Development and Testing of a Vaccination Message Targeted to Persons With Spinal Cord Injuries and Disorders

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Abstract

Background/Objective: Individuals with spinal cord injuries and disorders (SCI&D) are at high-risk of complications and death after influenza and pneumonia. Respiratory vaccinations are effective in reducing infection and complications. The aim of this study was to test the feasibility and effectiveness of a multimedia educational message developed using a strong theoretical basis and targeted consumer input to modify negative perceptions, increase knowledge, and positively influence intentions and beliefs regarding respiratory vaccinations.

Methods: Veterans with SCI&D (n = 36) completed a pretest questionnaire, viewed the message, and, after a clinic visit, completed a posttest questionnaire. Mean differences were examined using paired *t* tests. Providers (n = 25) were surveyed about the content, comprehension, and reception of the message; response frequencies were examined.

Results: Respondents showed positive changes in beliefs from pre- to posttest on multiple items related to knowledge, severity, and self efficacy and response efficacy. There were no changes in perception of personal susceptibility to these diseases. Most providers were in favor of using the message in this population.

Conclusions: A brief theory-based multimedia intervention is a feasible way to improve knowledge and attitudes about respiratory vaccinations in high-risk populations.

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INTRODUCTION

The benefits of influenza and pneumococcal immunizations are well documented. Influenza vaccine has been found to be effective in decreasing illness severity, preventing secondary complications, and reducing the risk of influenza-related hospitalizations and death among adults in various age groups, with and without

high-risk medical conditions (1–4). Pneumococcal polysaccharide vaccine (PPV) has also been shown to be effective in preventing some pneumococcal pneumonias and bacteremia and reducing related mortality (5–9). However, even with these efficacious preventive measures, vaccination rates for populations with disabilities, such as those with spinal cord injuries and disorders (SCI&D) who are often at increased risk for mortality caused by influenza and pneumonia, remain below the rates advocated by *Healthy People 2010*. The *Healthy People 2010* goal for influenza and pneumococcal vaccination is 90% for noninstitutionalized adults 65 years of age and older and 60% for noninstitutionalized high-risk persons with disabilities 18 to 64 years of age (10). For veterans with SCI&D, regardless of age, the Department of Veterans Affairs goals are 75% for annual influenza vaccination and 85% for PPV (11).

During fiscal year (FY) 2002, national vaccination rates for veterans with SCI&D 65 years of age and older

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were 62% for influenza and 78% for ever having received PPV, whereas rates for vaccination in the general veteran population 65 years of age and older during the same time period were higher at 68% and 81%, respectively (11). However, the rates for younger veterans with SCI&D showed room for improvement in FY2002: influenza, younger than 65 years of age (57%) and younger than 50 years (50%) (12); PPV, younger than 65 years of age (54%) (SCI QUERI¹, unpublished data).

Vaccination is of particular importance to individuals with SCI&D. Respiratory complications are a leading cause of morbidity and mortality in this population; this risk is increased for individuals with tetraplegic vs paraplegic levels of injury (13). Overall, compared with the general population, individuals with SCI&D are 37 times more likely to die from respiratory complications after influenza or pneumonia (14). These increased risks coupled with lower rates of vaccination are a tremendous cause for concern and a crucial issue to address in the disabled population. Assessment of attitudes and knowledge regarding influenza and pneumonia vaccinations shows that low vaccination rates in veterans with SCI&D are associated with limited knowledge about the vaccine, belief that vaccination is unimportant, poor understanding of personal susceptibility, and the severity of influenza, as well as lack of knowledge about the availability of the PPV (15).

Prior intervention work on influenza that the authors (FW, SL) were involved in included a quasi-experimental study conducted with 2,284 veterans with SCI&D at 8 Veterans Administration (VA) facilities nationwide (16). The intervention group received mailed reminders, viewed targeted educational material in the clinics, and in some cases interacted with “clinical champions” who advocated for influenza vaccination. This relatively low-cost intervention was modestly effective in improving rates; the influenza vaccination rate was significantly higher in the intervention groups (61%) than in the control groups (54%; $P = 0.01$).

Additional national vaccination interventions focusing on influenza vaccination and PPV used strategies including mailed reminders to patients, provider education, computerized clinical reminders, and standing orders. Vaccination rates have remained steady, with FY2003 national rates among veterans with SCI&D for influenza vaccination and PPV reaching 61% and 79%, respectively (11).

