8-2017

Content Analysis of Spanish-language Materials Targeting Consumers with Information about Human Norovirus

Ana Romero Vega
Clemson University, acromero86@gmail.com

CONTENT ANALYSIS OF SPANISH-LANGUAGE MATERIALS TARGETING CONSUMERS WITH INFORMATION ABOUT HUMAN NOROVIRUS

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
Food, Nutrition and Culinary Sciences

---

by
Ana Romero Vega
August 2017

Accepted by:
Dr. Angela Fraser, Committee Chair
Dr. Julia Sharp
Dr. Vivian Haley-Zitlin

ABSTRACT

Background and Rationale: Worldwide, human norovirus is a significant public health problem. One way to reduce the burden of illness attributed to norovirus is to educate consumers about prevention and control strategies. A common vehicle to do so is the Internet. Unfortunately, the accuracy of information posted to the Internet is not well known as no universal review system is in place.

Aim and Objectives: The aim of this study was to determine if web-based Spanish-language norovirus educational materials targeting consumers were clearly written and accurate (aligned with evidence-based prevention and control strategies). The objectives were: (1) determine if the web-based Spanish-language norovirus education materials targeting consumers are clearly written and accurate (aligned with evidence-based guidelines to control and prevent norovirus infections); (2) identify if there is a correlation between alignment and clarity scores of the web-based Spanish-language norovirus educational materials targeting consumers; and (3) analyze if the web-based Spanish-language norovirus educational materials targeting consumers differ in alignment and clarity across geographic regions.

Methods: A content analysis of web-based Spanish-language norovirus education materials targeting consumers was performed to determine if materials were aligned with the CDC prevention and control strategies and were clearly written according to the CDC Clear Communication Index (CCI). A Google Advanced Search of the Word Wide Web (WWW) for Spanish-language norovirus education materials targeting consumers was performed. All materials were independently coded by two native Spanish speakers. For data analysis, response frequencies, mean alignment and clarity scores and ANOVA were calculated using JMP®.

Results: The Google Advanced Search yielded 501 educational materials. After removing the educational materials according to the exclusion criteria, 26 eligible Spanish-language norovirus education materials were included. The total mean alignment scores for all six norovirus prevention and control strategies was low (11.6 of 33 points). The mean clarity score was also low (13.96 of 20 points), with all having a score less than CDC CCI's recommended value.

Conclusions: Our findings suggest there is a need to either revise existing educational materials other create new materials. Specifically, these findings showed what information is missing from Spanish-language norovirus education materials that should be included. Additionally, these findings demonstrate the importance of using the CCI to evaluate if educational materials are clearly written and easy to understand.

DEDICATION

I would like to dedicate this thesis to my parents, Francisco Antonio Romero Estrada and María Cecilia Vega Matamoros, and my brother, Luis Mario Romero Vega, who have faithfully supported me, given me guidance in pursuit my dreams and taught me to trust God's plans. I also wish to dedicate this work to my dear grandparents, Luis Paulino Vega Rojas and Cecilia Matamoros Valverde.

ACKNOWLEDGMENTS

I wish to thank my advisor, Dr. Angela Fraser, for allowing me the opportunity to participate in this meaningful project and for teaching me how to conduct research. Also, I thank Dr. Angela Fraser for being an excellent mentor and for encourage me to always give the best version of myself.

I thank Dr. Julia Sharp for giving her time and energy to teach me about statistics and study design. I thank Dr. Vivian Haley-Zitlin for being part of my graduate committee.

I thank the members of our Clemson University research team who played instrumental roles in this research and helped me in my writing process: Morgan G Chao, Cortney Leone, Kinsey Porter and Hillary Evans.

Finally, I would like to thank the United States Department of Agriculture, National Institute of Food and Agriculture, Agriculture and Food Research Initiative, which provided financial support for this project under "Building Capacity to Control Viral Foodborne Disease: A Translational, Multidisciplinary Approach", Grant No. 2011-68003-30395.

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

BACKGROUND AND RATIONALE

Worldwide, human norovirus is the leading cause of acute gastroenteritis, sickening an estimated 120 million people each year (WHO, 2015). Every year in the United States between 19 and 21 million people are infected resulting in 56,000 - 71,000 hospitalizations, and 570 - 800 deaths (Hall, Wikwswo, Pringle, Gould & Parashar, 2014). To combat this growing public health problem, the Centers for Disease Control (CDC) published a paper in 2011 describing three strategies known to prevent and control norovirus infections -- proper hand hygiene, exclusion and isolation of infected persons, and environmental sanitation (Hall et al., 2011). In 2015, CDC posted to their website these three strategies as well as additional safe food handling strategies (CDC, 2015).

Education can serve as a bridge between these strategies and reducing the burden of illness attributed to noroviruses. One convenient and easily accessible way to educate the public is the Internet. In the United States, as well as in many regions of the world, the Internet has become a commonly used communication channel for most people. Nearly all (84%) U.S. adults use the Internet (Pew Research Center, 2015a) with 80% reporting having Internet access at home (Gallup, 2013). According to a survey commissioned by the National Cancer Institute, half of U.S. Americans indicated the Internet was the first place they went for information about health or medical topics (National Cancer Institute, 2015). This is not surprising, given that more healthcare systems use the Internet for dissemination of health information (Lapão, da Silva & Gregório, 2017).

While the Internet is a convenient and easily accessible way to reach the public, it also has one major disadvantage -- there is no guarantee the content is accurate. Universal review systems are not in place before content is posted, as most Internet content is open access so not subject to any form of peer review. The importance of emphasizing this is that concern has been expressed about the potential risk associated with persons acting on inaccurate health information found on the Internet, which could unintentionally result in physical, emotional, and financial harm (Crocco, Villasis-Keever & Jadad, 2002). In fact, the Internet's capacity for harm is likely to be equal to or exceeded by its capacity to provide good and useful health information to users (Crocco, Villasis-Keever & Jadad, 2002). Hence, to have a positive effective, health information, including information about preventing norovirus infections, should be grounded in good scientific evidence derived from well-designed research studies. This form of evidence typically is found in peer-reviewed journals or provided by governmental/public health agencies, such as the CDC or the World Health Organization.

In addition to being grounded in good scientific evidence, information must also be clearly written (Baur & Prue, 2014). We believe educators recognize this but we believe frequently use the wrong tool to determine clarity of text. Many use readability formulas (e.g. Flesch Reading Ease and Flesch-Kincaid Grade Level), which measure grade level but not clarity, assuming if it is written at a certain grade level it will be easy to understand. An alternative to using readability formulas, or at least as a supplement, is the CDC Clear Communication Index (CCI) (Baur & Prue, 2014). This index does not rely on traditional readability formulas. Instead, it helps users improve the clarity of educational

materials, which is the appropriateness of text for specific audiences and includes general (e.g. layout) and specific (e.g. captions for graphics) factors (Baur & Prue, 2014).

CCI was grounded in the available evidence about clarity, health and science literacy, numeracy, health behavior, and risk communication as it relates to information comprehension (Baur & Prue, 2014). Additionally, the CCI was based on the 2010 U.S. Federal Plain Writing Act, which requires all U.S. federal agencies, including CDC, to clearly write government documents so the target audience can understand and act on the information (Parmer & Baur, 2015). To date, the CCI has been used by public health professionals to create water quality reports (Phetxumphou, 2014), health messages for Ebola (Santibañez, Siegel, O'Sullivan, Lacson & Jorstad, 2015), and educational materials for obese children (Brito et al., 2015). CCI has also been used as a tool to evaluate materials like a patient portal used by over 80,000 patients (Alpert, Desens, Krist, Aycock & Kreps 2017).

