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ABSTRACT

Can all-cause school absenteeism be used to optimize the timing of school closure in response to pandemic influenza?

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Objective
To determine the optimal pattern in school-specific all-cause absenteeism for use in informing school closure related to pandemic influenza.

Introduction
School closure has long been proposed as a non-pharmaceutical intervention in reducing the transmission of pandemic influenza.[1] Children are thought to have high transmission potential because of their low immunity to circulating influenza viruses and high contact rates. In the wake of pandemic (H1N1) 2009, simulation studies suggest that early and sustained school closure might be effective at reducing community-wide transmission of influenza.[2,3] Determining when to close schools once an outbreak occurs has been difficult. Influenza-related absentee data from Japan were previously used to develop an algorithm to predict an outbreak of influenza-related absenteeism.[4] However, the cause of absenteeism is frequently unavailable, making application of this model difficult in certain settings. For this study, we aimed to evaluate the potential for adapting the Japanese algorithm for use with all-cause absenteeism, using data on the rate of influenza-related nurse visits in corresponding schools to validate our findings.

Methods
Data consisted of the daily count of all-cause absenteeism and school nurse visits for fever/flu syndrome in 1206 public schools in New York City from 6 September 2005 to 26 June 2009. A model-adjusted school-specific z-score was calculated for both absenteeism and ILI for each day from 5 September 2006 to 28 June 2009. The z-score was calculated by dividing the model residual by the school-specific standard deviation of the outcome. Both models adjusted for day of week, whether the preceding or proceeding day was a holiday, school type (elem., middle, high), school day and sine and cosine terms to account for seasonality.

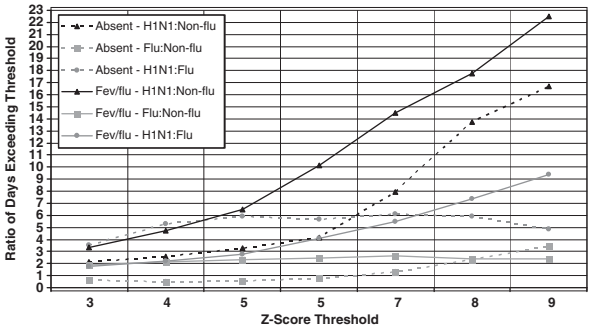

Figure 1 The ratio of the proportion of days exceeding various z-score thresholds, comparing the seasonal, pH1N1, and non-flu periods.

Results
The ratio of the proportion of z-scores higher than a given threshold for the non-flu period, seasonal flu period and the pH1N1 2009 period (April 20–June 19, 2009) are shown in the Figure 1. As expected, the ratio of high fever/flu z-scores during the pH1N1 period to non-flu periods is greater than one. This pattern is similar for high absentee z-scores during the pH1N1 period compared with the non-flu period; however, the ratio of absentee z-scores during the seasonal flu period compared with the non-flu period is below one for z-scores of six or less. This trend reverses itself for z-scores greater than six. In fact, for both absenteeism and fever/flu, the ratio tends to increase with an increasing threshold cutoff.

Conclusions
Preliminary results indicate that for moderately high absenteeism (z-score <6) there is little variation between seasonal and non-seasonal flu periods. However, high absenteeism (z-score >6) occurs more frequently during periods of flu transmission, suggesting that a high absentee threshold may be needed to predict a flu outbreak. Further work will involve determining the optimal temporal pattern

and threshold levels in absenteeism that best predicts both high absenteeism and fever/flu visits. Results of this work will help determine the relative utility of tracking all-cause school absenteeism for use in school-based influenza surveillance.

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References

1 Cauchemez S, Ferguson NM, Wachtel C, Tegnell A, Saour G, Duncan B, *et al.* Closure of schools during an influenza pandemic. *Lancet Infect Dis* 2009;**9:**473–81.
2 Halder N, Kelso JK, Milne GJ. Analysis of the effectiveness of interventions used during the 2009 A/H1N1 influenza pandemic. *BMC Public Health* 2010;**10:**168.
3 Lee BY, Brown ST, Cooley P, Potter MA, Wheaton WD, Burke DS, *et al.* Simulating school closure strategies to mitigate an influenza epidemic. *J Public Health Manag Pract* 2010;**16**(3):252–61.
4 Sasaki A, Hoen AG, Ozonoff A, Suzuki H, Tanabe N, Seki N, *et al.* Evidence-based tool for triggering school closures during influenza outbreaks Japan. *Emerg Infect Dis* 2009;**15:**1841–3.