However, there remain certain subgroups within the SCI&D population that are less likely to be vaccinated, including those who are younger (<50 years) and those

who are not married (16). When a cohort of veterans with SCI&D were asked why they did not receive an annual influenza vaccination, the top reasons cited were (a) not thinking that they needed the shot; (b) belief that they got the flu after getting a flu shot in the past; and (c) worry about getting sick from the shot. Among patients with SCI&D who never received PPV, the top reasons for nonreceipt were (a) never heard of it and (b) did not think I needed the shot (SCI QUERI, unpublished data).

In light of the serious consequences of respiratory problems among veterans with SCI&D and their high risk for complications, the purpose of this study was to develop a brief educational message about influenza and pneumococcal vaccinations in hopes of reaching individuals who did not respond to “generic” educational mailings and reminders regarding vaccination. Theoretical models and empirical research have identified numerous constructs that affect behavior change. Integrating these theoretical constructs is an important step in designing messages to increase influenza and pneumococcal vaccination among persons with SCI&D. The content of the educational message for this study was developed using the Theory of Planned Behavior (TPB) and the Extended Parallel Process Model (EPPM) as the groundwork and by soliciting input from persons with SCI&D.

An individual’s beliefs, attitudes, perceived control, and expectations regarding behavior change are key components in determining behavioral intention, which is the most immediate determinant of a person’s behavior in the TPB (17–21). Subjective norms encompass an individual’s perception of the social pressure to perform or not perform a behavior (21). As part of the TPB, subjective norms include the role of physicians and peers in the decision process. Surveys show that people consider physicians their most important source of information about health and medicine, which is consistent with evidence that a physician’s recommendation is an effective means of motivating patient behavior, including motivation to seek influenza and pneumococcal vaccination (22–25). Furthermore, research indicates that peer and family acceptance or promotion of influenza vaccination can be persuasive (26–28). Thus, past research indicates that addressing subjective norms in an intervention message is likely to have a persuasive effect. The TPB also addresses the role of efficacy in persuasion, in that an individual must believe the behavior being advocated is under his/her control.

The EPPM was developed by Witte to provide a theoretical basis for explaining why some messages using fear as a motivator succeed in persuading people to adopt health behavior change, whereas other fear appeals fail (29–31). The EPPM proposes that a fear appeal message initiates 2 appraisals. The first is the threat appraisal, in which an individual assesses both the perceived risk (ie, susceptibility) and perceived severity of

¹The Department of Veteran’s Affairs developed the Spinal Cord Injury Quality Enhancement Research Initiative (SCI QUERI) to identify gaps in knowledge of treatment and management, carry-out research to address these gaps, identify best practices, and to implement evidence-based findings to improve health outcomes for veterans with SCI&D.

the health threat (eg, “How bad is influenza?”). If perceived risk and severity are low, the individual will cease to process the message. If perceived risk and severity are high, the model suggests that the individual will continue to the efficacy appraisal. In this appraisal, the individual assesses his or her perceived self efficacy (belief that he/she can enact the behavior requested; eg, get vaccinated) and perceived response efficacy (belief in the effectiveness of the message’s recommendations, eg, vaccines work) regarding the recommended health behavior. The EPPM proposes that a high level of efficacy is associated with accepting and acting on the recommended response (eg, get a flu shot), whereas low efficacy is associated with rejection of the recommended response.

Thus, by using a collaborative approach that involved a theoretical basis and consumer input, the goal of this study was to integrate theory while ensuring that the developed message contained the information most needed by and persuasive to the intended audience of veterans with SCI&D. The intention was to design an educational intervention aimed at positively influencing intentions and beliefs regarding respiratory vaccinations.

METHODS

Design

During 2004/2005, an unblinded feasibility study was conducted to test a brief multimedia message designed to overcome barriers to vaccination by modifying negative perceptions and increasing knowledge. This pilot study of a targeted respiratory vaccination message included a pre- and posttest evaluation of patients’ attitudes, beliefs, and knowledge related to vaccinations, in addition to a 1-time assessment of message content, clarity, and feasibility of its use according to health care providers of persons with SCI&D. In addition to the self-reported patient data, VA administrative databases were used to collect demographic data including age, sex, marital status, ethnicity/race, and education level. The VA Spinal Cord Dysfunction Registry was used to obtain veterans’ injury characteristics including level of injury and duration of injury.