In addition to addressing where, what, and how content is presented, we also need to consider the language or languages in which information is communicated, particularly here in the United States. As the U.S. population becomes more multilingual, the demand for educational materials in languages other than English has also increased and with this comes problems if translations are not properly conducted. For example, often for the sake of time or lack of resources simple translations are performed using base documents in English to another language. With this, grammatical problems can emerge, wrong word choices can be made, and most importantly cultural context not be addressed. To effectively reach the public with information about how to prevent a norovirus infection,

we must develop materials in other languages that are not only accurately translated and clearly presented but that are also culturally sensitive.

In the United States as the most recent U.S. census (2010) showed, the minority population (i.e. any group other than non-Hispanic White alone) was 38%, with the minority population estimated to grow to 56% in 2060 (United Census Bureau, 2015). For persons in many minority groups, English is not their first language. In the United States, Spanish is the second most commonly spoken language -- 37.5 million people speak Spanish, many who identify as Hispanic/Latino. What is also important to note is that of the Hispanics/Latinos living in the United States, 36% report being bilingual (Spanish and English speakers) and 38% report that they mainly speak Spanish (Pew Research Center, 2015b). These statistics clearly illustrate the importance of creating norovirus educational materials in Spanish. In addition, three studies suggest that among the Hispanic/Latino community, knowledge about handwashing (Dharod et al., 2007; SteelFisher et al., 2015) and disinfecting procedures (Henley, Stein & Quinlan, 2012), two preventive strategies, might be limited warranting the need for education targeting this population group.

The aim of this study was to determine if a sample of web-based Spanish-language norovirus educational materials targeting consumers were clearly written and accurate (aligned with evidence-based guidelines to prevent norovirus infections). Three research questions guided our study: (1) Are web-based Spanish-language norovirus education materials targeting consumers clearly written and accurate (aligned with evidence-based guidelines to control and prevent norovirus infections)? (2) Is there a correlation between

alignment and clarity scores of the educational materials? (3) Do educational materials differ in alignment and clarity across geographic regions?

CHAPTER TWO

CONTENT ANALYSIS OF SPANISH-LANGUAGE MATERIALS TARGETING CONSUMERS WITH INFORMATION ABOUT HUMAN NOROVIRUS

INTRODUCTION

Worldwide, norovirus infections are a significant public health problem. According to the World Health Organization (WHO), in 2010 nearly 25% (120 million of the 600 million) of cases of foodborne disease were attributed to noroviruses illustrating the importance of developing effective intervention strategies to reduce the burden of illness (WHO, 2015). Until a vaccine becomes available, implementation of prevention and control strategies -- good hand hygiene, isolation/exclusion of infected individuals, environmental sanitation, and safe food handling practices -- is critical. Education is the bridge between these strategies and reducing the burden of illness attributed to noroviruses.

One convenient and easily accessible way to educate the public with information about how to prevent a norovirus infection is the Internet. Most (84%) Americans adults use the Internet (Pew Research Center, 2015a) and 80% have Internet access at home (Gallup, 2013). According to a survey commissioned by the National Cancer Institute, nearly 50% of U.S. Americans reported the Internet was the first place they went to get information about health and medical topics (National Cancer Institute, 2015).

While the Internet is a convenient and easily accessible way to reach the public, it also has one major disadvantage -- there is no guarantee the information is accurate.

Universal review systems are not in place before information is posted as most Internet content is open access so not subject to any form of peer review. The importance of stating this is that concern has been expressed about the potential risk associated with persons acting on inaccurate health information found on the Internet, which could unintentionally result in physical, emotional, and financial harm (Crocco, Villasis-Keever & Jadad, 2002). In fact, the Internet's capacity for harm is likely to be equal to or exceeded by its capacity to provide good and useful health information to users (Crocco, Villasis-Keever & Jadad, 2002).

This problem can become amplified as the United States becomes more multilingual and the availability of inaccurate and improperly translated materials in other languages increases. As Spanish is the second most commonly spoken language in the world (414 million speakers) (Lewis, Simons & Fennig, 2014) and the second most commonly spoken language in the United States (37.5 million speakers), we believed warranted a study aimed to examine Spanish-language norovirus educational materials currently available on the Internet.

The aim of this study was to determine if web-based Spanish-language norovirus educational materials targeting consumers were clearly written and accurate (aligned with evidence-based guidelines to prevent norovirus infections). Three research questions guided our study: (1) Are web-based Spanish-language norovirus education materials targeting consumers clearly written and accurate (aligned with evidence-based guidelines to control and prevent norovirus infections)? (2) Is there a correlation between alignment

and clarity scores of the educational materials? (3) Do educational materials differ in alignment and clarity across geographic regions?

METHODS

A content analysis of Spanish-language norovirus educational materials was performed to determine if educational materials were aligned with the CDC guidelines to prevent norovirus infections (CDC, 2015), and were clearly written using the CDC CCI. According to Krippendorff, *"a content analysis is a systematic search or a review, where the researcher attempts to draw inferences from a text as to the use of a certain trend or theme, or common characteristics in communication"* (Krippendorff, 2004). A Google Advanced Search of the Word Wide Web (WWW) for Spanish-language norovirus educational materials targeting consumers was performed. To be included in the analysis, the educational material (hereafter called an artifact) had to: (1) have been published to the WWW between January 1, 2011 and February 10, 2015; (2) target general consumers; (3) pertain to noroviruses and food safety; (4) be written in Spanish; and (5) be formatted as info sheets, articles, bulletins, newsletters, slideshows, or videos. News articles, theses, dissertations, research articles, protocols, class presentations, class syllabi, Wikipedia entries, question/answer sites, online forums, continuing education training materials, catalogues of products, government/non-government reports, non-food safety related links, educational materials formatted as blogs, and artifacts written in English were excluded. The start date of January 2011 was chosen because Scallan et al. (2011) published national statistics about foodborne disease in the United States showing

norovirus to be the leading cause of foodborne disease. Additionally in 2011, the CDC published a paper describing three strategies known to prevent norovirus infections -- proper hand hygiene, exclusion and isolation of infected persons, and environmental sanitation. In addition, CDC created Preventing Norovirus Infection guidelines available on CDC's website which are based on the paper mentioned before and include new topics like safe handling of food; procedures for cleaning and disinfecting vomit and fecal matter; and laundry (CDC, 2015).

Two Google Advanced Searches were conducted by a research assistant using two search strings: (1) "Norovirus" AND "prevención" AND "hogar" OR "cocina" OR "consumidores," and (2) "Norovirus" AND "control" AND "hogar" OR "cocina" OR "consumidores." The translation in English is (1) "Norovirus" AND "prevention" AND "home" OR "kitchen" OR "consumers," and (2) "Norovirus" AND "control" AND "home" OR "kitchen" OR "consumers." For each search string, the total number of results (links to artifacts) was recorded. Each result was opened and recorded in an electronic spreadsheet (one spreadsheet for each search string). Each spreadsheet included: identification number, individual educational material title, link, whether educational material was included or excluded, reason for exclusion (if applicable), and target population. Each artifact was converted to a portable document format (PDF) file using the NCapture function of NVivo 10® (QSR International Pty Ltd, 2013).

