

# Syndromic Surveillance for Outbreak Detection and Investigation

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## Objective

For the purpose of developing a national system of outbreak surveillance, we compared local outbreak signals in three sources of syndromic data – telephone triage of acute gastroenteritis (Swedish Health Care Direct 1177), web queries about symptoms of gastrointestinal illness (Stockholm County's website for healthcare information), and OTC pharmacy sales of anti-diarrhea medication.

## Introduction

A large part of the applied research on syndromic surveillance targets seasonal epidemics, e.g. influenza, winter vomiting disease, rotavirus and RSV, in particular when dealing with preclinical indicators, e.g. web traffic (Hulth et al, 2009). The research on local outbreak surveillance is more limited. Two studies of teletriage data (NHS Direct) have shown positive and negative results respectively (Cooper et al, 2006; Smith et al, 2008). Studies of OTC pharmacy sales have reported similar equivocal performance (Edge et al, 2004; Kirian and Weintraub, 2010). As far as we know, no systematic comparison of data sources with respect to multiple point-source outbreaks has so far been published (cf. Buckeridge, 2007). In the current study, we evaluated the potential of three data sources for syndromic surveillance by analyzing the correspondence between signal properties and point-source outbreak characteristics.

## Methods

The extracted data streams were compared with respect to nine waterborne and foodborne outbreaks in Sweden in 2007-2011. The analysis consisted of three parts: (1) the validation of outbreak signals by comparing signal counts during outbreak and baseline periods, (2) the estimation of detection limits by modeling signal rates (signal-to-case ratios), and (3) the evaluation of early warning potential by means of signal detection analysis.

## Results

The four largest outbreaks generated strong and clear outbreak signals in the 1177 triage data. The two largest outbreaks produced signals in OTC sales of anti-diarrhea. No signals could be identified in the web query data. The outbreak detection limit based on triage data was about 100-1000 cases. For two outbreaks, triage data on diarrhea provided outbreak signals early on, weeks and months respectively, potentially serving the purpose of early warning.

## Conclusions

The sensitivity and specificity were highest for telephone triage data on patient symptoms. It provided the most promising source of

syndromic data for surveillance of point-source outbreaks. Currently, a project has been initialized to develop and implement a national system in Sweden for daily syndromic surveillance based on 1177 Health Care Direct, supporting regional and local outbreak detection and investigation.

## Keywords

syndromic surveillance; outbreak detection; point-source outbreak; outbreak investigation; data analysis

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