

SEASONAL INFLUENZA: LINKS WITH METEOROLOGY AND SOCIAL NETWORK

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Background and Aims: Prevention of influenza is a long-standing public health objective. Recent observational studies demonstrate that complex seasonal influenza patterns are sensitive to changes in social networks. The experimental studies suggest potential links with meteorology, when influenza virus infectivity depends on the effect of ambient temperature and humidity. We examined the relationship between influenza, meteorological conditions, and social contacts' intensity using influenza virus surveillance in Milwaukee, Wisconsin, USA.

Methods: Laboratory-confirmed influenza cases were provided by the Milwaukee Health Department Laboratory during 5/22/2004-02/22/2011. Records contain weekly positive test results for the influenza A/H1N1, A/H3N2, 2009-A/H1N1 and Influenza-B strains detected in human subjects from six CDC-WHO-specified age groups (<1, 1-4, 5-24, 25-44, 45-64, and ≥65 yrs). Daily meteorological parameters (maximum/mean/minimum for temperature and relative humidity) were aggregated into weekly time series. Public school calendars were used to create the time series to reflect the probability of person-to-person contacts. Poisson harmonic regression models were used to assess seasonal characteristics: peak timing and absolute intensity for each strain and age group. Relative risks of influenza associated with temperature and humidity and their interactions with viral genome were estimated using non-linear regression models. The preliminary results are limited by the first 128 weeks of the study period (prior to the massive testing for 2009-A/H1N1 influenza).

Results: Three major influenza strains (A/H1N1, A/H3N2, Influenza-B) have distinct peaks at weeks: 8.6 [95%CI:8.0-9.1], 9.6 [95%CI:8.3-10.3], and 12.9 [95%CI:11.6-15.3] respectively. Influenza-A peaked at colder and less humid weather conditions compared to Influenza-B. The intensity of Influenza-B exhibited the 6-fold increase ($p < 0.001$) over the study period. Intensity of community social network has minimal impact on the influenza seasonality.

Conclusions: The seasonal influenza incidences are likely to be linked with meteorological conditions and school-related activities, however their effects on the circulating viruses and severity at a community level is inconclusive.