When the Google Advanced Search was performed, the last page of Google displayed the following, *"In order to show you the most relevant results, we have omitted some entries very similar to the [number of results] already displayed."* According to

Google Support this was displayed because *"multiple documents contained identical titles as well as the same text in their snippets, therefore, only the most relevant document from among a like set was displayed in the results"* (Google Support, 2017). All remaining artifacts were considered duplicates. We calculated the number of duplicates by subtracting the number of results displayed from the total number of results reported on the initial search result page. The final results from the second search string were compared with the final results from the first search string to find duplicates between the two search strings. The duplicates were removed, and the two spreadsheets were combined into one. Once duplicates were removed, artifacts were screened for eligibility based on inclusion criteria.

Coding

Two coding manuals were developed to analyze eligible artifacts. The first coding manual was created to assess alignment with the CDC prevention guidelines, and the second one was the CCI designed by communication experts at CDC to assess clarity. In some studies, researchers use readability formulas instead of assessing clarity. The first coding manual was comprised of 37 items divided into 3 categories: identifying information (11 items), format (2 items), and accuracy of content (24 items). Topical areas in which accuracy of content was measured included: hand hygiene (8 items); washing fruits and vegetables (1 item); cooking seafood (2 items); preparing food while sick (5 items); cleaning and disinfecting (6 items); and laundry (2 items) (CDC, 2015). In addition, we referenced cleaning and disinfecting educational materials linked on the CDC guidelines website because they described procedures for cleaning and disinfecting in

more detail (Somerset (NJ) County, National Environmental Health Association, Water Quality and Health, American Chemistry Council, & Canadian Chlorine Chemistry Council, 2015). The information from these sources was included as part of the topic cleaning and disinfecting (6 items) (Table 1).

Table 1. CDC guidelines to prevent norovirus infections used to evaluate alignment of web-based Spanish-language artifacts

Topic area	CDC guidelines to prevent norovirus infections
Hand hygiene	• Wash your hands carefully with soap and water.[a] • When should you wash your hands? - Before, during, and after preparing food; - Before eating food; - Before and after caring for someone who is sick and treating a cut or wound; - After using the toilet, changing diapers, or cleaning up a child who has used the toilet; blowing your nose, coughing, or sneezing; touching an animal, animal feed, or animal waste; handling pet food or pet treats; touching garbage.[a] • Wet your hands with clean, running water, and apply soap. Lather your hand (backs of your hands, between your fingers, and under your nails). Scrub your hands for at least 20 seconds. Rinse your hands well under clean, running water. Dry your hands using a clean towel or air dry them.[a] • Continue washing hands often during the two weeks following norovirus illness.[a] • Alcohol-based hand sanitizers can be used in addition to handwashing but not as a substitution.[a]
Washing fruits and vegetables	• Carefully wash fruits and vegetables before preparing and eating them.[a]
Cooking seafood	• Cook oysters and other shellfish thoroughly.[a] • Be aware that noroviruses are relatively resistant to heat (140°F).[a]
Preparing food while sick	• Keep sick children out of areas where food is being handled and prepared.[a] • When you are sick, do not prepare food or care for others who are sick.[a] • Do not prepare food for others or provide healthcare while you are sick and for at least 2 days after symptoms stop.[a]
Cleaning and disinfecting	• Use a chlorine bleach solution with a concentration of 1000-5000 ppm or other disinfectant registered as effective against norovirus by the Environmental Protection Agency (EPA).[a] • Clean up after a vomiting or diarrhea accident - Remove vomit or diarrhea right away: wearing protective clothing (e.g., gloves, apron and/or mask), wipe up vomit or diarrhea with paper towels; use kitty litter, baking soda, or other absorbent material on carpets and upholstery to absorb liquid; do not vacuum material: pick up

Table 1. CDC guidelines to prevent norovirus infections used to evaluate alignment of web-based Spanish-language artifacts (continued)

Topic area	CDC guidelines to prevent norovirus infections
Cleaning and disinfecting	using paper towels; dispose of paper towel/waste in plastic trash bag or biohazard bag. - Use soapy water to wash surfaces that contacted vomit/diarrhea and all nearby surfaces. - Rinse thoroughly with plain water. - Wipe dry with paper towels.[b] • Disinfect surfaces by applying a chlorine bleach solution - Prepare a chlorine bleach solution. Mixing directions are based on EPA-registered bleach product directions to be effective against norovirus. Consult label directions on the bleach product. Steam cleaning may be preferable for carpets and upholstery. - Leave surfaces wet for at least 5 minutes. - Rinse all surfaces intended for food or mouth contact with plain water before use.[b] • Wash your hands thoroughly with soap and water.[b]
Laundry	• Immediately remove and wash clothes or linens that may be contaminated with vomit/diarrhea.[a] • You should: handle soiled items carefully without agitating them; wear rubber or disposable gloves while handling soiled items, and wash your hands after; and wash the items with detergent at the maximum available cycle length then machine dry them.[a]

[a] CDC Guidelines to Prevent Norovirus Infections (http://www.cdc.gov/norovirus/preventing-infection.html)
[b] Clean-up and Disinfection for Norovirus ("Stomach Bug") (http://www.disinfect-for-health.org/wp-content/themes/disinfect/pdfs/NorovirusIncident_8.5x11_English_Color.pdf)

The second coding manual, the CCI, was used to assess clarity. The CCI consists of 20 scored items (scored as 0 or 1) that influence clarity of text and ease of understanding (Baur & Prue, 2014). The scored items were divided into 4 parts: (A) core items -- main message and call to action, language, information design, and state of the science (11 items); (B) behavioral recommendations (3 items); (C) numbers (3 items); and (D) risk (3 items) (Baur & Prue, 2014).

Two numeric scores were calculated for each artifact, one score for alignment with the CDC guidelines (alignment score) and one for clarity (CCI score). The maximum possible score for alignment was 33 points. The maximum possible score for clarity was

20 points. A minimum score of 18 points is recommended for an artifact to be considered clearly written according to the CCI (Baur & Prue, 2014). These scores allowed us to evaluate the alignment and clarity of web-based Spanish-language norovirus artifacts.

Two native Spanish speakers were trained as coders by content analysis specialists to ensure a consistent, reliable coding process. During training sessions, coders analyze 20% of the sample (n=7) as a pilot. Points of disagreement between coders were reexamined and discussed until agreement was reached for each coding item (i.e. points of disagreements were reconciled). Intercoder reliability (IR) scores were calculated for the pilot analysis (Perreault & Leigh, 1989). The pilot analysis using the alignment coding manual received an IR that was above the recommended score of 0.70 (0.97) (Perreault & Leigh, 1989). However, the pilot analysis using the CCI received an IR below the recommended score of 0.70 (0.63), therefore, a second pilot analysis on just the CCI using another 20% of the sample was performed, at which time coders scored within the recommended range (0.89).

A coding sheet was used to record coder responses to each item in the coding manual used to assess alignment. For the CCI, a score sheet created by the CDC was used to record coders' responses to each item. All responses were entered into an electronic spreadsheet. To ensure responses were entered correctly, 10% of the sample was checked by a research assistant. A scoring system was created by our research to determine educational material alignment with the six topic areas (CDC, 2015; Somerset (NJ) County, National Environmental Health Association, Water Quality and Health, American Chemistry Council, & Canadian Chlorine Chemistry Council, 2015). Based on alignment,

each artifact was assigned an alignment score and subscores for each of the six topic areas (Table 2). Each question of the coding manual had the same weight, such as 1 point. The maximum possible subscores for each topic area were as follows: hand hygiene=17, washing fruits and vegetables=1, cooking seafood=2, preparing food while sick=5, cleaning and disinfecting=6, and laundry=2. Some topics areas had more points than others because the CDC guidelines to prevent norovirus infections presented more information in some areas. For example, for washing fruits and vegetables, the guidelines only suggested to wash fruits and vegetables and no details were specified.

