In clinic, owing to the carbapenem resistance and sensitiveness to 2 aminoglycosides (amikacin and gentamycin), carbapenems and other β-lactams were abdicated, and etimicin, a type of aminoglycoside, was utilized to control the abdominal infection. To our great relief, 6 days later, the therapy was successful in clearing the abdominal drainage.

Accompanied by the dissemination of KPC-2 throughout the world, novel KPC variants emerged continuously. In our study, a novel KPC variant termed KPC-2-like was discovered in a *K. pneumoniae* isolate from the abdominal drainage of an 81-year-old patient. This KPC-2-like carbapenemase shared 99% homology with KPC-2. However, an attempt to transfer carbapenem resistance or to present the biochemical characterization of this new variant should be further performed. All β-lactams including carbapenems were virtually useless; etimicin was chosen so that the abdominal infection was controlled. KPC carbapenemases posed serious challenges to clinical therapy and the health of patients. Surveillance of the spread of KPC-producing *K. pneumoniae* should be urgently undertaken.

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Jian Ming Zhu, BS;[1] Ru Jin Jiang, BS;[1] Zu Huang Mi, BS;[2] Hai Sheng Kong, BS;[3] Feng Zhang, MD[4]

Affiliations: 1. Microbiology Laboratory, Hangzhou Yuhang Hospital of Traditional Chinese Medicine, Hangzhou, China; 2. Wuxi Clone Gen-Tech Institute, Wuxi, China; 3. Clinical Laboratory Department of the First Affiliated Hospital, College of Medicine, Zhejiang University, Hangzhou, China; 4. Clinical Laboratory Department of the Third Affiliated Hospital, Nantong University, Wuxi, China.

Address correspondence to Feng Zhang, MD, Clinical Laboratory Department of the Third Affiliated Hospital, Nantong University, 585 Xing Yuan North Road, Wuxi 214041, China (zf9958@163.com).

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Investigation and Control of a Nosocomial Norovirus Outbreak in a Long-Term Care Facility

To the Editor—We report the investigation and control of an important nosocomial outbreak of norovirus infections that occurred in a long-term care facility (240 beds on 3 floors) affiliated with the university hospital of Brest, France, during the winter of 2008.

Norovirus is an RNA virus of the *Caliciviridae* family and the agent that causes most nonbacterial gastroenteritis.[1] Transmission is essentially fecal-oral, either direct through

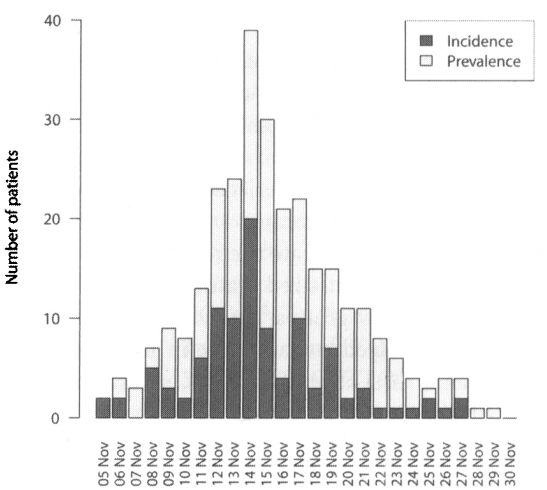

FIGURE 1. Winter 2008 norovirus outbreak in René Fortin long-term care facility: incident and prevalent cases, as daily observed.

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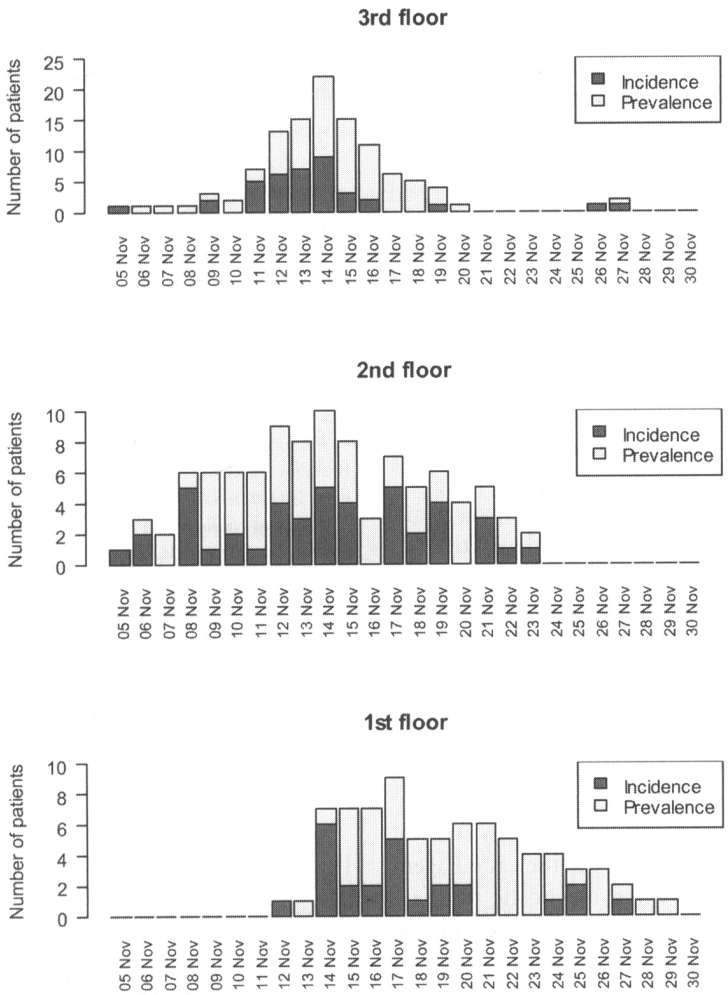

