Comparison of Parallel and Consensus Monitoring Approaches for Multistream Influenza Monitoring in Ontario

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OBJECTIVE

To retrospectively ascertain whether a parallel or consensus monitoring approach is better suited to multistream surveillance of influenza in Ontario.

BACKGROUND

As stated by Burkom, "multiplicity of data sources is appealing because a combination of evidence types suggest additional sensitivity and corroboration of a prospective outbreak." [1] Multistream syndromic surveillance data can be monitored in two main ways: parallel monitoring or consensus monitoring. Parallel monitoring examines timeliness of aberrations in each dataset separately. Consensus monitoring can either be based on a multiple univariate analysis or a multivariate analysis. Both methods have their advantages, which have been discussed in the literature [2].

Data streams include calls made to Telehealth, a teletriage health helpline available free of charge to all Ontarians, and all Ontario emergency department visits as reported to the National Ambulatory Care Reporting System (NACRS) between June 2004 and March 2006.

METHODS

Parallel and consensus monitoring methods will be compared for two data streams (Telehealth and NACRS). For parallel monitoring, a time series analysis is conducted to assess which dataset notes an aberration earliest, with the application of a Bonferroni correction to the probability threshold to control for multiple testing problems common with simultaneous datasets.

For the consensus method-based multiple univariate analysis which combines separate p-values from each dataset to obtain one p-value, the authors have opted to use Hotelling's T^2, which has been used by other systems [3] and is commonly used for this purpose within syndromic surveillance [4].

For the consensus multivariate-based approach, Edgington's additive method [5] will be applied to the two available datasets. This method is considered best suited to surveillance of a limited number of independent data streams [6], and has also been used for syndromic surveillance [1].

The gold standard for comparison will be data from the Federal influenza surveillance program (FluWatch); these data will be used to identify outbreaks, using a simple anomaly-detector algorithm [3].

RESULTS

With these analyses, we hope to ascertain or elucidate the following:

1. The number of alerts generated by the corrected and uncorrected parallel monitoring approach;
2. The number of alerts generated by both consensus approaches;
3. The sensitivity of the different methods;
4. How much corroboration between the two datasets is required for an alert to be deemed credible.

CONCLUSIONS

Given the limited time period covered by these datasets, any observations made from this evaluation will have to be approached conservatively. However, to date, no evidences exists on the preferential method(s) for the multistream surveillance of influenza in Ontario, nor for the multistream surveillance of influenza using teletriage data. Consequently, this evaluation will contribute novel evidence to the field of influenza syndromic surveillance monitoring.

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