

Norovirus-induced outbreak of diarrhea in the psychiatric ward of a hospital

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Background

The Third Branch of the CDC received report form the Health Bureau of Miao-Li County in the afternoon (around 5:20) of Feb. 7, 2006 that diarrhea had occurred in several patients since Jan. 30, 2006 in the psychiatric ward on the eighth floor of a hospital. An outbreak of diarrhea was suspected, and to prevent further spreading of the disease, epidemiological surveillance and necessary infection control measures were applied. The goals of the surveillance were to identify the severity of the outbreak and the route of infection, to investigate the causes of the outbreak, and to assess the effect of infection control measures.

Disease Surveillance

The outbreak occurred in the psychiatric ward on the eighth floor of the front building in a hospital. Most patients in the ward were chronic psychiatric patients. There were 66 patients and 9 nurses. Since psychiatric patients could not describe their symptoms clearly, the frequency of defecation recorded in the nursing records was used to identify diarrhea. Diarrhea cases were defined to have at least 3 times of defecation per day or watery diarrhea. The first case of diarrhea was identified to occur on Jan. 30, 2006. Two cases were then occurred on Jan. 31.

There was no new case till Feb. 2. On Feb. 3, three cases occurred in the same ward. Six more cases occurred on Feb. 4, and two on Feb. 5. There were no cases between Feb. 7 and 9. Five cases occurred between Feb. 10 and 13, and three of them were patients of the seventh floor. No cases of diarrhea were identified thereafter. Totally, there were 20 patients satisfying the case definition, with an infection rate of 30.3% (20/66). All cases were male, with an average age of 49.4 and average hospitalization period of 1.5 years. No nurses were identified to have diarrhea.

Route of transmission

The dates of onset of the 20 cases are shown in Fig. 1. A peak is identified between Feb. 3, and 6, resembling the mode of cluster infection. However, the irregular distribution of cases before and after this period resembles human-to-human transmission. This type of distribution is characteristic of Norovirus infection. If there was no case before Feb. 3, then this outbreak must have originated from a cluster infection. The human-to-human transmission thereafter was a reasonable consequence. If there were diarrhea cases before Feb. 3, then the outbreak must have originated from human-to-human transmission. Once there was a diarrhea case, rapid transmission resembling cluster infection would occur as a character of Norovirus infection if the first case was not identified. Among the 20 patients, 17 of them were living on the eighth floor. The position of their beds and the sequence of onset were depicted in Fig. 2, which suggests a mode of human-to-human transmission.

Specimen collection and laboratory examination

To identify the causes of diarrhea, anal swabs and stool specimens were gathered from diarrhea cases. Besides, environmental specimens were taken from

drinking water, door handles of the bathrooms, etc. Stool specimens were also gathered from five workers working on the seventh and eighth floors. In total, twenty-two anal swabs, eight stool specimens and six environmental specimens were examined. Anal swabs and environmental specimens were all negative for bacteria. One stool specimen was positive of Norovirus by RT-PCR, and three were positive of Norovirus by ELISA. Thus, the pathogen of this outbreak was suspected to be Norovirus.

Factors leading to onset of outbreak

All patients were staying in the hospital and attended only to activities held by the hospital. Although there were four cases who went back home or had family visiting them on Jan. 28 and Feb. 2, none of their family members had diarrhea. Accordingly, we can exclude the relationship between their family members and this outbreak.

Second, these patients were having their therapies, activities, and meals together on the same floor. However, during occupational therapy and rehabilitation, they would have interaction with patients of other floors. Certain therapy sessions involved patients from both the seventh and eighth floors. This means that the three cases on the seventh floor might be a consequence of contacting patients from the eighth floor. Besides, the stool sample of the head of nurse working in the seventh and eighth floors was positive for Norovirus by RT-PCR, but the nurse had no symptom of diarrhea. Whether this is related to the three cases on the seventh floor requires further investigation.

