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Burden of gastroenteritis outbreaks: specific epidemiology in a cohort of institutions caring for dependent people

P. Gaspard [a,b,*], K. Ambert-Balay [c], A. Mosnier [d], S. Aho-Glélé [e], C. Roth [a], S. Larocca [a], L. Simon [f], D. Talon [f], C. Rabaud [f], P. Pothier [c]

[a] Hospital Hygiene Service, Rouffach Hospital Center, Rouffach, France
[b] UMR 6249 Chrono-Environnement, University of Franche-Comté, Besançon, France
[c] National Reference Center for Enteric Viruses, Laboratory of Virology, CHU Dijon, Dijon, France
[d] Open Rome, Paris, France
[e] Department of Hospital Epidemiology and Infection Control, CHU Dijon, Dijon, France
[f] Co-ordination Centre for Nosocomial Infection Control, Eastern Regions, CHU Nancy, Nancy, France

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SUMMARY

Background: In institutions caring for dependent people, viral gastroenteritis occurs frequently and is highly contagious. In elderly persons, these episodes can lead to hospitalization and occasionally death.

Aim: To study the impact of gastroenteritis outbreaks (GOs) in institutions caring for dependent people.

Methods: This study was conducted on 18 sites consisting of 35 units from four different disciplines (geriatric medicine and rehabilitation, psychogeriatrics, geriatric nursing homes, and specialized care homes for adults with physical and mental disabilities). Spatio-temporal analysis of GOs was performed during six winter seasons, and clinical and viral data were analysed with regard to structural parameters (size of the sites and dining-room organization), virus epidemiology and chronology of the outbreaks and type of activities.

Results: A total of 98 outbreaks were recorded in the 35 units. The risk of GO was high even outside national epidemic periods. Viruses were searched for in 86 outbreaks and were identified in 96.5% (83/86) of these outbreaks: norovirus genotype GII.4 (59.0%, 49/83), other viruses (41.0%, 34/83). There were variations between surveillance periods in terms of GO frequencies and attack rates and types of viruses. Dining-room organization could be a factor in cross-infection at a site.

Conclusion: Specific surveillance that takes into account the precise epidemiology needs to be developed in institutions caring for dependent people in order to improve infectious disease control and information for healthcare workers.

* Corresponding author. Address: Hospital Hygiene Service, Rouffach Hospital Center, 27 rue du 4ème RSM, 68250 Rouffach, France. Tel.: +33 03 89 78 74 47; fax: +33 03 89 78 70 00.
E-mail address: ph.gaspard@ch-rouffach.fr (P. Gaspard).

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Introduction

Gastroenteritis outbreaks (GOs) are frequent occurrences in nursing homes.[1] Nursing of elderly people and closed settings contribute to the rapid spread of enteric viruses by person-to-person transmission.[2] Noroviruses, which are the main cause of gastroenteritis, are highly contagious and difficult to eradicate. In addition, elderly persons are particularly susceptible to viral infections and carry a high risk of adverse outcomes.[3] Gastroenteritis, which is generally mild, may be debilitating in elderly persons leading to hospitalization and even death.[4]

The aim of this study was to develop strict surveillance in a variety of institutions that provide a high level of care for elderly and/or very dependent people and to evaluate the impact of gastroenteritis outbreaks. A spatio-temporal analysis was performed and virological and epidemiological investigations were conducted.

The analyses should lead to the optimization of surveillance and infection control pratices in institutions caring for highly dependent people.

Methods

Design and setting

The present study was conducted in southern Alsace (an area of north-eastern France) during six yearly surveillance periods (September to August) from 2008 to 2014. Eighteen sites (numbers 1—18) spread over an area measuring 25 by 65 km and providing a high level of care for elderly and/or very dependent people were included in the study.

Each of the 18 sites consisted of at least one unit, and in total 35 units were included in the study. Units were defined by having a dedicated team of day-time staff, being on one geographical location, and providing one type of care. These units were specialized in different disciplines: six units in medicine and geriatric rehabilitation (MGR), three units in psychogeriatrics, 23 units were geriatric nursing homes (GNH), and three units were specialized care homes for adults with physical and mental disabilities (SAPMD). Units that were co-located shared the same care staff for the night, and in some cases the residents shared the same dining room.

Case definition

Gastroenteritis was defined as the sudden onset of vomiting and diarrhoea during a 24 h period: (i) diarrhoea $\geq$3 episodes, (ii) and/or vomiting $\geq$3 episodes, (iii) or diarrhoea or vomiting $<$3 episodes with two or more other symptoms (diarrhoea, vomiting, stomach ache, abdominal cramps, nausea, fever, mucus in stools).[1]

An outbreak in a unit was defined as two or more cases of gastroenteritis occurring in a 72 h period. The outbreak in the unit concerned was presumed to be ended when no new cases had occurred during the 96 h after the last case in the site experiencing the outbreaks. Moreover, surveillance in all units on one site was carried out during seven days after the resolution of symptoms in the last case to take into account potential transmission between the different wards (dining room, healthcare workers, visitors, patients, residents) and prolonged virus survival in the environment. The duration of an outbreak at the unit level was calculated as the time between the date of onset of the first case and the date of onset of the last case in the unit concerned.[1]

Management of outbreaks and control measures

All the sites shared the same protocols for infection control, and were supervised by infection control staff. Standard precautions, including hand hygiene, wearing gloves and gowns, and decontamination of the bathroom after use were universally implemented at all of the sites. The use of facial masks when in contact with vomit was recommended but not implemented consistently. Information and alcohol-based hand sanitizers were available at the entrance to each site for visitors. As soon as a cluster of gastroenteritis cases was reported in a ward, specific infection control measures were implemented to prevent the transmission of infection and the spread to other unaffected wards. These measures included information for visitors at the entrance of the establishment, stopping common social activities, bio-cleaning once a day for common areas with a product effective against enteric viruses (5000 ppm chlorine), systematic hand hygiene with alcohol-based sanitizers for residents in the dining room, and movement restrictions for asymptomatic patients between different wards and to other establishments. Symptomatic healthcare workers were placed on sick leave for the symptomatic period (24—48 h).

Additional infection control measures were implemented for symptomatic patients. They were confined to their rooms for at least 48 h after their last symptoms; patients' linen was placed in double-packaging before laundering; surfaces, furniture and the toilet of their private room were disinfected twice a day with a product containing 5000 ppm chloride; all the waste from the room was treated according to hazardous infectious waste management guidelines; visitors were informed and alcohol-based sanitizers were made available to them.

Laboratory investigations

Stool samples were sent to the National Reference Centre for Enteric Viruses in Dijon for laboratory investigations. Type 40/41 adenoviruses, astroviruses and group A rotaviruses were detected by enzyme immunoassay using the ProSpecT™ Astrovirus kit (Oxoid Ltd, Basingstoke, UK), the Premier™ Adenoclone® Type 40/41 kit (Meridian Bioscience, Inc., Cincinnati, OH, USA) and the Premier™ Rotaclone® kit (Meridian Bioscience), respectively. All positive samples were confirmed by reverse transcriptase—polymerase chain reaction (RT-PCR) and genetically characterized.

Viral RNA was extracted as previously described.[5] Rotavirus G and P genotyping was performed using semi-nested type-specific multiplex RT-PCR, as previously described.[6] Noroviruses were detected by RT-PCR, then characterized by sequencing as previously described.[9] Sapoviruses were detected and characterized as previously described.[7]

Analysis

Fisher's exact test was used to compare the following percentages: outbreaks (at least one outbreak) in units according to the period of surveillance, the type of activity, the dining