A summertime peak of "winter vomiting disease": Surveillance of noroviruses in England and Wales, 1995 to 2002

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Abstract

Background: Noroviruses are the most common cause of gastroenteritis outbreaks in industrialised countries. Gastroenteritis caused by Norovirus infection has been described as a highly seasonal syndrome, often referred to as "winter vomiting disease".

Methods: The Public Health Laboratory Service Communicable Disease Surveillance Centre has systematically collected reports of laboratory confirmed cases of Norovirus-gastroenteritis since 1995. We analysed these data for annual and seasonal trends and age distribution.

Results: A mid-summer peak in reported cases of Norovirus was observed in 2002, unlike all six previous years when there was a marked summer decline. Total reports from 2002 have also been higher than all previous years. From the first 10 months of 2002, a total of 3029 Norovirus diagnoses were reported compared to the previous peak in 1996 of 2437 diagnoses for the whole 12-month period. The increase in 2002 was most marked in the 65 and older age group.

Conclusion: This surveillance data challenges the view that Noroviruses infections exclusively have wintertime seasonality.

Background

Noroviruses are the group of viruses formerly known as Norwalk-like viruses (NLV) or Small Round Structured Viruses (SRSV). These viruses have long been recognised as a cause of relatively mild gastroenteritis, often referred to as "winter vomiting disease" [1]. While transmission does occur year-round, cases and outbreaks exhibit a cold-weather peak [2].

Noroviruses are a leading cause of gastroenteritis in the community and are the most common cause of outbreaks in semi-closed environments such as schools, cruise ships, hospitals and residential homes [3]. Outbreaks are difficult to control due to the high frequency of vomiting and widespread contaminations [4]. There is increasing concern in both in the medical and popular press about the impact of Noroviruses on healthcare institutions, with over 100 articles from outbreaks appearing on the BBC News website [3,5,6].

Methods

Approximately 200 National Health Service laboratories and 40 public health laboratories throughout England and Wales report positive diagnostic results of
gastrointestinal pathogens, including Noroviruses, to the Public Health Laboratory Service Communicable Disease Surveillance Centre (CDSC) via an electronic reporting system called LabBase [7]. Not all laboratories have the capability to test for Noroviruses, so specimens are sent to regional or reference laboratories for analysis by electron microscopy (EM), enzyme linked immunosorbent assay (ELISA) and/or reverse transcription – polymerase chain reaction (RT-PCR). A medical microbiologist submits diagnostic reports from the source laboratory where specimens were first received for testing. This system of laboratory reporting of Norovirus-positive results to CDSC provides a consistent and timely source of trend data despite the fact that Noroviruses laboratory diagnostic reports underestimate the true incidence of infection [8].

All electronic records from 1995 to October 2002 were downloaded from the central database. Duplicate records were removed. The software programs Microsoft Excel and STATA 6.0 (College Station, Texas) were used for analysis [9].

Results

The number of Norovirus reports for each month from 1995 to October 2002 are shown in Figure 1. A total of 17,771 positive test results were reported during the surveillance period. From the first 10 months of 2002, there were a total of 3029 Norovirus reports. The previous annual peak in reporting was in 1996, when 2437 cases were reported for the whole 12-month period. The highest previous January to October figure was 2189 in 1995.

In 2002, Norovirus reports did not fall during the summer months as they had in every other year in the reported period. Reports increased to a peak of 430 reports in July.

Electron microscopy was the most common laboratory method used, accounting for 12031 (67.7%) reports from the surveillance period. ELISA testing was first commercially made available in March 2001 (Dako Cytomation, Ely, UK) [10] and was used for 12.4% (231/1861) of diagnoses in 2001 and 10.7% (324/3029) of all diagnoses in 2002. Considering only the diagnoses made by EM in 2002, reports increased from April (n = 34) to May (n = 76), and came to a summer peak in July (n = 96).
From 1995 to 2001, an average of 52% of all cases were 65 years or older (Figure 2). In 2002, the number of cases in this age group was proportionately larger (68%) compared to previous years ($\chi^2 = 259.8$, $p < 0.001$).

**Discussion**

For the first time, a summer peak of Norovirus reports has been observed in England and Wales. This observation from summer 2002 is in contrast with a ubiquitous collection of reports that Noroviruses are principally an infection associated with the winter months [11–13]. The year 2002 also appears exceptional in terms of the total number of reports which were 38% higher when compared to 1996, the previous peak year of reporting. It should be noted that laboratory reports represent only a small fraction (estimated at approximately 1 in 315) of the actual cases of Norovirus occurring in the community [8].

Surveillance data such as these are inevitably subject to reporting bias, especially when a syndrome becomes as prolific in the popular media as Norovirus has [5]. Another potential bias in the surveillance period was the introduction of a commercial ELISA for the detection of Noroviruses in faecal samples in March 2001 (Dako Cytomation, Ely, UK) [10]. Since many more laboratories have the capacity to use an ELISA diagnostic test compared to EM or RT-PCR, it is possible that the use of the ELISA could result in increased ascertainment of Noroviruses. However, it is unlikely that introduction of the ELISA explains the observed increase during this surveillance period as it was used in only 11% of diagnoses in 2002 whilst overall reports increased by 28% in 2002 compared to the previous
For the first time, a summer-time peak of Norovirus laboratory reports has been observed in England and Wales.

In the first ten months of 2002, there were more reported cases of Norovirus than in any previous year.

The age distribution of the cases suggests that the increase is mostly seen in the elderly, where the impacts, both on individuals and the health service are most pronounced.

Conclusions
- For the first time, a summer-time peak of Norovirus laboratory reports has been observed in England and Wales.
- In the first ten months of 2002, there were more reported cases of Norovirus than in any previous year.
- The age distribution of the cases suggests that the increase is mostly seen in the elderly, where the impacts, both on individuals and the health service are most pronounced.

Competing interests
None declared.

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