Rapid communications

OUTBREAK OF NOROVIRUS INFECTION IN A NURSING HOME FOR THE ELDERLY IN MALTA, NOVEMBER-DECEMBER 2008

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In a norovirus outbreak in a nursing home in Malta in November and December 2008, 44 people were affected. 35 of 91 residents and nine of 44 employees were symptomatic. The overall attack rate among residents was 38.5%*. The outbreak lasted 17 days and the symptoms were mild.

On 1 December 2008, the Infectious Disease Prevention and Control Unit (IDCU) in Malta was notified about an outbreak of gastroenteritis in a nursing home for the elderly. The investigation revealed a total of 44 cases with onset of symptoms between 19 November and 5 December. Norovirus was the causative agent of this outbreak.

Method

Case Definition

A case was defined as any resident or employee of the nursing home with two or more episodes of vomiting and/or diarrhoea, with or without other symptoms and with or without laboratory confirmation, between 19 November and 5 December 2008.

Epidemiological investigation

A descriptive study was undertaken among staff and residents of the nursing home. The nursing home is subdivided into three wings. All wings are at ground level and interconnected through a central foyer. The wings are spacious and have wide corridors with residential areas divided into rooms. Each wing is under the responsibility of a wing manager and has designated staff during the day. At night, staff members on call cater for all three wings, as the need arises.

The residents are predominantly elderly with a mean age of 84 years. Many suffer from dementia. It was therefore deemed unreasonable to undertake a study of possible exposures including food consumed during the two weeks prior to the outbreak.

It is usual practice that mobile residents of one wing mingle and socialise freely with residents from other wings. Most residents are visited regularly by family members. When the number of symptomatic cases was on the rise, the management of the nursing home started discouraging visits to residents who were symptomatic as well as visits by symptomatic family members.

Each wing manager was asked to compile a list of affected residents and staff members in their wings, including information on the date of onset, symptoms and duration of symptoms. Information on the total number of residents, subdivided by gender, and on the number of staff members in each wing was also gathered.

A concurrent investigation was carried out by the department of environmental health. Food, water and environmental samples were taken, and an assessment of the level of hygiene was carried out. Food and water samples were examined microbiologically and chemically and were assessed to be normal, while the state of hygiene in the food preparation areas was assessed as very good.

Laboratory investigation

Faecal specimens were obtained from thirteen of the symptomatic residents – four from wings A and B and five from wing C, and examined for *Shigella*, *Campylobacter*, *Salmonella* and *E. coli* O157 in the national public health laboratory. The stools were also tested for norovirus using RT-PCR. In all cases, stool samples had been collected after most of the symptoms had subsided. None of the samples was positive for *Shigella*, *Campylobacter*, *Salmonella* or *E. coli* O157. Norovirus was detected in all but one of the submitted samples.

Results

The first case in this outbreak occurred on 19 November 2008 and the last case 16 days later.

Of the 91 residents, 35 were symptomatic (overall attack rate 38.5%). The attack rate in female residents (n=79) of the residential home was 51.9%, while the attack rate in males (n=12) was 25.0%. The mean age among affected residents was 84 years (range 55 to 94 years). The attack rates among the residents by wing were 29.7% (n=37) in wing A, 53.1% (n=32) in wing B and 31.8% (n=22) in wing C. Statistical analysis showed no significant relationship between any wing and the presence of illness in residents (chi-squared=4.51, degrees of freedom=2, p=0.105). Similarly, gender was not a significant factor in acquiring the disease (Fisher's exact two-tailed test: p=0.35).

The nursing home has 44 wing employees. Administrative and kitchen staff all remained asymptomatic. Each wing has a wing manager, but wing A has two managers because of its larger

capacity. Wing A has 14, wing B 12 and wing C nine carers and helpers, respectively. Wings A and B have two cleaners each, while wing C has one cleaner. Fisher's exact test ($p=0.110$) also showed that norovirus infection in staff members was not related to any single wing.

The most common symptoms were vomiting ($n=27$; 61.4%) and diarrhoea ($n=38$; 86.4%). While in wing C all cases experienced vomiting and diarrhoea, a number of patients in the other wings experienced diarrhoea only. Diarrhoea was the predominant symptom in wing B. No fever was recorded among cases. The symptoms were generally mild, lasting less than 12 hours. Two of the residents, who were frail due to chronic illnesses, were visited by the home's resident doctor. None of the affected individuals required hospitalisation.

