Use of Healthcare Worker Sickness Absenteeism Surveillance as a Potential Early Warning System for Influenza Epidemics in Acute Care Hospitals

Dear Editor,

The global spread of emerging infectious diseases can strain resources and result in healthcare staff absenteeism, as was the case during the severe acute respiratory syndrome (SARS) outbreak in Singapore in 2003.[1,2] The recent emergence of a novel influenza A (H1N1-2009) pandemic[3] has again reminded us of the potential impact of such infections on hospital operating capacity.[4]

Syndromic surveillance systems have been proposed for the early detection of community and institutional outbreaks of emerging infections[5,6] but there is little work on the usefulness of such systems for hospital personnel. Following the SARS experience, a syndromic surveillance system for monitoring healthcare personnel sickness absenteeism was established in Tan Tock Seng Hospital (TTSH), a 1100-bed general hospital in Singapore. As part of preparations for pandemic H1N1-2009 influenza, we did a quick assessment of whether our system could serve as a potential early warning system for pandemic influenza.

Following the nosocomial outbreaks of SARS, TTSH implemented an on-line staff sickness absenteeism surveillance system. The web-based user interface includes pre-populated demographic and employment details of hospital personnel, including name and work area. In each work area, there are at least 2 designated staff in charge of daily submission of data on medical certificates (MCs) for sickness absenteeism. Data captured include start and end dates of MC, area of work, and the reason for the staff being on MC, either as a diagnosis [e.g., pneumonia, URTI (upper respiratory tract infection)] or a set of self-reported symptoms (fever, cough, breathlessness, and diarrhoea). On a daily basis, a team of epidemiologists monitors healthcare worker reports of URTI, gastroenteritis and conjunctivitis, with clusters being identified and actively investigated. Hospital personnel may be advised on enhanced infection control measures and staying away from work if necessary.

For our rapid assessment, we included all staff MCs from 31 December 2006 to 29 December 2007 which had URTI/influenza as a diagnosis and/or the following self-reported symptoms: fever, and/or respiratory symptoms (including nasal discharge, sore throat, laryngitis, cough, sputum, and breathlessness). We refer to the sum of these healthcare sickness absenteeism submissions as reports of acute respiratory illness (ARI). Syndromic reports of healthcare staff ARI were compared to national level polyclinic data on URTI, and national laboratory surveillance data on the proportion of specimens positive for influenza A for the year 2007, presented by epidemiological week.[7] We also looked at potential clustering of staff ARI reports in a given work area using the following definitions:

Cluster definition A: ≥2 reports of ARI on the same day

Cluster definition B: ≥3 reports of ARI on the same day

Cluster definition C: ≥2 reports of ARI on the same day, but a cumulative total of ≥5 reports within the last 4 days

Figure 1 illustrates how weekly national influenza A activity and national URTI diagnoses are correlated with staff ARI MCs as well as staff ARI clusters. On national surveillance, influenza A activity increased around weeks 18 to 27, with peak activity occurring on week 19, although there was no discernible increase in national URTI diagnoses (Fig. 1A). However, as shown in Figure 1B, staff ARI clusters occurred more frequently during the period with peak influenza A activity. The excess of staff clusters over the baseline level of clusters was particularly marked when using cluster definition C, and appears to precede national epidemic activity. However, there were also other periods with low influenza A activity where we could observe temporal peaks in the number of staff ARI MC clusters.

Our unique syndromic surveillance system has been in operation for 6 years with consistently high compliance rates from healthcare personnel reporting of about 80%. We suggest that surveillance of sickness absenteeism in healthcare staff, using algorithms for highlighting staff ARI MC clusters, can serve as a useful and cost effective tool for detecting influenza epidemics. Since laboratory surveillance is not routinely performed for staff presenting with ARIs, syndromic surveillance becomes our best means for the early detection of unusual and emerging diseases and events, and could complement other means of uncovering outbreaks. Our rapid assessment suggests that the number of staff ARI clusters did correlate better with influenza A activity in 2007 than the total count of staff ARIs (Fig. 1). In fact, in May 2008, a cluster of ARI did occur among healthcare staff working in a medical ward in TTSH.[8] Online reporting on the web-based staff MC surveillance system enabled early identification and investigation of the cluster. Staff with acute symptoms were tested for influenza and other respiratory pathogens, and sent home. Sixty per cent of the staff with ARI tested positive for influenza A. Subsequent investigations revealed that although all infected staff had received influenza vaccination in September to October 2007, there had been a drift in the circulating influenza A strain. The circulating strain was antigenically related to A/Brisbane/10/2007(H3N2), which was not in the 2007 northern hemisphere influenza vaccine, but was included in the 2008 southern hemisphere (SH) influenza vaccine. Consequently, a hospitalwide staff

