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Knowledge of norovirus prevention and control among infection preventionists

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Abstract

A Web-based survey was administered to infection preventionists (IPs) (N = 941) to characterize awareness and knowledge of norovirus (NoV). Only 44% of respondents correctly identified NoV as one of the 3 most common foodborne pathogens in the United States, and 5% correctly identified the 3 most common settings for NoV outbreaks. Several gaps in IPs' knowledge of NoV were identified; specifically, IPs could benefit from learning more about the natural history of NoV, modes of transmission, and cleaning and disinfection processes.

Keywords

Survey; Core competency

In the United States, noroviruses (NoV) are recognized as the leading causes of both epidemic gastroenteritis[1–5] and foodborne disease.[6] NoV are responsible for 19 to 21 million acute gastroenteritis cases annually, including 56,000 to 71,000 hospitalizations and 570 to 800 deaths.[7] Health care facilities (eg, hospitals and long-term care facilities) are the most commonly reported settings of NoV outbreaks,[7] and NoV causes the most health care-associated infections outbreaks (18.2% of outbreak investigations).[8]

A Web-based survey was administered to IPs to characterize their awareness and knowledge of NoV. The 37-item questionnaire included open-ended questions and a set of true-and-false questions, which were primarily taken from information about NoV on the Centers for Disease Control and Prevention's (CDC's) Web site (www.cdc.gov/norovirus).

Methods

To recruit survey respondents, 15 professional organizations agreed to promote the survey via their Web sites, newsletters, or e-mail distribution lists. The online survey was hosted by

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Survey Monkey (Palo Alto, CA) and was open from mid-October 2012 to mid-January 2013. A total of 1,567 surveys was received, and 1,255 were considered complete (at least 70% of the true-and-false questions answered by respondent). Of the total completed surveys, 941 respondents reported they were professionals involved in training or education regarding infectious disease control or developing or implementing policies and procedures to control and prevent infectious diseases.

Frequencies were computed for each question. For the true-and-false questions, the proportion of respondents who answered each question correctly and an overall score (ie, the percentage of correct answers) were computed. Each true-and-false question was also grouped into a content domain (prevention and control strategies, transmission, and illness) to compute the number of correct responses for each domain.

Results

The majority of survey respondents (68.8%) identified their primary occupation or profession as infection control professional (646 out of 939). Other respondents included nurses (21.5%), epidemiologists (6.9%), and other professions (2.8%). The majority of respondents (85.9%) indicated that they were members of Association for Professionals in Infection Control and Epidemiology (APIC) and that their demographic characteristics were similar to APIC's membership.[9]

In the United States, the 3 leading causes of domestically acquired foodborne disease in descending order are NoV (5,461,731), nontyphoidal *Salmonella* spp (1,027,561), and *Clostridium perfringens* (965,958).[6] Eighty-three percent of survey respondents correctly identified *Salmonella* among the 3 most common causes of foodborne disease in the United States; however, only 44% identified NoV, and less than 8% identified *Clostridium perfringens*.

According to Hall et al,[10] the 3 most common settings for NoV outbreaks in the United States are health care facilities (49%), restaurants or banquet facilities (15%), and schools or day care facilities (5%). Survey respondents correctly identified health care facilities (82.5%), restaurants or banquet facilities (19.3%), and schools or day care facilities (76.2%) among these 3 most common settings for NoV outbreaks in the United States.

Table 1 presents the percentage of respondents who correctly answered each true-and-false question on NoV, grouped by the 3 domains. Only 1.7% of respondents answered all 15 true-and-false questions correctly; 7.6% of respondents answered 14 of the 15 questions correctly; and 64.4% of respondents answered at least 11 of the 15 questions correctly (ie, a score of 73% and higher).