FIGURE 2. Winter 2008 norovirus outbreak in René Fortin long-term care facility: incident and prevalent cases, as daily observed at each floor.

person-to-person contact or indirect through environmental contamination (water and surfaces). Transmission by shorter-range aerosol has also been proved when exposed to vomiting episodes. With a low infective dose and a relative resistance in the environment and to some disinfectant agents, it frequently causes outbreaks that rapidly spread and are difficult to control. Noroviruses of genotype II-4 are mainly implicated.[2]

During the outbreak, 237 patients were present, with a sex ratio of 0.44 (men, 72; women, 165) and a median age of 83.2 (first quartile, 74.5; third quartile, 88.3). Turnover is usually low, and new admissions were delayed during the outbreak; therefore, the studied population was a closed one.

The first 2 recorded cases occurred on November 5, 2008, and contact precautions were applied. On Friday, November 14, because of an uncontrolled epidemic extension, stool samples were collected from active cases, and the infection control unit was alerted. Enzyme immunoassay testing for norovirus was positive. On Monday, November 17, control measures were reviewed by a crisis control staff, including the facility's doctors and nurse supervisor, the infection control unit, and virologists. The following supplementary control measures were proposed. In regard to patients, hand hygiene was promoted, requiring constant incentive for noncompliant patients. Probable cases were asked to stay in their rooms, and contact precautions were maintained 72 hours after last symptoms, as a preventive measure for the expected persisting diffusion of norovirus after the relapse of symptoms. Concerning environmental cleaning, products active against norovirus were promoted, and all nonprivate areas were fully cleaned twice a week. Concerning professionals, symptomatic ones were asked to take temporary leave immediately, and hospital direction facilitated their fast replacement. Finally, living rooms were temporary closed, and patients' transfers in and out of the facility were delayed.

Probable cases were defined as any patient experiencing diarrhea or vomiting during the epidemic period (from November 5 to November 27). Demographic (gender, age), spa-

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tial (floor, single or double room, neighbor), clinical (diarrhea, vomiting, fever, autonomy scoring), and microbiological information was collected for each of the 237 patients from medical files. First and last days with diarrhea or vomiting episodes were noted, as reported by medical and paramedical staffs.

The attack rate was 45.1% (107/237): 55.1% (59/107) had vomiting episodes, and 87.9% (94/107) had diarrhea. Median duration of the symptomatic phase was 2 days (interquartile range, 2 days). The outbreak lasted 23 days (Figure 1). Maximal prevalence was 16.5% (39/237), which implied high diffusion potential and showed control difficulties that had to be faced. One death was attributed to infection. Patterns of diffusion varied between the 3 floors (Figure 2) and resulted in different attack rates (first floor, 31.6%; second floor, 56.4%; third floor, 48.1%; $P < .01$).

From the 107 probable cases, 37 stool samples were available, of which 83.8% (31/37) were considered positive for norovirus after reverse-transcription polymerase chain reaction (RT-PCR) processing (OUEST–Genopole Center). Nucleotidic sequences were compared with publicly available sequences from the GenBank database and showed that the strain had a 99% homology with another strain of genotype II-4 (Norovirus Hu/GII/Maizuru/7748/2007/JPN capsid protein gene, partial cds; GenBank accession no. EU852598.1); we named it GII-4/BOHARS117/2008/FR.

This outbreak fulfilled at least 3 of the 4 Kaplan criteria[5] that can be used to incriminate norovirus as the causal agent of an outbreak of gastroenteritis when diagnostic tests are not available: vomiting in more than half of the affected persons (including at the beginning; first 5 days, 58.3% [7/12]), mean or median duration of illness of 12–60 hours, and no bacterial pathogen in stool culture. The fourth criterion (mean or median incubation period of 24–48 hours) could not be assessed in this nonfoodborne outbreak and without observing certain transmission events.