Subjects and Setting

Participants included a convenience sample of community-dwelling veterans with SCI&D who receive care from a large Midwest VA Spinal Cord Injury (SCI) center. Participation in the study occurred in conjunction with a regularly scheduled office visit. Providers at the SCI center were surveyed during their monthly staff meeting.

Procedures

Creating the Message. As a first step, focus groups were conducted with 2 groups of veterans with SCI&D to learn their reactions to various message formats (eg, use of cartoon-like characters vs images of real people), types of messages (eg, use of messages invoking fear or positive

affect), and content (eg, what should the demographic characteristics of the persons portrayed in the message be?). The first focus group included 5 veterans with either paraplegic or tetraplegic level injuries; they ranged in age from 52 to 74 years. In this focus group, participants were shown an original digital video disc (DVD) message previously developed for an elderly population highlighting the importance of annual influenza vaccination (32). This original message was designed to highlight risk and severity while also focusing on self- and response efficacy, as advocated by the TPB and the EPPM.

As expected, focus group responses indicated the need to significantly alter the previously developed message. In particular, our participants indicated that issues related to severity and transmission of the virus needed to be more fully addressed in the message. Suggestions included the need to scare viewers as to the seriousness and potential deadly outcomes of not being vaccinated (especially among persons with SCI&D), including the possibility of contracting pneumonia and dying; using drawings that included persons with SCI&D; and including animated slides (eg, moving droplets depicting influenza being transmitted to others through coughing and sneezing). In particular, the participants stressed the need to make the message more fearful, citing that as their day-to-day life was already difficult because of their injuries; merely informing them that they may get sick was not enough to motivate them to act.

An artist was commissioned to create new drawings, many of which depicted individuals in wheelchairs. The existing script was substantially modified to address the possible negative consequences of not getting vaccinated (eg, persons with SCI&D who contract the flu are 37 times more likely to die than those without SCI&D) (14), discuss the common misperceptions regarding vaccination (eg, that you can not get the flu from the vaccine as it is a killed virus), and encourage individuals to get vaccinated to protect themselves and their family, friends, and caregivers. The new message therefore addressed susceptibility, severity, barriers, benefits, normative beliefs, motivation to comply, self efficacy, and response efficacy. In addition, we expanded the message to include PPV and influenza vaccination.

A second focus group was convened to view the new message targeted toward persons with SCI&D. Participants included 6 veterans with SCI&D (paraplegia/tetraplegia), 45 to 75 years of age, who had been living with their injuries from 4 to 56 years. These participants suggested that the drawings be made even more realistic and that severity be emphasized to an even greater extent. Additional modifications were made based on this input. The final message, created in Adobe AfterEffects 5.5 (Adobe Systems, San Jose, CA), copied to Windows Media player, and transferred to DVD was approximately 4.5 minutes long.

Testing the Message. Veterans with SCI&D who were scheduled for an upcoming clinic appointment were

contacted in advance of their appointment and asked if they would be willing to come to the clinic approximately 30 minutes early to participate in a brief study. It was explained that the study would involve completing a brief questionnaire about respiratory vaccinations and viewing a short educational message on a laptop computer. After viewing the message, the veteran would proceed with his/her regularly scheduled clinic appointment. After the appointment, each participant was asked to complete a second questionnaire. Each questionnaire took approximately 10 minutes to complete. Participants were offered a \$5.00 token incentive for their participation.

The pretest questionnaire included Likert-type items (using a 4-point scale with the following response choices: strongly disagree, slightly disagree, slightly agree, strongly agree) to assess knowledge, attitudes, behavioral intentions, and prior behaviors related to the influenza and pneumococcal vaccines. Participants viewed the multimedia message in the clinic before seeing their health care providers. The posttest questionnaire also included Likert-type items assessing knowledge, attitudes, and vaccination behavior, as well as questions designed to assess participants' responses to the message.

In addition, the DVD was shown to SCI&D health care providers and staff during a monthly staff meeting. After viewing the message, they were asked to complete a brief anonymous questionnaire asking them to indicate on a 5-point Likert-type scale how believable, informative, interesting, and powerful they felt the message was. They were asked to choose from 1 to 5 on a scale, with a 1 indicating not at all [insert adjective] and 5 indicating very [insert adjective]. They were also asked to comment on the questionnaire about whether there was anything missing from the multimedia educational message developed for consumers.

