



Content analysis of web-based norovirus education materials targeting consumers who handle food: An assessment of alignment and readability



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ABSTRACT

Human noroviruses sicken 19–21 million people in the U.S. each year, suggesting the need for education. The World Wide Web is an accessible source of information about how to prevent a norovirus infection but the accuracy and readability of information targeting consumers is unknown. The aim of the study was to evaluate the alignment and readability of web-based norovirus education materials targeting consumers using CDC evidence-based guidelines and Microsoft Word readability formulas. The search yielded 60 artifacts. Most did not address duration of handwashing (83%), use of hand sanitizers (83%), type of drying devices (92%), or avoidance of bare-hand contact with ready-to-eat foods (97%). Less than half ($n = 29$) recommended minimizing contact with sick persons. Two-thirds of the artifacts ($n = 40$) also did not mention the recommended concentration of sodium hypochlorite (bleach) solution to be used to disinfect surfaces contaminated with noroviruses. The mean Flesch Reading Ease score was 47.75 (score of >70 is easy to read), and the mean Flesch-Kincaid Grade Level was 10.36 so documents were written at a 10th grade level. The alignment and readability of web-based educational materials about noroviruses must be improved as knowledge is a prerequisite to application of behaviors that can prevent one from becoming infected with noroviruses.

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1. Introduction

Worldwide, human noroviruses are the leading cause of acute gastroenteritis. In the U.S., an estimated 21 million individuals (1 in 14) are sickened each year by this group of viruses resulting in \$777 million in healthcare costs (Hall et al., 2013). Most reported outbreaks are attributed to person-to-person contact (69%) followed by the consumption of contaminated food (23%) making noroviruses the most common cause of foodborne disease in the U.S. (Hall, Wikswo, Pringle, Gould, & Parashar, 2014; Scallan et al., 2011).

Results from a nationally representative survey of 1051 U.S. adults revealed that many consumers are not aware of noroviruses and have limited knowledge about how to prevent a norovirus infection. Forty-seven percent (47%) of respondents reported awareness of noroviruses with 85% having heard the terms “cruise

ship virus,” “stomach bug,” or “stomach flu,” which are all commonly used to describe noroviruses (Cates, Kosa, Brophy, Hall, & Fraser, 2015). Less than one-third (341) correctly answered 50% or more of 22 true-and-false questions, suggesting consumers also have limited knowledge about how to prevent a norovirus infection. These survey findings support the need to educate consumers about noroviruses as knowledge is a prerequisite to application of necessary behaviors to prevent illness (DiClemente et al., 1989; Fisher & Fisher, 1992).

The World Wide Web (hereafter referred to as the Web) is one way to reach consumers with information about how to prevent a norovirus infection. Eighty-seven percent (87%) of U.S. adults use the internet, and of those, 72 percent use the Web to seek health information (Pew Research Center, 2014). While the internet has accelerated the speed and spread of information, it also has a downside – allowing the dissemination and diffusion of information without checks and balances, peer review, and/or fact checking. Several studies that evaluated health information available online reported a lack of quality information characterized by inaccurate content and/or inappropriate design and usability

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(Berland et al., 2001; Irwin et al., 2011; Scullard, Peacock, & Davies, 2010). Moreover, a systematic review of web-based medical information further supported the above-mentioned authors' conclusions that there is a lack of high-quality sites on the Web that offer complete and accurate information on various health topics (Eysenbach, Powell, Kuss, & Sa, 2002). One problem with inaccurate or misleading health information being so accessible on the Web is that the user of this information might implement recommendations that have no effect on preventing the targeted disease or condition or even worse one might implement recommendations that cause harm (Ilic, 2010).

Another potential problem is the readability of the text. If text is not easy to read, its usability can be diminished. To illustrate how wide ranging this problem could be, one needs to simply read the National Assessment of Adult Literacy (NAAL), released in 2006 by the U.S. Department of Education. The authors report that 30 million U.S. adults struggle with basic reading tasks, which represents nearly 10% of the U.S. population (Kutner, Greenberg, Jin, & Paulsen, 2006). Within the context of health information, Kessels (2003) pointed out that 40–80% of information provided to patients by health professionals is forgotten immediately because when text is too difficult to read, the reader could become frustrated hence they stop reading, hence its purpose is not achieved – improving knowledge. Thus, experts recommend documents about health, medicine, or safety be written at the 5th grade level (DuBay, 2004).

These authors assert that if consumer education materials are aligned with evidence-based guidelines and are easy to read, the reader is more likely to engage in behaviors known to prevent a norovirus infection. Thus, the aim of the study was to evaluate the alignment and readability of Web-based consumer education materials addressing noroviruses using evidence-based guidance documents and Microsoft Word readability formulas. Two research questions guided the study: 1) Are Web-based norovirus materials targeting consumers who handle food aligned with the three prevention strategies recommended in CDC guidelines? and 2) Are materials written at the recommended grade level for health-related documents (5th grade level)? The study findings can be used to inform the revision or creation of consumer education materials that focus on preventing a norovirus infection.