In this facility, before this first known encounter with norovirus, common seasonal gastroenteritis clusters were usually contained by contact precautions. By the time the situation was deemed to be out of control and signaled to the infection control department, disease had widely spread. The chain of alert was not fast enough. Nevertheless, norovirus outbreaks have been shown to be characterized by high reproductive ratios, including effective ones with optimal hygiene measures.[3,4] This experience shows the major impact of the norovirus when giving rise to a nosocomial outbreak with almost half of the patients being infected. In this fragile population of elderly people, gastroenteritis can be severe, and 1 patient died. Moreover and despite professional training regarding hygiene practice, healthcare workers (HCWs) were not spared either—leading to 43 with gastroenteritis symptoms. Their necessary removal impaired the means of control in a facility with a low HCW-to-patient ratio.

Norovirus emergence changed the means of preventing and controlling gastroenteritis outbreaks. Long-term care facilities are particularly concerned. Whether or not rapid immunoassay tests and RT-PCR are available, protocols now have to consider norovirus as a probable causal agent, heeding carefully first gastroenteritis cases and their epidemic threat and applying adapted and prompt control measures. New guidelines for prevention and control of norovirus gastroenteritis outbreaks in healthcare settings are about to be published by the Centers for Disease Control and Prevention.[6]

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Marc Carpentier, MD;[1] Jordan Ollivro, MD;[1] Raoul Baron, MD;[1] Mickaël Le Galudec, MD;[1] Chantal Fauchier, MD;[2] Adissa Minoui-Tran, MD;[3,4] Christopher Payan, Pharm D, PhD;[3,4] Benoist Lejeune, MD, PhD;[1,5] Ronan Garlantézec, MD, PhD[1,6]

Affiliations: 1. Service de Santé Publique et d'Hygiène Hospitalière, Centre Hospitalier Régional Universitaire, Brest, France; 2. Centre René Fortin, Centre Hospitalier Régional Universitaire, Brest, France; 3. Laboratoire de Virologie, Centre Hospitalier Régional Universitaire, Brest, France; 4. Equipe d'Accueil LUBEM EA3882, Unité de Formation et de Recherche de Médecine (UFR Médecine), Brest, France; 5. Cellule Régionale d'Epidémiologie Nosocomiale, UFR Médecine, Brest, France; 6. Unité Inserm U625, Rennes, France.

Address correspondence to Marc Carpentier, MD, Service de Santé Publique, Hôpital Morvan, Centre Hospitalier Régional Universitaire Brest, 2 avenue Foch 29609 Brest Cedex, France (marc.carpentier@chu-brest.fr).

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QuantiFERON-TB Testing for Latent Tuberculosis Infection in Low-Prevalence Countries: Making the Most of an Imperfect Process

To the Editor—The commentaries of Gandra et al[1,2] and Joshi et al[3,4] reflect the experiences that we have also had with QuantiFERON-TB Gold (QFT-G)[5] and then with QuantiFERON-TB Gold In Tube (QFT-GIT).[6] During initial testing of selected new hospital employees as well as subsequent annual testing for tuberculosis, conversions and reversions have occurred with surprising frequency among those employees with high negative values and those with low positive values. Because of our concerns about broadly replacing the time-tested, if itself imperfect, tuberculin skin test (TST), we have restricted the use of interferon gamma release assay (IGRA) testing to hospital employees who are TST-positive, BCG vaccine recipients. This itself eliminates one of the concerns cited by Joshi et al,[4] that of deciding what to do about those with positive IGRA and negative TST results.

Initially using QFT-G, we found that only 13.5% (29/215) of our TST-positive, BCG recipient new employees tested positive.[7] This increased to 30.2% (38/126)[6] when we introduced QFT-GIT and now hovers between 23% and 24% (70/302), as would be anticipated with a reportedly more sensitive test.[8] However, it is important to recognize that by virtue of adding IGRA testing to the TST, we have reduced the percentage of those to whom we offered treatment for latent tuberculosis infection (LTBI) by more than 70%. This is important in addressing a multinational and urban employee population such as ours, with nearly one-quarter of our new employees testing tuberculin positive.

In addition to or in place of repeat testing,[3] one can also emphasize clinical judgment more decisively in determining whether to propose treatment for those with borderline positive IGRA results. Thus, factors such as suggestive chest x-ray findings, relative youth, recent immigration from a tuberculosis-endemic area, and coincident illnesses or treatment programs wherein TB is either more frequent or more threatening serve as inducements, while advanced age and slight liver function abnormalities act as constraints. Additionally, a decisively positive IGRA test result or a confirmed more modest response can reinforce both the practitioner and the patient in advancing LTBI treatment plans. Thus, this test process, while still imperfect in the context that we use it, offers distinct advantages over TST testing alone.

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William J. Schneider, MD;[1,2] Arthur E. Brown, MD;[1,2] Cynthia Eisenstein, RN[1]

Affiliations: 1. Employee Health and Wellness Services, Memorial Sloan-Kettering Cancer Center, New York, New York; 2. Weill Cornell Medical College, New York, New York.

Address correspondence to William J. Schneider, MD, Employee Health and Wellness Services, Memorial Sloan-Kettering Cancer Center, 222 East 70th Street, New York, NY 10021 (schneidw@mskcc.org).

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