Table 2. Scoring key for determining alignment of web-based Spanish-language artifacts with CDC guidelines to prevent norovirus infections

Coding Manual Question by Topic Area	Correct Response	Score
Hand hygiene		
Is handwashing stated?[a]	Yes	1
What is the duration for handwashing?[a]	20 seconds or greater	1
Is soap mentioned?[a]	Yes	1
What type of drying device is recommended?[a]	Clean towel	1[c]
	Air dry	1[c]
Following which events is hand-washing suggested?		
Before, during, and after preparing food[a]	Yes	1
Before eating food[a]	Yes	1
Before and after caring for someone who is sick[a]	Yes	1
Before and after treating a cut or wound[a]	Yes	1
After using the toilet[a]	Yes	1
	Yes	1
After blowing your nose, coughing, or sneezing[a]	Yes	1
After touching an animal, animal feed, or animal waste[a]	Yes	1
After handling pet food or pet treats[a]	Yes	1
After touching garbage[a]	Yes	1
Does it mention that one should continue washing hands often during the two weeks following a norovirus infection?[a]	Yes	1
Are hand sanitizers mentioned?[a]	Yes	1
Are hand sanitizers stated to be an acceptable alternative for handwashing?[a]	No	1
	Maximum Possible Score	**17**

Table 2. Scoring key for determining alignment of web-based Spanish-language artifacts with CDC guidelines to prevent norovirus infections (continued)

Coding Manual Question by Topic Area	Correct Response	Score
Washing fruits and vegetables		
Is washing fruits and vegetables recommended?[a]	Yes	1
	Maximum Possible Score	**1**
Cooking seafood		
Is proper cooking of seafood recommended?[a]	Yes	1
Is the maximum temperature at which norovirus can survive (140°F or 60°C) mentioned?[a]	Yes	1
	Maximum Possible Score	**2**
Preparing food while sick		
Does it mention that sick infants and children must be kept out of areas where food is being handled and prepared?[a]	Yes	1
Is minimizing contact with persons when they are sick mentioned?[a]	Yes	1
Are sick persons discouraged from preparing food for others?[a]	Yes	1
Are sick persons discouraged from caring for others?[a]	Yes	1
Does it mention that sick persons must wait at least 2 days after symptoms stop to return to normal activities?[a]	Yes	1
	Maximum Possible Score	**5**
Cleaning and Disinfecting		
Are there recommendations for cleaning vomit?[a,b]	Yes	1
Are there recommendations for cleaning fecal matter?[a,b]	Yes	1
Does it mention that bleach solutions must be freshly prepared?[b]	Yes	1
Is a concentration of bleach solution suggested?[a,b]	Yes	1
Is the correct concentration of bleach for disinfection of norovirus (1,000-5,000 ppm) or another disinfectant registered as effective against norovirus stated?[a,b]	Yes	1
Is a method/procedure for cleaning vomit or fecal matter provided?[a,b]	Yes	1
	Maximum Possible Score	**6**
Laundry		
Does it recommend that one immediately remove and wash clothes or linens that may be contaminated with vomit or feces?[a]	Yes	1
Is a method/procedure for thoroughly washing soiled clothes or linens that may be contaminated with vomit or feces provided?[a]	Yes	1
	Maximum Possible Score	**2**

[a] Preventing Norovirus Infection (http://www.cdc.gov/norovirus/preventing-infection.html)
[b] Clean-up and Disinfection for Norovirus ("Stomach Bug") (http://www.disinfect-for-health.org/wp-content/themes/disinfect/pdfs/NorovirusIncident_8.5x11_English_Color.pdf)
[c] Points are mutually exclusive

Data Analysis

Response frequencies were calculated using JMP®, Version 11 (SAS Institute Inc., Cary, NC, 1989-2007). Mean alignment scores and standard deviations for each of the six strategies of the CDC guidelines to prevent norovirus infections were calculated. Based on the CDC CCI scoring system, we calculated frequencies and mean scores for clarity. Correlations were computed between alignment and clarity scores.

Artifacts were also classified by country of origin using the following geographic regions: North America (United States and Canada), Latin America (Argentina, Chile, Peru, and Venezuela), Europe (European Union and Spain), and Asia (Japan). An analysis of variance (ANOVA) test was performed to compare alignment scores between geographic regions and for clarity scores between geographic regions, using JMP®, Version 11 (SAS Institute Inc., Cary, NC, 1989-2007). Normality was assessed using the Kolmogorov-Smirnov Goodness of Fit test and homogeneity of variance was assessed using Levene's test. We also computed correlations between and within the alignment and clarity scores among geographic regions (North America, Latin America, Europe and Asia).

RESULTS

Our Google Advanced Search yielded 501 artifacts, 247 from the first search string and 254 from the second search string (Table 3). After removing 129 duplicates, 372 remained. We excluded 317, including news articles, blogs, and materials not related to food safety. Four could not be opened because the link was broken. Next, all artifacts were

screened based on target audience. We excluded 20 that did not target consumers, targeting food handlers, health professionals and special consumers (e.g. pregnant women, cancer patients). After the initial screening, 35 met our inclusion criteria. Each was then rechecked and nine more excluded because they did not meet the inclusion criteria. Those artifacts were not related to food safety (n=5), blogs (n=2), in English language (n=1), and not targeting consumers (n=1). Our final sample was comprised of 26 eligible artifacts. Our final sample of artifacts were from countries around the world, even non-Spanish-speaking countries: the United States (n=11), Japan (n=3), Spain (n=3), Argentina (n=2), Chile (n=2), Peru (n=2), Canada (n=1), and Venezuela (n=1). One was from the European Union (Figure 1).

Table 3. Number of results given by Google Advanced Search strings

	First research string	**Second research string**
Keywords	"Norovirus" AND "prevención" AND "hogar" OR "cocina" OR "consumidores"	"Norovirus" AND "control" AND "hogar" OR "cocina" OR "consumidores"
English translation	"Norovirus" AND "prevention" AND "home" OR "kitchen" OR "consumers"	"Norovirus" AND "control" AND "home" OR "kitchen" OR "consumers"
Total number of results	2260	2219
Duplicates not shown by Google	2013	1965
Number of results displayed	247	254

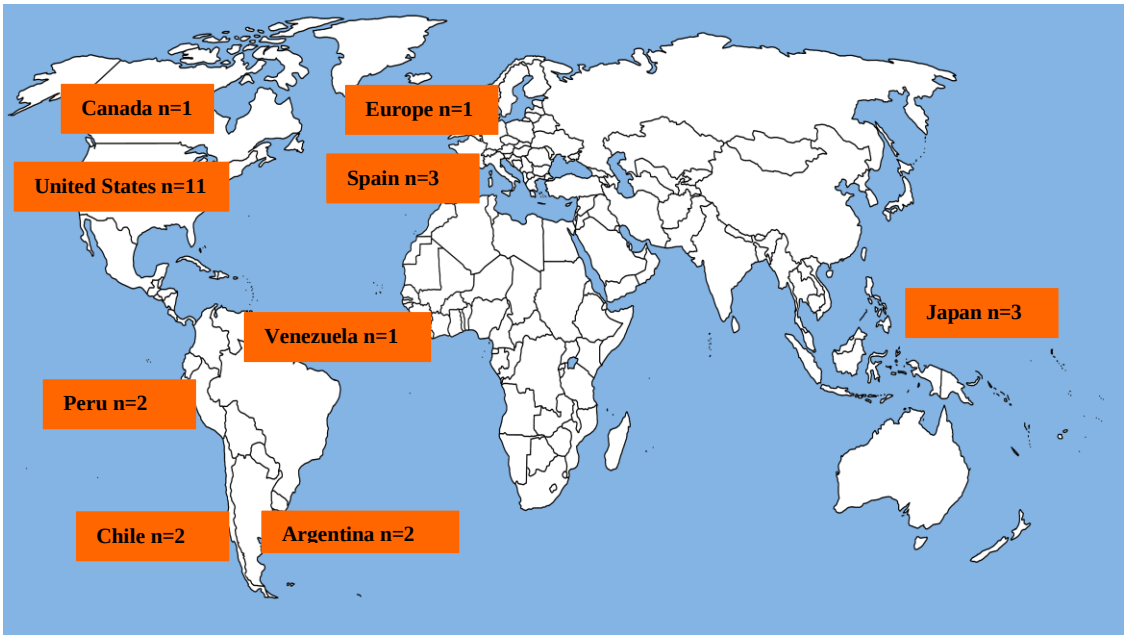

Figure 1. Artifacts by country (N=26)

