

An early warning system for pneumonia and influenza mortality in Taiwan

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Objective

To develop and evaluate a nationwide automated system for early detection of aberrations and real-time monitoring of pneumonia and influenza (P&I) mortality in Taiwan.

Introduction

Influenza is a serious disease that seasonality causes substantial but varying morbidity and mortality. In Taiwan, estimates of the influenza mortality burden were based on post-hoc analyses of national mortality statistics and not available until at least six months after the corresponding epidemic. Timely monitoring and early detection of influenza-associated excess mortality can guide antiviral or vaccine interventions and help healthcare capacity planning. Beginning April 2009, Taiwan Centers for Disease Control (TCDC) has been collaborating with the Department of Health (DOH) Office of Statistics to develop an automated system for real-time P&I mortality surveillance (1).

Methods

Taiwan's Mortality Information Regulations require medical institutions to report any mortality to DOH through the National Death Certificate System (NDCS) within 7 days after a death certification is issued. Automated data from the NDCS were daily submitted to TCDC by secure electronic transmission and processed and analyzed using SAS Enterprise Guide 4.3 (SAS Institute Inc, Cary, NC). For each report, the underlying cause of death was determined by applying the World Health Organization classification principles (2) and searched for free-text traditional Chinese 'pneumonia', 'influenza', or 'flu' to identify P&I deaths. Reporting timeliness and completeness of this surveillance system was assessed by comparing reporting data with post-hoc mortality statistics for the year of 2008. We used an R-package 'surveillance' to detect aberrations in the P&I mortality weekly data (3).

Results

In 2008, the number of deaths for which P&I was listed as the underlying cause in the national mortality statistics was 8,665; of these, 6,795 (78%) were reported through the NDCS. The weekly surveillance-based P&I mortality estimates had a consistently strong correlation with those obtained from mortality statistics data (correlation coefficient 0.85, $p < 0.0001$). Eighty seven percent of the reports were received within 7 days after death (median 2 days). During the 2010–11 influenza season, an increase in mortality was observed in January 2011, with the highest weekly number of P&I deaths to be 421 (week 5 of 2011) (Fig. 1). From 2010 through 2011, consecutive alarms were generated for week 26–27, 31–32 and 36–39 of 2010, and week 2–15 of 2011 (Fig. 1).

Conclusions

Taiwan has established an early warning system for P&I mortality to assist with characterization of influenza severity.

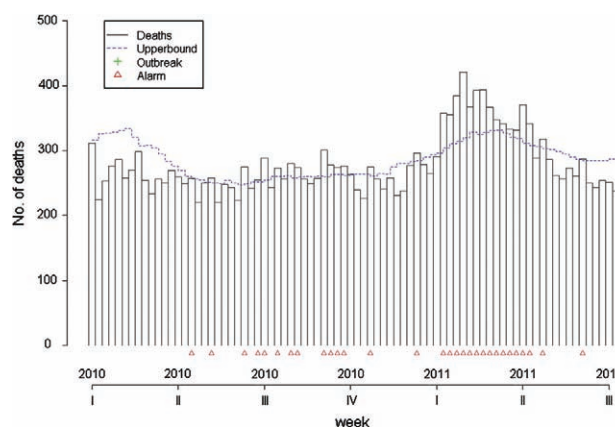


Fig. 1. Weekly numbers of pneumonia and influenza deaths, Taiwan, week 1 of 2010 through week 29 of 2011.

Integration of this mortality surveillance with data from viral surveillance, Real-Time Outbreak and Diseases Surveillance (RODS) for influenza-like illness, and surveillance for influenza with severe complications can provide policy makers with timely information during public health emergencies. Further efforts should focus on broader adoption of electronic death reporting to capture a larger percentage of deaths, educating physicians about how to complete death certificates to improve data quality, and evaluating the sensitivity and specificity of this aberration detection algorithm.

Keywords

Taiwan; influenza; mortality; aberrations

References

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