

## Norovirus Outbreak in Iran

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Received: May 8, 2013; Accepted: June 22, 2013

**Keywords:** Norovirus; Iran; Gastroenteritis

Due to the recent outbreak of norovirus in the northern area of Tehran, this report reviews the recent advances and provides guidelines for outbreak management and disease prevention for medical practitioners. Norovirus is the most common cause of epidemic gastroenteritis, responsible for at least 50% of all gastroenteritis outbreaks worldwide, and a major cause of foodborne illnesses. In the United States, approximately 21 million illnesses attributable to norovirus are estimated to occur annually. Since 2001, when the most recent norovirus recommendations were published (1), substantial advances have been made in norovirus epidemiology, immunology, diagnostic methods, and infection control. As molecular diagnostic techniques have improved and become more widely available, detection and reporting of norovirus outbreaks have increased. Although the inability to culture human noroviruses in vitro has hampered the progression, assessment of the performance of disinfectants has been facilitated by the discovery of new, cultivable surrogates for human noroviruses. In addition, the periodic emergences of epidemic strains (from genogroup II type 4, GI.4) as well as outbreaks in specific populations (e.g. the elderly in nursing homes) have been characterized (1).

The prototype norovirus was first identified as the cause of a gastroenteritis outbreak in Norwalk, Ohio, in 1968 (2). However, the epidemiology of noroviruses remained poorly characterized until relatively recently, because of the lack of widespread availability of sensitive diagnostic methods (3). Noroviruses are a group of nonenveloped, single-stranded RNA viruses, classified into the genus norovirus (previously referred to as Norwalk-like viruses (NLVs) or small round-structured viruses (SRSVs) of the caliciviridae family) (4). Noroviruses cause acute gastroenteritis in all ages. The illness typically begins after an

incubation period of 12 - 48 hours and is characterized by acute onset, nonbloody diarrhea, vomiting, nausea, and abdominal cramps. Some patients might only experience vomiting or diarrhea. Low-grade fever and body aches might also be associated with the infection, and thus, the term "stomach flu" is often used to describe the illness, although there is no biological association with influenza. Although symptoms might be severe, they typically resolve without treatment after 1 - 3 days in otherwise healthy persons. However, more prolonged courses of illness lasting 4 - 6 days can occur, particularly among young children, elderly persons, and hospitalized patients (5, 6).

Approximately 10% of cases with norovirus gastroenteritis seek medical attention, which might include hospitalization and treatment for dehydration with oral or intravenous fluid therapy. Norovirus-associated deaths have been reported among elderly and in the context of outbreaks in long-term-care facilities (7). Necrotizing enterocolitis in neonates, chronic diarrhea in immunosuppressed patients and post-infectious irritable bowel syndrome have also been reported in association with norovirus infections (8). Norovirus is extremely contagious, with an estimated infectious dose as low as 18 viral particles, suggesting that approximately 5 billion infectious doses might be contained in each gram of feces during peak shedding. Humans are the only known reservoirs for human norovirus infections and transmission occurs by three general routes: person-to-person, foodborne and waterborne. Person-to-person transmission might occur directly through the fecal-oral route, by ingestion of aerosolized vomitus, or by indirect exposure to fomites or contaminated environmental surfaces. Foodborne transmission typically occurs via contamination by infected food handlers dur-

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### Implication for health policy/practice/research/medical education:

Norovirus is the most common cause of epidemic gastroenteritis, responsible for at least 50% of all gastroenteritis outbreaks worldwide, and a major cause of foodborne illnesses. Due to the recent outbreak of norovirus in the northern area of Tehran, this report reviews the recent advances and provides guidelines for outbreak management and disease prevention for medical practitioners

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ing preparation and the majority of clinical virology laboratories perform real-time reverse transcription-polymerase chain reaction (RT-PCR) assays (specifically, TaqMan-based real-time assays) for norovirus detection. Since human noroviruses cannot be grown in cell cultures, current detection methods (e.g. RT-qPCR) allow detection of norovirus RNA in water, food, and environmental specimens (9). Appropriate hand hygiene is likely the single most important method to prevent norovirus infection and control its transmission. Reducing the amount of norovirus on hands is best accomplished thorough hand washing with running water and plain or antiseptic soap, and there is not any modality for the treatment except for prevention (10).

### Acknowledgements

We highly thank the Center for Diseases Control of Ministry of Health and Dr. Mohamad Mehdi Goya.

### Financial Disclosure

There was no financial interest regarding the concept of this manuscript.

### Funding/Support

There was no funding or support.

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