Alignment with CDC Guidelines and the CCI

The mean alignment score across all six norovirus prevention strategies was low (11.6 of 33 points) (Table 4). All (N=26) addressed at least one of the 17 dimensions of hand hygiene, but the mean hand hygiene score was low (6.6 of 17 points; SD=2.6) (Table 5). The length of handwashing was only mentioned in 9 (34.6%). The tools listed for hand hygiene -- soap and hand sanitizer -- differed across artifacts. Soap was mentioned in 20 (77.0%) while hand sanitizer was only mentioned in 7 (27.0%). Most suggested washing hands after using the toilet (21, 80.8%); before, during, and after preparing food (19, 73.1%); and before eating food (14, 53.9%). Nearly half (11, 42.3%) mentioned cleaning up vomit were mentioned and 12 (46.1%) cleaning up fecal matter. However, only 4 (15.4%) stated bleach solutions must be freshly prepared, and only 2 (8.1%) provided actual procedures for how to clean up vomit or fecal matter.

Table 4. Mean score for alignment with the CDC guidelines to prevent norovirus infections (N=26)

Prevention or Control Strategy	Artifacts[a]		Max Possible Score	Mean Score	Range (Min-Max)	SD[b]
	N	%				
Hand hygiene	26	100	17	6.6	3-14	2.6
Washing fruits and vegetables	16	61.5	1	0.6	0-1	0.5
Cooking seafood	17	65.4	2	0.8	0-2	0.7
Preparing food while sick	20	76.9	5	1.5	0-4	1.2
Cleaning and disinfecting	14	53.8	6	1.7	0-6	1.9
Laundry	7	26.9	2	0.4	0-2	0.8
Total	26	100	**33**	**11.6**	5-23	4.9

[a] Artifacts refer to individual items included in our sample.
[b] SD = Standard deviation

Table 5. Number of artifacts addressing each coding manual item derived from the CDC guidelines to prevent norovirus infections (N=26)

Item	Number of artifacts that addressed item n (%)
Hand Hygiene	
Handwashing is stated	26 (100)
Duration of handwashing: 10-15 seconds	1 (3.9)
Duration of handwashing: 20 seconds or greater	8 (30.8)
Mentioned soap	20 (77.0)
Type of soap: plain	2 (7.7)
Type of soap: liquid	5 (19.2)
Type of drying device: paper towels	3 (11.6)
Type of drying device: paper towels or cloth towels	1 (3.8)
Events warranting handwashing:	22 (84.6)
Before, during, and after preparing food	19 (73.1)
Before eating food	14 (53.9)
Before and after caring for someone who is sick	4 (15.4)
Before and after treating a cut or wound	1 (3.8)
After using the toilet	21 (80.8)
After changing diapers or cleaning up a child who has used the toilet	8 (30.8)
After blowing your nose, coughing, or sneezing	3 (11.5)
After touching an animal, animal feed, or animal waste	2 (7.7)
After handling pet food or pet treats	1 (3.8)
After touching garbage	3 (11.5)
Continue washing hands often for two weeks after norovirus illness	9 (34.6)
Hand sanitizers mentioned	7 (27.0)

Table 5. Number of artifacts addressing each coding manual item derived from the CDC guidelines to prevent norovirus infections (N=26) (continued)

Item	Number of artifacts that addressed item n (%)
Hand sanitizers stated not to be an acceptable substitute for handwashing	5 (19.2)
Washing Fruits and Vegetables	
Washing fruits and vegetables	16 (61.5)
Cooking Seafood	
Proper cooking	16 (61.5)
Maximum temperature at which noroviruses survive	4 (15.4)
Preparing Food while Sick	
Keeping sick children out of areas where food is prepared and handled	3 (11.5)
Minimizing contact with persons when they are sick	12 (46.2)
Sick persons discouraged from preparing food for others	12 (46.2)
Sick persons discouraged from caring for others	5 (19.2)
Sick persons must wait at least 3 days to return to normal activities	9 (34.6)
Sick persons must wait at least 2 days to return to normal activities	8 (30.1)
Cleaning and Disinfecting	
Recommendations for cleaning vomit	11 (42.3)
Recommendations for cleaning fecal matter	12 (46.1)
Bleach solutions must be freshly prepared	4 (15.4)
Concentration of bleach solutions suggested (i.e.1000-5000 ppm)	8 (30.1)
Correct concentration of bleach for disinfection of norovirus	6 (23.1)
Procedure for cleaning vomit or fecal matter	2 (8.1)
Laundry	
Remove and wash clothes/linens contaminated with vomit or feces	7 (26.9)
Procedure for washing clothes/linens contaminated with vomit or feces	4 (15.4)

The maximum possible clarity score was 20 points, with CDC recommending a minimum CCI score of 18 points to be considered clearly written. The mean clarity score across all artifacts (N=26) was 13.96 ± 2.31 (range 9-17), with all having a score less than the recommended value (Table 6).

Table 6. Number of artifacts that addressed each item included in the CDC Clear Communication Index (N=26)

Item	Number of artifacts that addressed item n (%)
Part A: Core	
Main message	23 (88.5)
Main message location	21 (80.8)
Visual cues	5 (19.2)
Visual support	4 (15.4)
Call to action	26 (100)
Active voice	18 (69.2)
Words used by primary audience	20 (76.9)
Use of lists	24 (92.3)
Organization	18 (69.2)
Placement of important information	24 (92.3)
Known/unknown information	15 (57.7)
Part B: Behavioral Recommendations	
One or more behavioral recommendations	26 (100)
Why recommendation is important	23 (88.5)
How to perform recommendation(s)	23 (88.5)
Part C: Numbers	
Number use	13 (50.0)
Meaning of numbers	20 (76.9)
Calculations	20 (76.9)
Part D: Risk	
Nature of risk	20 (76.9)
Risks and benefits[a]	20 (76.9)
Probability[a]	0 (0)
Mean Score[b]	**13.96 ± 2.31**

[a] For these items, N/A was counted as a 'No' response.
[b] The maximum possible score for all items combined was 20.

Of the 20 items included in the CCI, inclusion of a call to action and one or more behavioral recommendations were the only items included in all 26 (100%) artifacts. Most used lists appropriately (24, 92.3%); had important information placed correctly (24, 92.3%); explained why recommended behaviors were important (23, 88.5%); included specific directions for how to perform the recommended behavior (23, 88.5%); and clearly stated the main message in the beginning of the artifact (23, 88.5%). However, none addressed any type of probability of risk.

