

# Greater pathogenicity of norovirus strains in 2003? A syndromic approach

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

*National institute of Public Health and the Environment, Bilthoven, The Netherlands*

## OBJECTIVE

Although norovirus (NoV) is the most common cause of acute gastroenteritis ('winter vomiting disease'), its contribution to mortality remains unknown and may be an unrecognized problem [1]. In Europe a genetic shift in circulating NoV strains was observed in 2002 which coincided with an unusually high number of NoV outbreaks in all but one country participating in the European NoV-surveillance network [2]. Covering a time period which included this outbreak peak, we used general practitioner (GP), hospital, and death-cause data in combination with NoV surveillance data to explore the association between NoV outbreaks and morbidity and mortality.

## METHODS

Information on NoV outbreaks was acquired from the Dutch NoV outbreak surveillance system. Historic time series consisting of monthly counts of gastro-intestinal complaints or diagnoses (GI) were derived from 3 registrations in the Netherlands. 1) GP codes: diarrhea, vomiting, and presumable gastro-intestinal infection (2001-2003, coverage: 1-2%). 2) A hospital syndrome group of GI discharge diagnoses attributed to be of viral origin (viral GI), (1999-2004, from the national registration). 3) A syndrome group of primary and secondary death causes attributed to viral or infectious GI. (1999-2004, from the national registration).

## RESULTS

In the Netherlands there was an unusually high peak of reported NoV outbreaks from November 2002 until February 2003, totaling 130 outbreaks in these months ('NoV peak'). The majority occurred in residential facilities and nursing homes [2].

All other data sources show GI elevations coinciding with the 'NoV peak': the hospital viral GI diagnoses when excluding children younger than 5 years of age (whose GI morbidity pattern is dominated by rotavirus activity), and, in the GP data (in the same age group) the number of patients with a presumable GI infection also stands out. The most pronounced increase during the 'NoV peak' is present in the number of GI deaths (fig1). From December to February there are 21, 13 and 18 such deaths respectively, where the monthly average for the total

'99-'04 period is only 6. The GP and hospital elevations last somewhat longer than the 'NoV peak' period, perhaps due to the rotavirus and influenza season, which, both arrived in march and april 2003, just after the 'NoV peak' (fig1, red and blue line). Using the the ratio of hospital versus GP diagnoses as an indication of illness severity, a clear elevation is seen for viral GI (hospital) divided by vomiting (GP), also coinciding with the 'NoV peak' (fig2).

## CONCLUSIONS

Peaking of viral and infectious GI deaths during a period of extreme NoV outbreak activity suggests that a new NoV variant which arose in 2002/2003 may be associated with a greater risk of death than earlier variants. A simultaneous increase in hospital viral GI diagnoses also reflects the possibility of an increased pathogenicity of the new NoV strain, which is also supported by an increase in the proportion of hospital viral GI diagnoses relative to vomiting (which is more characteristic for NoV infection than for other GI infections) in the community (i.e. GP data). While the association between NoV and death cannot be proven as the data cannot be linked at the individual level, the observed association is striking and should be reason for further investigation.

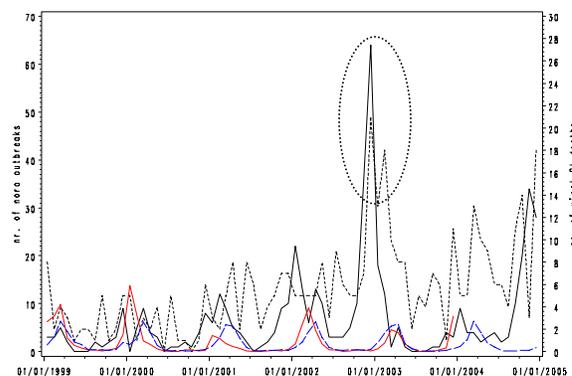


Fig.1. Norovirus outbreaks (black line) vs viral gastro-intestinal deaths (dashed line). Below, lab surveillance: influenza (red line), rotavirus (blue line).

## REFERENCES

- [1] Wu et al. A norovirus outbreak at a long-term-care facility: the role of environmental surface contamination. *Infection Control and Hospital Epidemiology* oct 2005, p:802-810.
- [2] Lopman B et al. Increase in viral gastroenteritis outbreaks in Europe and epidemic spread of new norovirus variant. *Lancet* 2004 feb. 28;363(9410):682-8.