The total attack rate among staff members, who are all female, was 23.1%. Wing managers were affected the most, with an attack rate of 50%, followed by cleaners (attack rate 40%). Wings A and B had an attack rate of 37.5% and 23.1%, respectively, among staff members, while no staff members from wing C had fallen ill.

Although there were cases of gastroenteritis among relatives of the residents and staff members, some were parallel cases (it is known that at the time there was a high rate of noroviral disease in the community) and some were known to have been secondary cases, these were not included in the study.

Figure 1 illustrates the epidemic bimodal picture of the outbreak. The nature of the bar chart shows a continuous source in the nursing home in general, while each wing was affected individually. Wing A was the first wing to be affected by gastroenteritis which lasted for eight days, while wing B was affected on the day the infection on Wing A ended. Wing C was affected three days after onset of illness in wing B.

A resident in wing A was the first case of the outbreak (see Figure 2). The second case was another resident in the same wing.

There was no known or apparent relation between the two residents. The third case was a cleaner in this wing.

One can presume that wing B may have been affected from a source in wing A.

Infection control measures

The IDCU was notified late, at the time when the outbreak was nearing its end. Nevertheless, an on-site meeting with the wing managers was held. Measures such as hand washing techniques, cleaning and disposal of soiled items, protection methods for staff, disinfection techniques and food-handling precautions were discussed.

Discussion and Conclusion

Viruses of the *Caliciviridae* family, which includes norovirus, are very common causes of epidemics in closed communities, such as nursing facilities, hotels and cruise ships [1,2]. Such epidemics can spread rapidly, affecting a large number of individuals. Modes of infection include contaminated food and water, spread by direct contact with stools or vomitus, aerosol inhalation of vomitus, as well as spread from person to person by direct contact or through environmental contamination. When outbreaks occur in closed communities, such as this one, it is recognised that the outbreak becomes exhausted after transmission to all or most of the residents, whether affected or not.

The epidemic curve of this outbreak suggests a continuous source of infection. The initial resident is likely to have been infected by a source outside the facility, possibly an infectious visitor. Spread of the infection appears to have been from person to person and through environmental contamination. The fact that the staff members did not follow all the necessary infection control precautions could have facilitated spread of the infection. The members of staff from wing A, who showed symptoms on the third and fifth day of the outbreak, could have introduced the virus to the other wings. However, as residents from different wings interact with each other, this interaction could also have been the mode of spread of the infection. Since a thorough investigation of all likely sources was not possible, the source/s of this outbreak

FIGURE 1

Epidemic curve, norovirus outbreak among residents and staff of a residential home in Malta, Nov-Dec 2008 ($n=43^*$)

* date of onset of one case unknown

FIGURE 2

Norovirus cases, by date of onset, in residents and staff of a residential home in Malta, Nov-Dec 2008 ($n=43^*$)

* date of onset of one case unknown

remain unknown. However, the fact that kitchen staff remained asymptomatic and the source of infection was continuous suggests that a food source is unlikely.

When outbreaks are notified early in their course, aggressive measures, such as restricting staff and resident movement, cohorting of cases, reinforcing personal hygiene, strict environmental hygiene and strict and proper dealing with excretory products can prevent extensive spread of infection [3]. Early notification of this outbreak could have led to prompt intervention, drastically reducing the number of cases. While this outbreak was characterised by mild symptoms, a more aggressive infection in such a setting could lead to severe morbidity, hospitalisations or even fatalities.

*Erratum: A wrong overall attack rate of 51.9% was mistakenly published in the abstract. It was corrected to 38.5% on 30 January 2009.

References

1. Kroneman A, Vennema H, van Duynhoven Y, Duizer E, Koopmans M. High number of norovirus outbreaks associated with a GGII.4 variant in the Netherlands and elsewhere: Does this herald a worldwide increase? *Euro Surveill.* 2004;8(52):pii=2606. Available from: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=2606>
2. Grmek Kosnik I, Peternej B, Pohar M, Kraigher A. Outbreak of norovirus infection in a nursing home in northern Slovenia, July 2007. *Euro Surveill.* 2007;12(41):pii=3286. Available from: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=3286>
3. Ronveaux O, Vos D, Bosman A, Brandwijk K, Vinjé J, Koopmans M, Reintjes R. An outbreak of Norwalk like virus gastroenteritis in a nursing home in Rotterdam. *Euro Surveill.* 2000;5(5):pii=6. Available from: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=6>

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