During our analysis, spelling and grammatical errors became apparent. In one artifact, “eses” (the plural form of the letter “s” in Spanish) was used when the correct spelling should have been “heces” (meaning “feces”). Another error was “Como tomar la temperatura” when it should have been written as a question, “¿Cómo tomar la temperatura?” (meaning, “How to measure temperature?”). Also, we found words that were not correctly translated from English to Spanish, such as “diarrhea” (the correct word in Spanish is “diarrea"), “systematico” (the correct word in Spanish is “sistémico”), “desinfectador” (the correct word in Spanish is “desinfectante”). These errors could possibly affect the reading comprehension of Spanish-speaking consumers.

Comparison of Alignment and Clarity

Alignment and clarity were plotted on a graph with the x-axis representing alignment scores, and the y-axis representing clarity scores. The line in the x-axis indicates 50% of the total score for alignment (i.e. 16.5 of 33 points). The line in the y-axis indicates 50% of the total score for clarity (i.e. 10 of 20 points) (Figure 2). Few (5) had high scores (>50%) in both clarity and alignment (upper right quadrant); 19 had high clarity scores but poor alignment scores (upper left quadrant); 1 had a score of 50% for clarity and 50% for alignment (on the x-axis between the two left quadrants); and 1 had poor scores in both clarity and alignment (lower left quadrant). Lastly, there was a significant correlation between alignment scores and clarity scores ($r=0.4979$, $p=0.0096$). As alignment scores increased, clarity scores also increased.

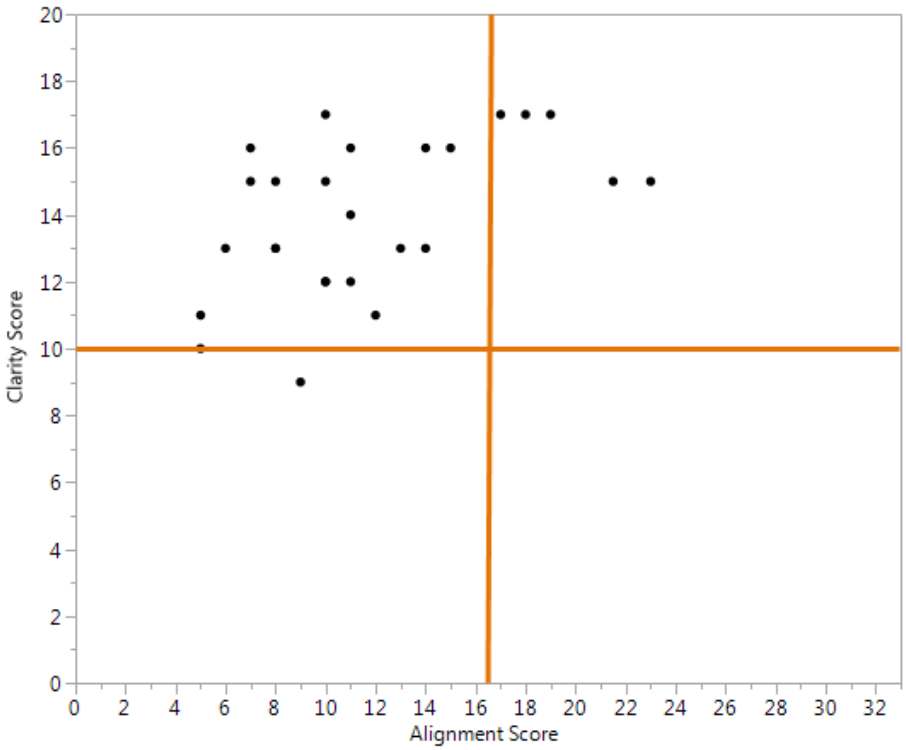

Figure 2. Scatterplot comparing alignment scores and clarity scores (N=26).
The following coordinates have two overlapping data points: (8,13), (10,12).

Comparison between Geographic Regions

The ANOVA test for alignment scores had an F-ratio of 1.8512 (p=0.1674), indicating no significant difference in alignment scores among the geographic regions (Figure 3). The ANOVA test for clarity scores had an F-ratio of 1.7893 (p=0.1801), also indicating no significant difference in clarity scores among geographic regions (Figure 4). Although there was a significant correlation between alignment scores and clarity scores across artifacts (r=0.4979, p=0.0096), correlations were not significant within the geographic regions: Asia (r=0.0751, p=0.9521), Europe (r=0.2967, p=0.7033), Latin America (r=0.6518, p=0.1127), and North America (r=0.3920, p=0.2075).

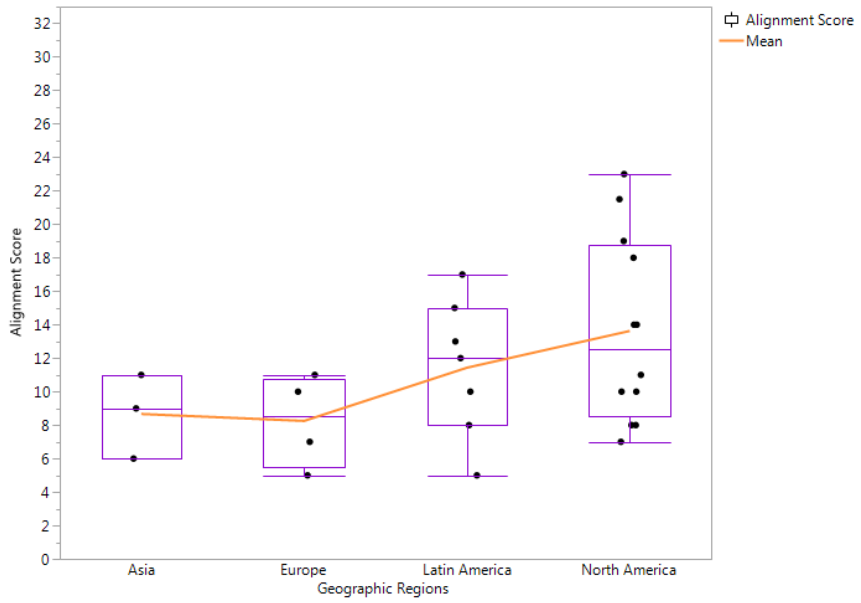

Figure 3. ANOVA of alignment scores by geographic region (N=26)

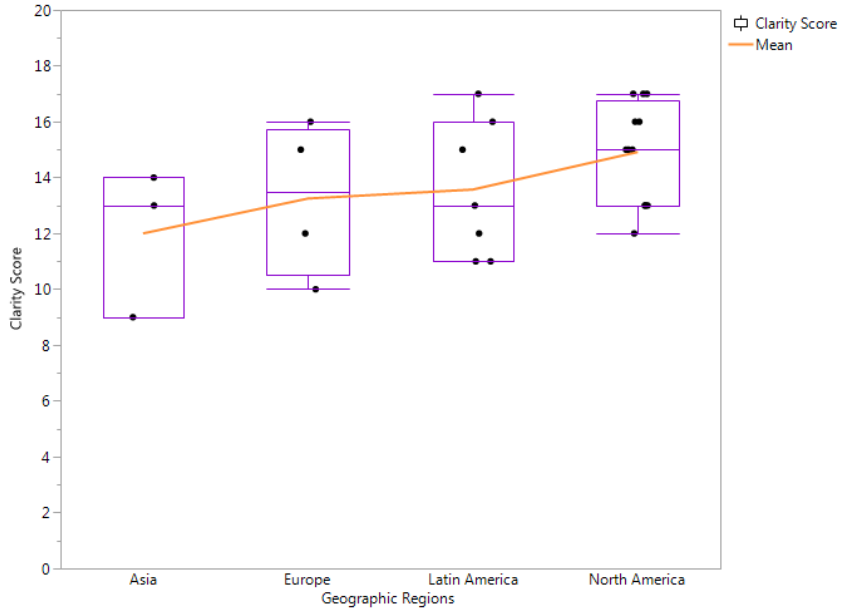

Figure 4. ANOVA of clarity scores by geographic regions (N=26)

DISCUSSION

Alignment

Total mean alignment scores across the six topical areas were low with less than half of the artifacts addressing maximum temperatures at which noroviruses survive; preparing food for others when sick; caring for others when sick; recommendations for cleaning vomit and fecal matter; procedures for washing contaminated clothes/linens contaminated; and freshly preparing bleach solutions. There are two possible reasons for these omissions. First, authors did not use updated evidence-based information. We do know that 2 artifacts were created in 2015; 7 in 2014; 6 in 2013 with almost half (11) not reporting a date. The second reason is that authors might not have believed these strategies were practical or necessary in a home environment so did not mention them.