Analysis

Analysis consisted of examining participants' responses to the knowledge and attitude questions before and after viewing the video to determine whether knowledge, attitudes, and beliefs changed as a result of viewing the message. Responses were used as continuous scores. Differences in means between pre- and posttest responses were examined using paired *t* tests. We were unable to use a McNemar test to analyze change pre- and posttest across the 4 categories caused by the small sample and zero values within cells. Furthermore, by collapsing and dichotomizing responses into agree and disagree groups, valuable information indicating changes within categories (eg, change from slightly agree to strongly agree) was lost. Select pre- and posttest frequencies of response categories were calculated. Acceptability of the video was determined by examining patient and provider responses to items

Table 1. Veteran Demographic and Injury Characteristics*

Sex	
Male	100%
Race/ethnicity	
White	42%
African American	42%
Hispanic	6%
Other	11%
Education	
Some high school	14%
High school graduate	11%
Some college	53%
College graduate	22%
Mean age (y)	58 (range: 32–87)
Marital status	
Married	53%
Divorced/separated/ widowed	28%
Never married	19%
Level of injury (n = 31)	
Paraplegia	29%
Mean duration of injury (y) (n = 31)	15 (range: 1–59)

*n = 36, unless otherwise noted.

related to the content, aesthetics, comprehension, and reception of the multimedia message.

This study was approved by the Human Studies subcommittee of the Hines/North Chicago VA Research and Development Committee and the Northwestern University Office of Research Protection.

RESULTS

Veteran Participant Characteristics

A total of 36 participants were involved in testing the message. All study participants were men. It was unintentional to have only men; this is likely caused by the convenience sampling method and the demographic breakdown of males in this veteran SCI population of 98% (LaVela et al 2004). The sample was made up of primarily of white (42%) and black (42%) veterans with SCI&D. The mean age of participants was 58 years. More than one half were married and more than one half had completed some college. The mean duration of injury was 15 years, and 29% had a paraplegic level injury. Demographic and injury characteristics are shown in Table 1.

Veteran Attitude Changes

Respondents showed positive changes in beliefs from pretest to posttest on several items including believing flu ($P = 0.012$) and pneumonia ($P = 0.002$) are serious in persons with SCI&D; getting the flu shot ($P = 0.001$) or pneumonia vaccine ($P = 0.013$) will protect my friends/family; whether or not I get pneumonia this year is in my control ($P = 0.004$); getting the pneumonia vaccine will help me avoid getting pneumonia ($P = 0.032$); I will be

Table 2. Change in Veterans Responses from Pretest to Posttest

	Differences in means: paired <i>t</i> test	<i>P</i> value
Influenza-related items		
I will probably get the flu this year (n = 34)	0.029	0.889
I believe that the flu is a serious health problem in persons with spinal cord injury and disorders (n = 34)	−0.353	0.012*
Whether or not I get the flu this year is in my control (n = 33)	−0.030	0.869
People get flu from the flu shot (n = 34)	0.206	0.090
The flu shot will make me feel ill (n = 35)	−0.314	0.047*
Getting a flu shot will help me avoid getting the flu this year (n = 35)	−0.200	0.213
Getting a flu shot will protect my friends and family from the flu (n = 36)	−0.639	0.001*
I will be taking care of myself by getting a flu shot (n = 35)	−0.171	0.324
If my health care provider encouraged me to get the flu shot this year, I would get the flu shot (n = 32)	−0.125	0.325
If my family encouraged me to get the flu shot this year, I would get the flu shot (n = 33)	−0.212	0.109
Pneumonia-related items		
I will probably get pneumonia this year (n = 33)	−0.061	0.677
I believe that pneumonia is a serious health problem in persons with spinal cord injuries and disorders (n = 34)	−0.382	0.002*
Whether or not I get pneumonia this year is in my control (n = 35)	−0.400	0.004*
People get pneumonia from the pneumonia vaccine (n = 33)	0.000	1.000
The pneumonia vaccine will make me feel ill (n = 33)	−0.333	0.062
Getting the pneumonia vaccine will help me avoid getting pneumonia (n = 35)	−0.343	0.032*
Getting a pneumonia vaccine will protect my friends and family from pneumonia (n = 34)	−0.500	0.013*
I will be taking care of myself by getting a pneumonia vaccine (n = 36)	−0.361	0.021*
If my health care provider encouraged me to get the pneumonia vaccine, I would get the pneumonia vaccine (n = 34)	−0.235	0.044*
If my family encouraged me to get the pneumonia vaccine, I would get the pneumonia vaccine (n = 34)	−0.206	0.017*