Preventive measures

To prevent the spreading of the outbreak, the Bureau of Health required the hospital to take certain infection control measures. For example, facial masks,

gloves and isolating clothes were required while taking care of cases of diarrhea, and hand washing was emphasized. After handling contaminated substances, hand washing with medical soap was mandatory. Free wondering was prohibited while wearing isolating clothes and gloves. All workers could not shift between floors.

Cases of diarrhea were put under GI and contact isolation, and cases having acute gastroenteritis were quarantined. Quarantine would stop if there were no signs of gastroenteritis for seven to ten days (at least five days). Cases, including asymptomatic cases, were required to wear facial masks. All activities were held separately. Hand washing with medical soap was monitored before and after each meal and after using the bathroom. Cases were prohibited from visiting guests, sleeping outside or going outside. Patients were required to wash their hands every two hours to reduce spreading.

As to infection control for contacts, other patients, family members who had patients coming back home for the Chinese New Year, medical workers, and kitchen workers were put under surveillance. Other measures to stop spreading of Norovirus through contact included disinfection every two hours and a temporary halt of all occupational therapies and interacting activities. After administration of these infection control measures, there was no case of diarrhea after Feb. 14, and the outbreak was ended on Feb. 23.

Fig. 1 Case distribution over time of diarrhea cluster in psychiatric ward

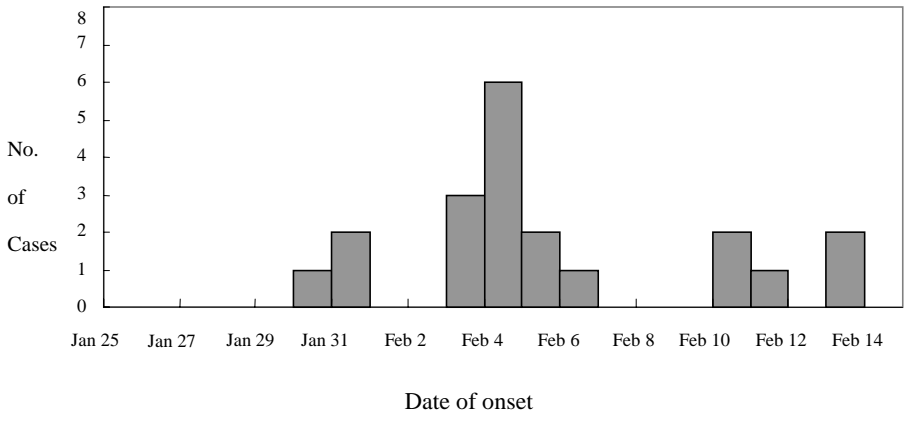
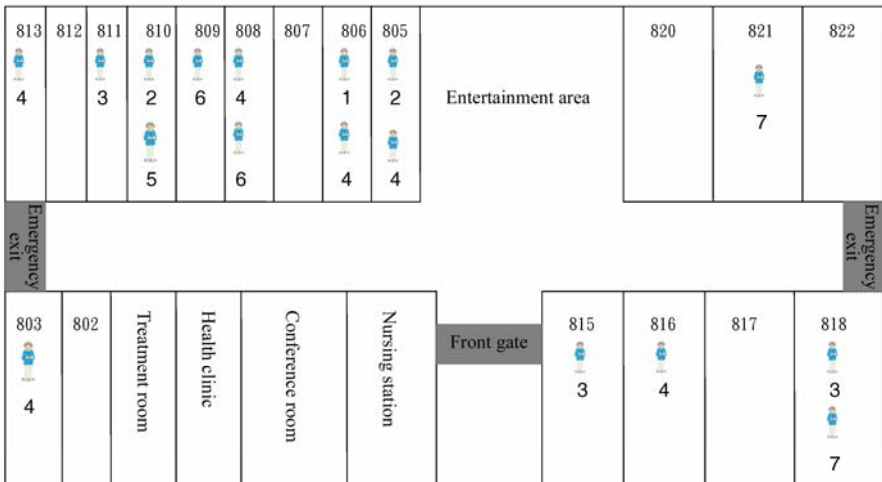


Fig. 2 Layout of eighth floor and sequence of illness onset



Note: The numbers indicate the sequence of onset