Several studies have documented that many consumers do not use thermometers to measure food temperatures as it is believed to be impractical, which could explain cooking temperature omissions. In a study of 199 households, only 4% of households reported using a thermometer to check doneness of ground beef patties (Phang & Bruhn, 2011). In addition, the maximum temperature which noroviruses survive is a gap of knowledge in food safety professionals. In a study, researchers reported 33.5% of 314 food safety professionals thought steaming shellfish for 3 minutes will inactivate norovirus (Kosa, Cates, Hall, Brophy & Fraser, 2014), which is not correct since the steaming temperature is 100 ºF and the maximum temperature norovirus survive is 140 ºF.

It was also not surprising that information regarding excluding or isolating individuals was omitted as this would be difficult to do within a single household. For example, in a house where both parents are sick, staying isolated could be difficult as they need to take care and cook for their children. Moreover, implementing procedures to clean up vomit and fecal matter can be difficult in a household. For instance, one of the steps is to leave surface wet for at least 5 minutes. For some consumers, the fact that they have to wait for 5 minutes to continue disinfecting might also generate some anxiety (i.e. they want to finish quickly because they are handling vomit/diarrhea). Also, is more common for consumers to have a prepared cleaning solution in their houses than prepare a fresh chlorine bleach solution. Frequently, the availability of prepared cleaning solutions in the markets is higher than chlorine bleach solutions. Indeed, it is more practical for consumers to use cleaning solutions rather than prepared fresh chlorine solutions at home.

Similar to cleaning and disinfecting vomit/diarrhea, immediately removing and washing clothes or linens contaminated with vomit/feces might be impractical because perhaps consumers are occupied doing other home activities and do not have time to do it immediately. The recommendation of immediately removed and wash clothes or linens contaminated with vomit/feces might be impractical because perhaps consumers are occupied doing other home activities and do not have time to do it immediately.

Clarity

None of the artifacts received a clarity score of 18 points or above. The maximum possible score was 20 points. Therefore, none of the artifacts were clearly written as a minimum score of 18 points is recommended for an educational material to be considered

clearly written according to the CCI (Baur & Prue, 2014). Also, in our study a few artifacts included visual cues (5, 19.2%) and visual support (4, 15.4%). One possible reason authors of the artifacts did not included visual cues and visual support is authors may not be trained in creating clear and evidence-based materials. When visual cues and visual support are not presented in an educational material, the clarity of an educational could be affected. Studies have shown that when educational materials that present clear information, specifically visual cues and visual support could generate a positive effect on consumers' knowledge, comprehension (Zipkin et al., 2016) and behavior change (Yin et al., 2008).

Educational materials not only need to be clearly written, they need to be well translated. If translation is poor, the meaning of messages could be obscured, possibly affecting the process of learning. Moreover, if the material is not written using correct grammar, changes in consumers' knowledge could be affected because the norovirus educational materials are unclear which could lead to educational materials being interpreted differently. For successful reading comprehension, the text must at least be written correctly because it involves the construction of a coherent mental representation of the text in the reader's memory. This mental representation of the text is part of the reading comprehension (McCrudden & Kendeou, 2014).

We recommend that health professionals who are involved in developing Spanish-language norovirus education materials hire a native Spanish speaker with expertise and/or knowledge about noroviruses. Translation software is not recommended because it does not take into account the cultural nuances of Spanish. For example, the translator can

identify a word in Spanish that appears to be synonymous in its main sense of word in the source language; the connotations associated with it do not tend to be identical in the target language (Radulescu, 2015). Even more, if one wants to communicate about health appropriately, conducting a cultural awareness assessment first is important (CDC, 2009; Bender, Martínez and Kennedy, 2016). This means learning as much as possible about the culture of the target audience (in this case Hispanics/Latinos) before developing educational materials. In this way, one can prevent cultural gaps that could have negative consequences (du Pré, 2010). For example, educators should use words that are familiar for Hispanics/Latinos consumers in order that they will have a better understanding and learn the correct procedures of how to clean and disinfect after an episode of diarrhea and/or vomit. This strategy will prevent spread of diarrhea and/or vomit because they do not know the correct procedures of cleaning and disinfecting.

Scores and Geographic Regions

The artifacts were not significant different across geographic regions as they might share the same information references. Nearly two-thirds (17 of 26, 65.4%) did not cite references so we could not perform an analysis to confirm whether common sources were used. Also, authors are not trained in how to create educational materials that are clear and easy to understand because training in the art of clear communication could not be required for the job position. Furthermore, authors of educational materials in the sample might not have known about the CDC guidelines to prevent norovirus infections. While this guidelines are on the Internet (i.e. public domain), it might not be a known or commonly used source of information for those who created the educational materials.

Moreover, authors might have use information from other sources for which the scientific evidence base is unknown or possibly incorrect.

Limitations

The Internet has an ever-changing nature. Therefore, educational materials sampled during the study could change as time progresses, so new materials that are better aligned with the CDC guidelines to prevent norovirus infections might become available. Also, we cannot expect educational materials created before 2014 to necessarily be in alignment with the CCI because it was published in September 2014.

Content analysis is a descriptive method because it describes what is in educational material but may not reveal the underlying motives for the observed pattern (i.e., content analysis answers the question "What?" but not the question "Why?"). As a result, a content analysis of educational materials was performed based on the information presented in the educational materials, but we were not able to interview the authors about the reasons for using that information or designing the education materials in a specific way.

CONCLUSION

Spanish-language norovirus education materials available on the Internet that target consumers were not aligned with CDC evidence-based guidelines to prevent norovirus infections, specifically clean-up procedures for vomit and fecal matter (including laundry procedures). Also, Spanish-language norovirus education materials were not clearly written. Our findings suggest there is a need to either revise existing

materials or create new materials. As the evidence base about norovirus continues to grow, it is wise for authors of educational materials to routinely review and revise educational materials to be sure the content is based on the best scientific evidence. Specifically, this study showed what information is missing from Spanish-language norovirus education materials that should be included in the future. Additionally, public health professionals should use the CCI to create clearly written, easy to understand education materials. Finally, authors should keep in mind that Spanish-language education materials should be culturally appropriate. Future research analyzing the content of web-based Spanish-language materials targeting consumers with information about human noroviruses should attempt to interview the authors to identify the target audience to determine if they are culturally appropriate.

REFERENCES

Alpert, J.M., Desens, L., Krist, A.H., Aycock, R.A., Kreps, G.L. (2017). Measuring health literacy levels of a patient portal using the CDC´s Clear Communication Index. *Health Promotion Practice*, 18 (1), 140-149.

