# Syndromic surveillance for detection of increased morbidity and mortality by influenza

**Cees van den Wijngaard M.Sc., Liselotte van Asten Ph.D., Wilfrid van Pelt Ph.D., Hans van Vliet M.D., Marion Koopmans D.V.M. Ph.D.**

*Centre for Infectious Disease Control, National Institute of Public Health and the Environment, Bilthoven, The Netherlands*

## OBJECTIVE

To evaluate whether a rise or shift in *severe* morbidity and mortality by influenza can be detected with syndromic surveillance.

## BACKGROUND

During the influenza season 2003/2004 a new influenza drift variant (H3N2-strain A/Fujian/411/02) circulated in the Netherlands that was expected to be less well contained by both vaccine-induced immunity (because the H3N2-vaccine strain did not match with the Fujian strain) and naturally-induced immunity. However the eventual magnitude of the epidemic was lower than expected (measured by both ILI incidence in GP-sentinel data, and influenza laboratory surveillance counts). Nevertheless it remains possible that, during this epidemic, the lower vaccine-induced and naturally-induced immunity did lead to more *severe* consequences of influenza infections (e.g. hospitalizations and mortality) than could be expected by the reported size of the epidemic. Therefore we retrospectively investigated whether respiratory syndromes (Hospitalizations and mortality) showed an excess increase in 2003/2004.

## METHODS

Respiratory syndromes were defined for the hospitalizations and mortality data using the CDC syndrome grouping of ICD9 codes as a guidance. We plotted the counts of the hospital syndrome, and the mortality syndrome. We also plotted the modeled estimated syndrome counts with 95% upper confidence limits. Influenza and other respiratory pathogen laboratory counts were used as predictive variables. We assumed that if the actual syndrome counts exceeded the 95% upper confidence limit of the model during the influenza season 2003/2004, this deviance may indicate more severe consequences of influenza infection by the Fujian drift variant.

## RESULTS

Both hospital and mortality respiratory syndromes exceeded the 95% upper confidence limit during the 2003/2004 influenza season (see fig. 1 for hospitalizations), indicating that more respiratory hospitalizations and respiratory mortality occurred than could be expected by the number of influenza laboratory counts in that season. During the previous influenza season of 2002/2003 both syndromes exceed the upper confidence limits as well, although with smaller peaks above the confidence limit. This could be an early indication of the severity of the Fujian drift variant, as the strain was first detected in the later phase of that season
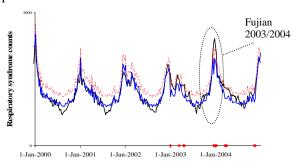


Figure 1 – Hospitalizations: Weekly counts of the respiratory syndrome (black line), the modeled syndrome (by resp.pathogen lab counts, blue line), the 95% upper confidence limit (red dotted line) and the exceedings of the upper confidence limit (red dots on X axis).

## CONCLUSIONS

Although the influenza epidemic in the Netherlands in 2003/2004 was reported of limited size, the circulation of the H3N2-Fujian variant coincided with higher levels of severe respiratory morbidity and mortality than were to be expected based on laboratory pathogen surveillance. This study shows that by performing a combined surveillance of syndromic and pathogen data, syndromic surveillance can be used to detect a shift in morbidity and mortality associated with a drift variant of influenza (or another common pathogen).

## REFERENCES

[1] de Jong JC, Rimmelzwaan GF, Bartelds AI, Wilbrink B, Fouchier RA, Osterhaus AD. [The 2002/2003 influenza season in the Netherlands and the vaccine composition for the 2003/2004 season]. Ned Tijdschr Geneeskd 2003; 147(40):1971-5.

[2] Rimmelzwaan GF, de Jong JC, Bartelds AI, Wilbrink B, Fouchier RA, Osterhaus AD. [The 2003/2004 influenza season in the Netherlands with a limited epidemic of the virus variant A/Fujian, and the vaccine composition for the 2004/2005 season]. Ned Tijdschr Geneeskd 2004; 148(40):1984-8.

Further Information:
Cees van den Wijngaard, kees.van.den.wijngaard@rivm.nl