Although only 8.2% of respondents answered all 4 questions on prevention and control correctly, 34.2% of respondents answered 3 of the 4 questions correctly. Only 18.2% of respondents correctly indicated that the following statement is false: “Using a sanitizing solution of chlorine bleach at 100 ppm will eliminate norovirus from a contaminated surface.” Although chlorine is recommended to disinfectant against NoV, two independent research studies have concluded that the optimal concentration of chlorine necessary to

inactivate NoV (at least on stainless steel surfaces) is much higher, 5,000 ppm; however, although these concentrations adequately reduce the amount of NoV present, they likely do not completely eliminate NoV from contaminated surfaces.[11,12] Furthermore, other common disinfectants, such as quaternary ammonium and ethanol alcohol, have been found ineffective at inactivating NoV[13] Likewise, research indicates that using alcohol-based hand sanitizers may not be an effective substitute for soap and running water.[13]

Twenty-nine percent of respondents answered all 6 questions related to NoV transmission correctly, and 30% of respondents answered all 5 questions related to NoV illness correctly. With regard to individual questions within these domains, the majority of respondents answered the questions on transmission and NoV illness correctly, except for one question. Less than half of survey respondents (48%) correctly indicated that the following statement is false: “Bacteria cause more cases of foodborne disease than do viruses.” As stated earlier, NoV is the leading cause of foodborne disease and is attributed to almost 5.5 million cases of foodborne illnesses annually in the United States.[6]

Discussion

IPs who completed the survey generally have some knowledge of NoV illness and transmission but could benefit greatly from education regarding NoV prevention and control. These knowledge gaps correspond with two of the major content areas of the IP-specific core competencies defined by the Certification Board of Infection Control and Epidemiology and included as part of APIC's competency model for IPs.[14] With regard to NoV, survey respondents could improve their core competency knowledge of (1) identifying infectious disease processes and (2) preventing/controlling the transmission of infectious agents, as well as their knowledge of the specific competency model domains infection prevention and control. Specifically, based on the survey results, IPs could benefit from learning more about the natural history of NoV, modes of transmission, and cleaning and disinfection processes.

The study had a few limitations. Although a large sample of IPs was surveyed, the survey results cannot be generalized to the US population of IPs because a probability-based sample was not used. In addition, although 85.9% of respondents were APIC members, the survey results should not be generalized to the entire APIC membership (>14,000 members). Although the survey results are not statistically representative, they provided insights into IPs' knowledge regarding NoV and identified areas for improvement, which will be used to inform the development of educational materials.

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Table 1

Percentage of respondents who correctly answered true-and-false questions on norovirus

Statements	No.	Correctly answered (%)
Illness (answered all items correctly)	282	30.0
People can get vaccinated to prevent NoV infection (False).	917	98.0
NoV infection can easily be treated with antibiotics (False).	913	97.3
Children less than 5 years old and adults aged 65 and older are more susceptible than the general population to severe NoV infections (True).	846	89.9
Most NoV outbreaks occur in the winter (True).	622	66.8
Bacteria cause more cases of foodborne disease than do viruses (False).	448	48.0
Transmission (answered all items correctly)	269	28.6
Once infected with NoV, a person is permanently immune from contracting NoV again (False).	932	99.3
People infected with NoV may be able to spread NoV for at least 3 days even after they no longer show signs and symptoms of illness (True).	882	94.3
It is safe for people infected with NoV to prepare food for others as long as they properly and frequently wash their hands while preparing food (False).	849	90.4
NoV does not survive well on porous surfaces, such as textiles, upholstery, and carpeting (False).	668	72.0
Most NoV infections occur on cruise ships than in any other setting (False).	653	69.8
The most common mode of transmission for NoV is person-to-person (True).	624	66.9
Prevention and control strategies (answered all items correctly).	77	8.2
Quaternary ammonium compounds and chlorine bleach are *equally* effective against NoV (False).	696	75.2
Alcohol-based hand sanitizer is as effective against NoV as washing hands with soap and water (False).	644	68.7
Antimicrobial soap must be used on hands to remove NoV (False).	583	62.1
Using a sanitizing solution of chlorine bleach at 100 ppm will eliminate NoV from a contaminated surface (False).	170	18.2