Baur, C., & Prue, C. (2014). The CDC Clear Communication Index is a new evidence-based tool to prepare and review health information. *Health Promotion Practice*, 15 (5), 629-637.

Bender, M, S., Martinez, S., & Kennedy, C. (2016). Designing a culturally appropriate visually enhanced low-text mobile health app promoting physical activity for Latinos: a qualitative study. *Journal of Transcultural Nursing*, 27(4), 420-428.

Brito, F., Zoellner, JM., Hill, JL., Hou, X., Alexander, R.C., Brock, D.P., & Estabrooks, PA. (2015). Using clear communication strategies to adapt and evaluate evidence-based childhood obesity intervention materials. Society for Behavioral Medicine; 2015 Apr 22-25; San Antonio, TX.

Centers for Disease Control Prevention (CDC) (2015). Preventing norovirus infection. Retrieved from http://www.cdc.gov/norovirus/preventing-infection.html

Centers for Disease Control Prevention (CDC) (2009). Simply Put: A guide for creating easy-to-understand materials. Retrieved from https://www.cdc.gov/healthliteracy/pdf/Simply_Put.pdf

Crocco, A.G., Villasis-Keever, M., & Jadad, A.R. (2002). Analysis of cases of harm associated with use of health information on the internet. *Journal of the American Medical Association*, 287 (21), 2869-2872.

Dharod, J.M., Pérez-Escamilla, R., Paciello, S., Bermúdez-Millán, A., Venkitanarayanan, K., & Damio, G. (2007). Comparison between self-reported and observed food handling behaviors among Latinas. *Journal of Food Protection*, 70(8), 1927-1932.

du Pré, A. (2010). *Communicating about Health*. (3th ed.) New York, NY: Oxford University Press, Inc.

Gallup (2013). Home internet access still out of reach for many worldwide. Retrieved from http://www.gallup.com/poll/159815/home-internet-access-remains-reach-worldwide.aspx

Google Support. (2017). Documents automatically filtered from search results. Retrieved from https://support.google.com/gsa/answer/2672256?hl=en

Hall, A.J., Vinjé, J., Lopman, B., Park, G. W., Yen, C., Gregoricus, N., & Parashar, U. (2011). Updated Norovirus outbreak management and disease prevention guidelines. *Morbidity and Mortality Weekly Report*, 60, 1-15.

Hall, A.J., Wikswo, M.E., Pringle, K., Gould, L.H., & Parashar, U.D. (2014). Vital signs: foodborne Norovirus outbreaks -- United States, 2009-2012. *Morbidity and Mortality Weekly Report*, 63(22), 491-495.

Henley, S.C., Stein, S.E., Quinlan, J.J. (2012). Identification of unique food handling practices that could represent food safety risks for minority consumers. *Journal of Food Protection*, 75 (11), 2050-2054.

Kosa, K.M., Cates, S.C., Hall, A.J., Brophy, J.E., & Fraser, A. (2014). Gaps in Food Safety Professionals' Knowledge about Noroviruses. *Journal of Food Protection*, 77 (8), 1336-1341.

Krippendorff, K. (2004). *Content analysis: an introduction to its methodology* (2 Ed). Thousand Oaks, CA: Sage.

Lapão, L.V., da Silva, M.M., & Gregório, J. (2017). Implementing an online pharmaceutical service using design science research. *BMC Medical Informatics and Decision Making*, 31 (17), 1-14.

Lewis, M.P., Simons, G.F., & Fennig, C.D. (eds.). (2016).*Ethnologue: Languages of the World, Nineteenth edition.* Retrieved from https://www.ethnologue.com/statistics/size

McCrudden, M.T., & Kendeou, P. (2014). Exploring the link between cognitive processes and learning from refutational text. *Journal of Research in Reading*, 37 (1), 116-140.

National Cancer Institute (2015). The health information trends survey. Retrieved from http://hints.cancer.gov/default.aspx

Parmer, J., & Baur, C. (2015). How CDC is promoting a clear communication culture. *The European Medical Writers Association*, 24(1), 9-13.

Phang, H.S., & Bruhn, C.M. (2011). Burger preparation: What consumers say and do in the home. *Journal of Food Protection*, 74, 1708-1716.

Perreault, W.D. Jr., & Leigh, L.E. (1989). Reliability of nominal data based on qualitative judgments. *Journal of Marketing Research*, 26(2), 135-148.

Phetxumphou, K. (2014). Consumers and Their Drinking Water: Communicating Water Quality and Assessing the Reaction of Zerovalent Nanoiron (nZVI) with Saliva. Retrieved from VTechWorks. (http://hdl.handle.net/10919/49260)

Pew Research Center (2015a). Americans' Internet access: 2000-2015. Retrieved from http://www.pewinternet.org/2015/06/26/americans-internet-access-2000-2015/

Pew Research Center (2015b). A majority of English-speaking Hispanics in the U.S. are bilingual. Retrieved from http://www.pewresearch.org/fact-tank/2015/03/24/a-majority-of-english-speaking-hispanics-in-the-u-s-are-bilingual/

Radulescu, A. (2015). The cognitive impact of computer-assisted translation (CAI) and machine translation (MT). *Contemporary Readings in Law and Social Justice*, 7 (2), 60-65.

Santibañez, S., Siegel, V., O'Sullivan, M., Lacson, R., & Jorstad, C. (2015). Health communications and community mobilization during an ebola response: partnerships with community and faith-based organizations. *Public Health Reports*, 130, 1-6.

Scallan, E., Hoekstra, R., Angulo, F., Tauxe, R., Widdowson, M., Roy, S., Jones, J., & Griffin, P. (2011). Foodborne illness acquired in the United States -- major pathogens. *Emerging Infectious Diseases*, 17(1) 7-15.

Somerset (NJ) County, National Environmental Health Association, Water Quality and Health, American Chemistry Council, & Canadian Chlorine Chemistry Council (2015). Clean-up and disinfection for Norovirus ("Stomach Bug"). Retrieved from http://www.disinfect-for-health.org/wp-content/themes/disinfect/pdfs/NorovirusIncident_8.5x11_English_Color.pdf

SteelFisher, G.K., Blendon, R.J., Kang, M., Ward, J.R.M., Kahn, E.B., Maddox, K.E.W., Lubell, K.M., Tucker, M., & Ben-Porath, E.N. (2015). Adoption of preventive behaviors in response to the 2009 H1N1 influenza pandemic: a multiethnic perspective. *Influenza and Other Respiratory Viruses*, 9 (3), 131-142.

United States Census Bureau (2015). New census Bureau report analyzes U.S. Populations Projections. Retrieved from https://www.census.gov/newsroom/press-releases/2015/cb15-tps16.html

World Health Organization (WHO) (2015). WHO estimates of the global burden of foodborne diseases. Retrieved from: http://apps.who.int/iris/bitstream/10665/199350/1/9789241565165_eng.pdf?ua=1

Yin, H.S., Dreyer, B.P., van Schaick, L., Foltin, G.L., Dinglas, C., Mendelson, A.L. (2008). Randomized controlled trial of a pictogram-based intervention to reduce

liquid medication dosing errors and improve adherence among caregivers of young children. *Archives of Pediatrics and Adolescent Medicine Journal*, 162 (9), 814-822.

Zipkin, D.A., Umscheid, C.A., Keating, N.L., Allen, E., Aung, K., Beyth, R., Kaatz, S., Mann, D.M., Sussman, J.B., Korenstein, D., Schardt, C., Nagi, A., Sloane, R., & Feldstein, D.A. (2014). Evidence-based Risk Communication. *Annals of Internal Medicine*, 161, 270-380.