness reports, expert-curated discussions and validated official reports, to achieve an intuitive and comprehensive view of the current global state of infectious diseases and their effect on human and animal health. Through an automated process that updates 24/7/365, the system monitors, organizes, integrates, filters, visualizes and disseminates online information about emerging diseases in nine languages, facilitating early detection of global public health threats.

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These informal data are already changing the public health landscape. Nowhere was this clearer than with the 2009 emergence of the novel influenza A (H1N1) virus. In March and early April of that year, while much of the world was focusing on the threat of avian influenza originating in Asia, HealthMap identified and reported evidence of an epidemic of acute respiratory infections in Veracruz, Mexico. This report came weeks in advance of more traditional reporting including laboratory confirmation of the novel strain. While epidemic intelligence systems still need to be fine tuned to specify when these signals require special attention among the many daily reports of mysterious respiratory illness, these systems nonetheless played a crucial situation awareness role in the tracking of H1N1 as it crossed the globe.

Cholera's emergence in Haiti provides another example of the value of these data streams provide to the global health community. Given the difficulties of obtaining real-time detailed health information in a crisis setting, HealthMap in collaboration with other international organizations including CrisisMappers and Humanity Road deployed a tool to integrate information on the developing cholera outbreak. The web resource (healthmap.org/haiti) mapped informal outbreak reports from news and social media as well as key information on the availability of healthcare and clean water facilities. Broadly, these freely available internet tools that collect, map and exchange epidemic intelligence may be rapidly deployed during future humanitarian emergencies.

After 5 years in operation, **HealthMap** is now moving to its next iteration, providing on-demand locally contextualized information on health events (www.healthmap.org/local). Just as the weather channel provides details on your daily forecast, HealthMap now provides users with their own personal view of disease circulating in their location.

HealthMap is part of a growing landscape of NGOs and government organizations working in the digital disease detection field. Other similar services are Argus, EpiSPIDER, BioCaster, MediSys, and the Wildlife Disease Information Node. Beyond web mining, movement toward “anytime, anywhere” technologies is providing new avenues for surveillance. Even Twitter and Facebook are now playing an emerging role in the early detection of epidemics. Social networking sites for clinicians and patients (such as PatientsLikeMe) are unproven but offer promising methods for harnessing collective wisdom for detection of emerging disease. These ubiquitous websites and mobile apps allow for seamless real-time communication on health and personal disease status.

When Internet-based systems first appeared on the public health scene, they were criticized for the possibility of false reports, lack of specificity, and sensitivity to external forces such as fickle media interest. Though these problems are recognized and accounted for as best as possible, these criticisms are still valid. But despite the possibilities for error, internet-based epidemic intelligence systems are invaluable resources for information on emerging diseases because of their ease of use, flexibility, transparency and sensitivity. Though these systems began on the fringes, in the span of a few years, they have become essential tools in the worldwide fight against public health threats.

*The views expressed in this article are solely those of John Browstein.*

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