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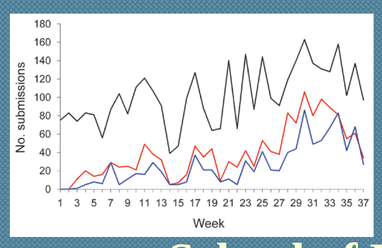
العامة للصحة المدرسة

# Are Informal Digital Surveillance-Systems Currently Capable of Detection Disease Outbreaks in Real-Time?

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## Background

The digital resources for the detection of infection disease outbreaks are increasing dramatically. A new generation of informal digital surveillance systems (i.e. not solely based on formal data) collects information from multiple sources, and then mines, categorizes, filters and disseminates it. Whether such systems are currently capable of early detection of disease outbreaks remains unclear

## Objectives

To compare some existing informal digital systems for disease outbreak detection, and to evaluate their capability of early detection of disease outbreaks.

## Methods

A systematic literature review was carried out to compare some informal digital systems, including ProMED-mail, Healthmap, Biocaster and Google flu trends with regards to their source of information, the manner in which they process and disseminate the information, and whether and to what extent these systems are capable of early detection of disease outbreaks.

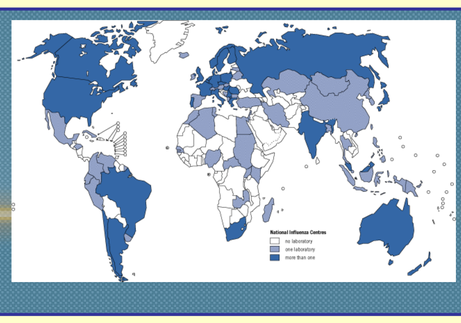
## Results

- Most of the reviewed systems use the same type of information sources.
- Systems are different in the manner they filter and analyze information
- There is evidence in the literature on the systems' usefulness in communicating the information during previous outbreaks.
- Some retrospective studies of some systems have shown a theoretical decrease in the time of outbreaks detection compared to conventional surveillance, however there is no evidence of such ability in real-time.
- Analysis showed a decrease in the interval between outbreak estimated start date to outbreak detection date and outbreak dissemination date over 14 years. This decrease is partially attributed to ProMED-mail, GPHIN and Healthmap reports.

However, these systems also uses official reports resulted from conventional surveillance as input, so their contribution to interval reduction is unclear.

**Informal digital systems source of information, analysis, information dissemination and performance**

| Informal digital system | Source of information | How information is analyzed? | How information is disseminated? | Performance evidence |
|---|---|---|---|---|
| **ProMED-mail** | Media reports, official reports, local observers | Review by experts | E-mail to subscribers, website | Analysis of the average interval between estimated outbreak start date to the earliest date of discovery and publication , using WHO-confirmed outbreak reports as well as ProMED-mail, GPHIN and Healthmap reports showed decreae in intervals over 14 years |
| **GPHIN** | Global media resources | Information is automitically filtered and then analyzed by experts | E-mail to subscribers, website | |
| **Healthmap** | News aggregators, eyewitness reports, official reports | Categorization by disease and location, clustering, duplication removal, expert analysis and filtering | Geographic map on healthmap website | |
| **Biocaster** | Media resources, mainly Google News, Yahoo News and European Media Monitor | Information filtering, ontology creation, dissemination. Process is fully automatic. | Maps and graphs on health-concerning events on Global Health Monitor health portal | Retrospective testing |
| **Google flu trends** | People searches on influenza-related topics | Plotting searching data on epidemic curve | Information is displayed on a graph in website | According to retrospective tool testing, outbreak can be detected 7-10 days before it is detected by conventional surveillance |
| **Argus** | Electronic media, internet-based newsletter and blogs, official sources | Information is selected and filtered by professionals using Bayesian analysis tools | E-mail to subscribers | Retrospective study of Argus reports on respiratory disease in Mexico showed incresed reporting rate in 2009 compared to 2008 |




## Conclusions

There has been an impressive progress in the development of informal systems. Currently, there is little prospective evidence that existing informal digital systems are capable of real-time early detection of disease outbreaks. Most systems accumulate a huge mass of information on a large variety of diseases, making it difficult to extract critical information. The challenge is to present critical information clearly and concisely.