Syndromic surveillance with death data: a pilot study in the Netherlands

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OBJECTIVE

To evaluate the potential use of mortality data in the Netherlands for real-time surveillance of infectious disease events through a pilot study.

BACKGROUND

Crude mortality could be valuable for infectious disease surveillance if available in a complete and timely fashion. Such data can be of used for detecting, and tracking the impact of unusual health events (e.g. pandemic influenza) or other unexpected or unknown events of infectious nature.

To evaluate whether these goals can be achieved with crude mortality monitoring in the Netherlands, a pilot study was set up in 2008 in which death counts were received from Statistics Netherlands.

The aims of this pilot are: 1) Setting up communication and data transmission. 2) Calculating expected mortality counts (depending on the season) and a prediction interval. 3) Detecting deviations in mortality counts above the threshold. 4) Comparing such deviations (and lags hereof) with other public health information (such as sentinel influenza-like-illness surveillance, and web-based selfreported ILI). 4) Evaluating the additional value of such a system for infectious disease public health.

METHODS

Daily death counts for 2008 were received at a monthly interval (initially set up as weekly, but modified to monthly data transfer for the first evaluation), from Statistics Netherlands – which registers all deaths in the Netherlands (population 16 million). Death counts were stratified by age and geographical region (North, West, East, South). A simple algorithm (serfling-type) was used; with linear trends and sine & cosine terms in a regression model of historical data to produce a baseline model which includes cyclical seasonal trends. This baseline model was based on a 7 year historical period: 2000-2006) producing expected values in the future with their prediction intervals. For mortality data this was done on daily and on weekly death counts. For ILI data this was done for weekly data.

RESULTS

An average of 400 deaths occur daily. The influenza season in 2008 was a relatively mild one, which is reflected in low ILI as well as low mortality counts. Neither exceeds the regression threshold levels (see fig.1 for daily mortality counts).

The correlation between weekly historical ILI and weekly historical mortality counts was high: 0.62 ($p<0,0001$), and was highest with death counts lagging on average 2 behind ILI counts (correlation: 0.67). However, in the winter seasons, the lag between the first mortality exceedance compared to the initial ILI exceedance differed by year: with a lag of 1 week in 2000 and 2003 and a 3 week lag in 2005.

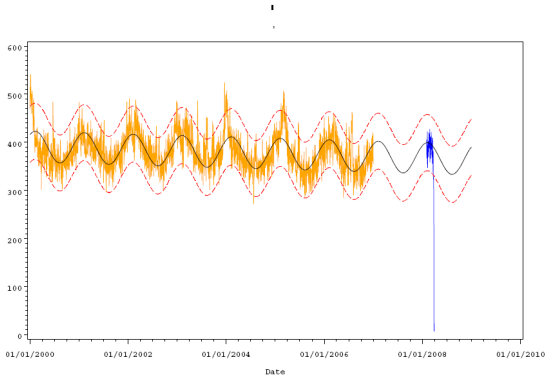

Fig.1. Daily deaths in the Netherlands 2000-2008: Historical trend (black line) based on 2000-2006 data (orange line), prediction limits (red dashed line), deaths reported in 2008 (blue line).

CONCLUSIONS

Real time crude mortality surveillance was expected to be possible when using data with a 1 to 2 week delay[1]. This first pilot study on monthly reports of daily deaths shows data to be strongly correlated with ILI surveillance data. The results show that mortality data may be suited for early warning purposes of higher than expected death counts that are possibly associated with infectious disease. Further study of real-time daily and weekly mortality data will help to further understand the potential of real time monitoring of overall mortality.

1. van Asten et al, Is Crude Mortality Data Suitable for Real Time Surveillance? *Advances in Disease Surveillance* 2007;2:175