

# The Potential of Syndromic Surveillance of Gastrointestinal Illness in the Community for Early Warning of Institutional Gastroenteritis Outbreaks

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## OBJECTIVES

To examine the association between short-term variation in Emergency Department (ED) visits for gastrointestinal illness (GI) with short-term variation in institutional gastroenteritis outbreaks and thus to evaluate whether syndromic surveillance of GI through EDs provides early warning for institutional gastroenteritis outbreaks.

## BACKGROUND

In 2004, the NSW Public Health Real-time Emergency Department Surveillance System (PHREDSS) operating in and around Sydney, Australia [1] signalled a large-scale increase in ED visits for GI. A subsequent alarming state-wide rise in institutional gastroenteritis outbreaks was also seen through conventional outbreak surveillance.

## METHODS

Three daily count time series for the 2004 calendar year were prepared: 1. ED visits with a physician-assigned diagnosis of GI, 2. ED visits with automatically classified GI syndrome categories based on triage nurse text, and 3. institutional GI outbreaks for all NSW based on the reported date of onset of the first case in each outbreak. To ensure adequate control for long-term trends and seasonality, we fitted Poisson regression models, adjusted for day of the week and cubic smoothing splines for day of the year. Lagged counts (autoregressive terms) were used to remove any residual autocorrelation. Using these serially uncorrelated residuals, we computed cross-correlations of each ED series with the outbreak series at different lags to estimate the temporal correlation of the remaining short-term patterns in the ED and outbreak series after removal of trend and seasonality [2].

## RESULTS

For each ED time series, the strongest and most statistically significant positive correlation occurred at a lag of -2 days relative to the outbreak series. (Figure 1), suggesting that short-term changes in community-level GI as indicated by ED visits preceded changes in outbreak activity by two days. The median interval between the date of onset of the first case in institutional outbreaks and reporting of the outbreaks to health authorities was 20 days. During the large statewide outbreak in 2004, norovirus was implicated by the majority (94.7%) of

outbreaks with known information on causative pathogens (95, 22.2% of outbreaks).

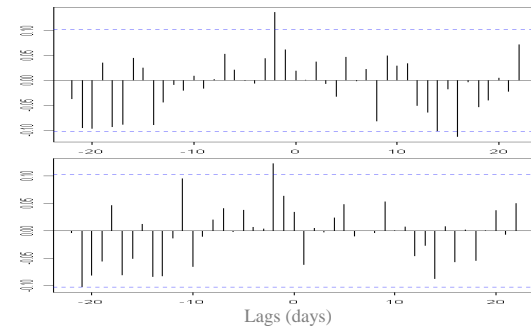


Figure 1: Cross-correlations of the ED diagnosis series (upper graph) and the ED text-classified syndrome series (lower graph) against the institutional outbreak series after removal of long-term trend and seasonality. Dashed horizontal lines are 95% confidence limits.

## CONCLUSIONS

Monitoring ED visits using diagnosis-based or automatically classified text-based syndromes could have provided two days' early warning of circulating GI in the population that put institutionalised people at risk. Therefore, increasing incidence of GI-related ED visits may warrant an alert for institutions to adopt preventive precautions. Taking into account current delays in recognising and reporting outbreaks, ED visits can potentially offer a further advance warning. This provides support for the addition of rapid syndromic surveillance to the routine public health surveillance toolkit.

The proportion of outbreaks with a known organism was low and the organism was not known for any ED visits for GI. Thus, there is an urgent need for better integration of syndromic surveillance, outbreak surveillance and diagnostic pathology surveillance for more effective prevention and control of future outbreaks. These improvements would enhance the interpretation of syndromic surveillance signals.

## REFERENCES

- [1] Muscatello DJ, Churches T, Kaldor J, et al. Emergency Department surveillance for the 2003 Rugby World Cup in New South Wales, Australia, The 2004 National Syndromic Surveillance Conference Proceedings, MMWR (in press).
- [2] Campbell MJ and Tobias A, Causality and temporality in the study of short-term effects of air pollution on health. *Int J Epidemiol.* 2000 Apr; 29(2): 271-3.