2. Methods

To be included in the sample, eligible educational materials (referred to as artifacts hereafter) were published between January 1, 2011 and May 23, 2013 and: 1) target adult consumers, 2) pertain to preparing food in the home, and 3) be available via Advanced Search of Google.com. The start date of the search was chosen because in January 2011, Scallan et al. (2011) reported that noroviruses causes 58% of foodborne disease in the U.S. Artifacts directed toward children and those formatted as blogs, news articles, theses, dissertations, research articles, Wikipedia entries, question/answer sites, forums, and continuing education training materials were deleted. A Google.com Advanced Search was conducted using the following search string: “norovirus” AND “food handling” AND “food preparation.” Food-related terms were chosen as it was assumed this would narrow the findings to artifacts that address preventing norovirus infections related to food preparation in the home. Artifacts were sorted by relevance, and two team members screened each artifact based on inclusion criteria. All eligible artifacts were downloaded as Portable Document Format (PDF) files or HyperText Markup Language (HTML) files.

A coding manual comprised of 71 items divided into four topic areas was created. The topic areas included: 1) identifying information, 2) format (including readability statistics), 3) content

(including food safety hazards), and 4) prevention strategies. The items in Table 1 assess three prevention strategies outlined in the Centers for Disease Control and Prevention (CDC) guidelines for preventing and managing a norovirus infection: 1) hand hygiene, 2) exclusion and isolation of sick individuals, and 3) environmental sanitation (Hall et al., 2011). While these guidelines were designed for use in health care and not home settings, at the time of the analysis it was believed they were the best source of evidence-based information to prevent norovirus infections.

A corresponding SurveyMonkey® (SurveyMonkey Inc., Paolo Alto, CA) instrument served as the coding sheet. Four trained coders independently conducted a pilot-test of the coding manual. Inconsistencies or ambiguities found in the manual during piloting were corrected before analysis began. Two trained coders then independently reviewed each artifact. Responses were entered into the SurveyMonkey® instrument. All responses were exported to an Excel spreadsheet. A third coder reconciled disagreements between coders.

To address alignment with the CDC recommendations, each artifact was assigned a total score, and sub-scores across the three disease management guidance documents were assessed: hand hygiene, isolation and exclusion of sick persons, and environmental sanitation. The maximum possible quality scores for each topic area were 7, 2, and 5, respectively. Response frequencies as well as mean scores, standard deviations, and ranges were calculated using SAS 9.3 (SAS Institute, Inc., Cary, NC).

To assess readability, two formulas were used – Flesch Reading Ease and Flesch-Kincaid Grade Level – both available in Microsoft Word. Flesch Reading Ease scores range from 0 to 100, with a lower score indicating that a document is more difficult to read than one with a higher score. A score of 70 or above is classified as ‘easy’ and is written at the grade school level. A score of 60–70 is ‘standard’ and is written at the high school level. A score of 60 or below is ‘difficult.’ The Flesch-Kincaid Grade Level uses mean sentence and word length to determine grade level between grades 3 and 12 (D'Alessandro, Kingsley, & Johnson-West, 2001).

3. Results

The Google Advanced Search yielded 826 results. After opening and viewing the first 292 results (sorted by relevance) the following was displayed on the results listing screen: “In order to show you the most relevant results, some entries very similar to the 292 already displayed were omitted. If you like, you can repeat the search with the omitted results included.” The search was repeated and it was determined that all results were duplicates of those already viewed. These 292 results were screened using the three eligibility criteria, yielding 74 artifacts which were then downloaded. After a second screening, 14 artifacts were removed due to page unavailability, duplicate, or wrong target audience. A total of 60 artifacts were included in the sample and analyzed.

3.1. Research question 1: alignment with prevention strategies

The total mean score across all three prevention strategies was low – 5.2 of 14 points – suggesting artifacts were not aligned with CDC guidelines (Table 2). All (N = 60; 100%) artifacts addressed at least one of seven components of hand hygiene that were assessed but the mean sub-score for hand hygiene was low, 2.3 of 7 points (SD = 0.77). Most (83%) did not address length of handwashing, type of drying devices (92%), avoiding bare-hand contact with ready-to-eat foods (97%), or use of hand sanitizers (83%). Of the artifacts that mentioned exclusion and isolation of sick individuals (78%), the mean score was 1.2 of 2. In nearly all artifacts (72%) sick individuals were discouraged from preparing food for others, but

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