Norwalk virus: 'Cruise ship' illness challenging and costly to hospitals, too

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A review of measures taken to address a 2004 outbreak of the highly infectious Norwalk virus at The Johns Hopkins Hospital has provided the first solid documentation of expenses and efforts in the United States to stop the infection from spreading among patients, staff and visitors. Total hospital costs for the three-month outbreak - including extra cleaning supplies, staff sick leave, diagnostic tests, replacement staff, and salaries and lost revenue from closed beds - were estimated at more than $650,000.

The outbreak at The Johns Hopkins Hospital (JHH) was one of at least 24 at Maryland hospitals during the first half of 2004. Norwalk virus is highly contagious because only small amounts, as few as 10 to 100 viral particles, can lead to infection. It is spread or passed from person to person through fecal matter when people fail to wash their hands properly after using the bathroom and when people touch or share handling of the same objects, such as doorknobs.

“We hope our approach will help other hospitals prepare for or manage an outbreak,” says Cecilia Johnston, M.D., an instructor at Hopkins in infectious diseases who led the investigation.

“Outbreaks need to be identified quickly and dealt with immediately, and relying on standard infection control procedures is not adequate,” she adds. “It may be necessary to close the infected units, isolate the infection source, get strict on hand hygiene, conduct a thorough washing down of units, and keep repeating these steps until the outbreak is

stopped. Health care workers especially need to be vigilant about these steps because they are the group primarily affected by outbreaks."

Reporting in the Sept. 1 edition of the journal Clinical Infectious Disease, Johnston and her team of Hopkins patient safety experts describe how an outbreak spread among 265 health care workers and 90 patients between February and May 2004.

No one at Hopkins died from their infection, but 13 afflicted hospital staff either visited the emergency room for treatment or required hospitalization after becoming severely dehydrated. Norwalk-like viruses, formally known as noroviruses, cause serious gastrointestinal illness for which no treatment currently exists except for keeping the patient well hydrated. Symptoms include nausea, vomiting, diarrhea and severe stomach cramps. Those infected generally recover on their own within two to three days after symptoms appear.

"Health care workers really do need to be on the lookout for norovirus infections, and if there is an outbreak, hospitals need to address it very aggressively," says senior hospital epidemiologist Trish Perl, M.D., a professor of medicine and pathology at The Johns Hopkins University School of Medicine. "Our experience shows that people can get very sick and that it costs a lot to fix the problem and address disruptions to staffing."

First reported in the hospital's coronary care unit, or CCU, the JHH outbreak quickly spread over a two-week period but remained clustered in the CCU, a nearby echocardiography laboratory and a floor housing psychiatric services where patients and staff frequently interact, especially during group therapy sessions.

The outbreak was detected soon after it began when two staff members who worked closely together became ill with diarrhea. Their illnesses

were immediately reported to Hopkins' infection control team, which monitors hospital operations daily for potential hazards to patient safety.

A norovirus outbreak was immediately suspected because there had been numerous reports of illness throughout the Baltimore region.

As part of their investigation, nurse managers began screening all staff and patients for any signs of gastrointestinal illness. Patient stool samples confirmed that the culprit was a norovirus, and genetic testing later verified that it was the same viral strain, genogroup II.4, that caused a series of widely publicized outbreaks in nursing homes and on cruise ships traveling from Europe and the United States in 2002.

As the investigation proceeded, staff implemented strict precautions to control the outbreak and prevent it from spreading. Patients with symptoms were placed in isolation, by being moved to either private rooms or into the same room with other sick patients. Group therapy sessions in psychiatry were temporarily halted, and no new patients were admitted to the units primarily affected. Sick staff were sent home for as long as they had symptoms plus an additional 72 hours, sufficient time for the illness to pass and no longer be contagious.

The investigation showed that many of the initial health care workers in the CCU who became ill had attended a social event outside of the hospital, where one of the non-staff guests was already experiencing symptoms. Others likely became ill after touching a patient chart that had been handled by another ill colleague.

Standard precautions to guard against infection were also followed, including a mandatory, hospital-wide staff review of basic infection control procedures with an emphasis on more frequent hand washing, accompanied by a thorough washing down of all affected hospital facilities. Even the CCU was closed for 24 hours to allow for a thorough

cleaning, with all exposed surfaces getting washed down with bleach solution.

The easiest known way to kill noroviruses is through repeat washing of surfaces using bleach solutions containing at least 10 percent sodium hypochlorite. However, researchers say that even after intense cleaning efforts, norovirus particles have been found to cling to carpet surfaces, elevator buttons, bed rails and dining room tabletops.

To address any virus remaining, all disposable supplies in infected areas were thrown out and replaced with fresh ones, an effort that cost more than $53,000.

Because the norovirus outbreak was citywide, staff from outside of JHH were not allowed to work on site, while Hopkins staff, in turn, were banned from working at other facilities. Even visitors to the Hospital were asked screening questions to identify stomach problems and, if present, were told not to see patients for 72 hours. Staff working on units hit by the outbreak wore gowns and gloves to guard against unwittingly picking up or spreading the disease. All group meals or shared-food events were banned inside the Hospital.

After three months of intense efforts to prevent the spread of infection, new infections stopped by early May 2004. The outbreak was deemed to be over, and affected units returned to normal activity.

The researchers' review showed that the number of patients infected, or so-called attack rate of the virus, in the CCU was low, at 5 percent (seven patients out of 133), but was notably higher for health care workers, at 30 percent (29 out of 97). The attack rate numbers were higher for psychiatry services, at 17 percent for patients (39 out of 233) and 38 percent for staff (76 out of 200).

Everyone infected experienced diarrhea or vomiting, while some others experienced such symptoms as chills and muscle aches.

Calculations of costs associated with the cleanup included expenses for cleaning supplies ($96,000), staff sick leave and overtime ($89,000), plus lost revenue from closing the units and echocardiogram laboratory to new patients ($418,000). Indeed, nearly 460 hours of sick leave were used by staff on the CCU, 138 hours in the echocardiogram lab, and more than 2,000 hours in psychiatry services.

Expenses not taken into account were those associated with other areas of the hospital where few cases were reported and no restrictions were placed on the unit. Costs incurred outside of main units were not included in this estimate because researchers were not certain that the infection had indeed resulted from contact within the hospital and not from exposure in the community. In addition, costs associated with lengthier stays in the hospital and more intensive patient care were also not factored into the estimates because researchers would have had to guess at what the patients' length of stay would have been in the absence of a norovirus outbreak.

Researchers say their next step is to evaluate which specific infection control strategies and procedures are most effective at preventing noroviruses from spreading.

Source: Johns Hopkins Medical Institutions

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