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Applications of the ESSENCE Desktop Edition for outbreak detection in a resource-limited setting

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Objective

To determine system usefulness of the ESSENCE Desktop Edition (EDE) in detecting increases in the number of dengue cases in the Philippines.

Introduction

Recent events have focused on the role of emerging and reemerging diseases not only as a significant public health threat but also as a serious threat to the economy and security of nations. The lead time to detect and contain a novel emerging disease or events with public health importance has become much shorter, making developing countries particularly vulnerable to both natural and manmade threats. There is a need to develop disease surveillance systems flexible enough to adapt to the local existing infrastructure of developing countries but which will still be able to provide valid alerts and early detection of significant public health threats.

Methods

In collaboration with the Philippine National Epidemiology Center (NEC) and the Philippines-AFRIMS Virology Research Unit, Armed Forces Research Institute of Medical Sciences, the EDE program, which was developed by Johns Hopkins University–Applied Physics Lab, was introduced in the Philippines to augment the data analysis capability of the Philippine Integrated Disease Surveillance and Response (PIDSR) System. Reported significant increases in the number of suspect dengue cases/outbreaks at the municipality, provincial and regional level, which were reported to and investigated by NEC from July 1, 2011, to August 31, 2011, were used as a reference point. A defined period, 30 days prior to the date when the event was officially reported, was retrospectively analyzed. The day when an EDE alert was first triggered and the number of EDE alerts detected during this period were described. Since NEC analyzes data by morbidity week, municipalities that were detected to be above the NEC alert or epidemic threshold during a randomly selected morbidity week (week 31; reporting date of August 6, 2011) were compared with the number of EDE alerts triggered during the past 7 days before the report date of morbidity week 31.

Results

Retrospective analysis done during the past 30 days before the event was officially reported showed that EDE Alerts were already triggered as early as 30 days (median of 27.5 and range 14–30 days) prior to the date of the NEC report. The number of days associated with EDE 'alerts' out of the 30 days prior to the NEC official report date had a median of 9.5 days (range of 3–14 days). A total of 17 municipalities had reported dengue cases above the alert or epidemic threshold with 8/17 of these municipalities having at least 1 day in the previous week with a case count of more than 5 while 9/17 had case counts of 5 or less for all 7 days in the past week. For municipalities with at least 1 day with a case count of 5 or more for the previous 7 days, the median of the number of days with associated EDE alerts was 5 (range 0–7 days). For municipalities with case counts of 5 or less for all 7 prior days, no alerts were usually generated (median 0 and range 0–2 days).

Conclusions

A surveillance system's usefulness for outbreak detection should be correlated with its ability to increase the lead time in detecting outbreaks of public health significance, which should subsequently lead to a more timely intervention. Analysis of currently available data seem to show promising applications of EDE in early warning alert capability of impending increases in dengue cases in the Philippines though when case counts are 5 or less, alert results may not be very reliable. Validity of alerts generated by EDE for early detection of outbreaks should be further investigated using other diseases, prediagnostic/nonclinical/nontraditional data and syndromes, taking into consideration effect of seasonality, weekly trends or holidays.

Keywords

Surveillance, outbreak, dengue, predictive, validity

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