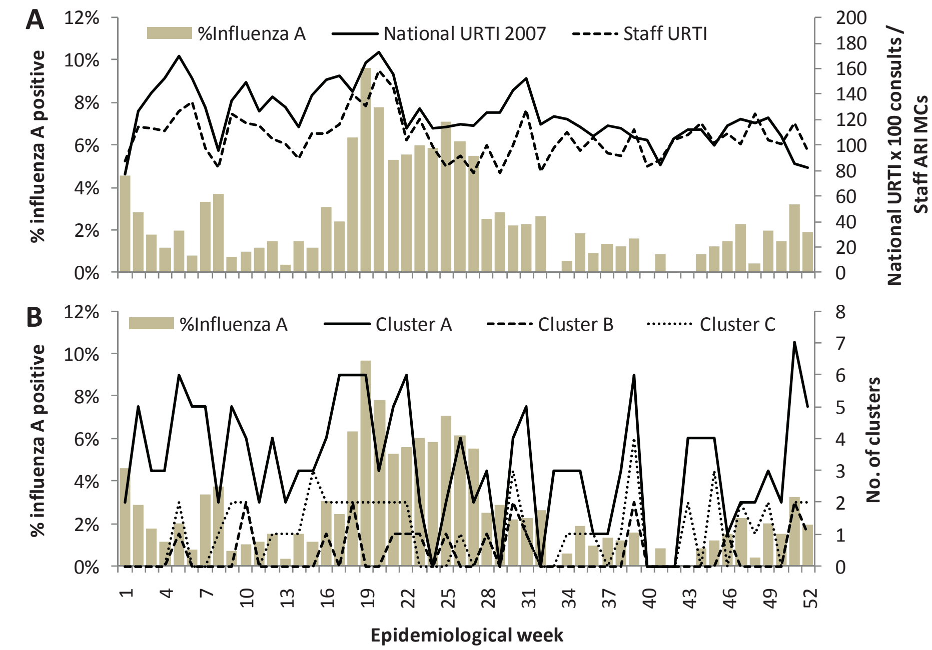

Fig. 1. Weekly influenza A activity correlated with: (A) National URTI diagnosis and staff ARI MCs. (B) Different definitions for staff ARI MC clusters.

immunisation programme with the 2008 SH influenza vaccine was implemented. Without the existence of the staff surveillance system, that particular influenza outbreak and the mismatch between circulating strain and vaccine might have been missed.

A prospective study to further validate this system is still needed. The simple correlation of staff MC clusters with national influenza A activity we presented is admittedly an imprecise way of assessing cluster detection algorithms given that it involves certain assumptions. Influenza testing of staff reported to be on MC with ARI would ideally help determine the sensitivity and specificity of different definitions of staff ARI MC clusters for detecting influenza outbreaks. In addition, we may also need to elucidate the role of other respiratory viral pathogens such as influenza B, and respiratory syncytial virus in causing outbreaks of acute respiratory illness in the hospital. However, in spite of not having information on other possible causes of staff ARI clusters, the preliminary analysis we performed above was sufficient to allow us to decide on a few functioning algorithms for prospective surveillance of influenza outbreaks. These algorithms were used in the recent H1N1-2009 epidemic in Singapore.

Even with the limitations pointed out, the TTSH staff surveillance system was one innovation arising out of the SARS outbreak which we believe deserves greater attention. Certainly, the above analysis was meant to facilitate no more than a crude and rapid assessment of the system's ability to detect influenza outbreaks ahead of the H1N1-2009 epidemic. The recent H1N1-2009 epidemic also provided data which might validate the system's usefulness, although preliminary analysis based on confirmed cases in TTSH staff suggests that there were few clusters of healthcare worker cases, possibly due to the widespread use of face masks for patient care during the epidemic.[9] Additional work to further evaluate the system is currently in progress.

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