**P* < 0.05 statistically significant.

taking care of myself by getting a pneumonia vaccine (*P* = 0.021); and I would get the pneumonia vaccine if encouraged to do so by health care provider (*P* = 0.044) and/or family (*P* = 0.017). Additionally, from pretest to posttest individuals better understood that side effects of the influenza vaccination could include feeling ill (eg, cold-like symptoms rather than influenza; *P* = 0.047). Differences in means of the paired *t* tests for all items from the pre- and posttests conducted with veterans with SCI&D are shown in Table 2.

Select Frequency Changes in Responses

Influenza. At baseline, 56% of participants strongly agreed with the statement that influenza is a serious health problem in persons with SCI&D, which increased to 80% after the educational intervention. At the pretest, 28% strongly disagreed that getting an influenza shot will protect friends and family from influenza; at the posttest, only 8% strongly disagreed. At the pretest, 56% of individuals with SCI&D strongly disagreed that the influenza shot would make them feel ill and after viewing the message 37% strongly disagreed. In

addition, 29% of veterans slightly agreed that “people get flu from the flu shot” before viewing the message, which decreased to 15% slightly agreeing after.

Pneumonia. At baseline, 3% strongly disagreed and 22% slightly disagreed that pneumonia is serious in persons with SCI&D, but at follow-up, nobody (0%) strongly or slightly disagreed that it is was serious in this population. Before viewing the message, 8% strongly disagreed that getting pneumonia this year was in their control; this dropped to 0% afterward. At the pretest, 11% strongly and 14% slightly disagreed that the pneumonia vaccine would help them avoid getting pneumonia, and at posttest, this decreased to 3% and 6% disagreement, respectively. Before viewing the DVD, 23% strongly disagreed that getting PPV would protect their friends and family, and after the educational intervention; this dropped to 9% who strongly disagreed. Pretest results indicated that 61% strongly agreed that they would be taking care of themselves by getting a vaccine in comparison to 83% at posttest. Respondents indicated strong agreement that they would get the PPV with health care provider

Table 3. Health Care Providers' Ratings of the Message (n = 24)

On a scale of 1–5, the patient education program was:	Percentage of Responses				
	1	2	3	4	5
Not at all clear (1)—Very clear (5)	0.00	0.00	0.00	0	100
Not at all informative (1)—Very informative (5)	4.17	0.00	8.33	25.00	62.50
Not at all persuasive (1)—Very persuasive (5)	0.00	0.00	8.33	16.67	75.00
Not at all interesting (1)—Very interesting (5)	0.00	0.00	8.33	45.83	45.83
Not at all powerful (1)—Very powerful (5)	0.00	0.00	16.67	33.33	50.00
Not at all believable (1)—Very believable (5)	4.17	0.00	4.17	25.00	66.67
Very weak (1)—Very strong (5)	0.00	0.00	12.50	29.17	58.33
Very bad (1)—Very good (5)	0.00	0.00	0.00	37.50	62.50

encouragement (62% at pretest and 77% at posttest) or family encouragement (62% to 77% from pre- to posttest).

Provider Findings

A total of 25 SCI&D health care providers viewed the respiratory vaccine educational DVD and completed a brief questionnaire. Providers represented multiple clinical disciplines that provide care to individuals with SCI&D. The respondents included therapists and psychosocial workers, physicians, nurse practitioners, nurses, and nutritionists.

All respondents indicated that they felt the educational message was clear, and the majority felt that it was very persuasive (75%), very believable (67%), very informative (63%), very strong (58%), and very good (63%). Approximately one half rated the message to be very powerful (50%) or very interesting (46%). A few individuals did feel that the message was not at all informative (4%) or not at all believable (4%). All of the providers who responded indicated that the patient education program did not interfere with their patient care. In addition, 96% were strongly in favor and 4% were slightly in favor of the DVD being used for all veterans with SCI&D (without contraindications to vaccination). Ratings of the educational message in the DVD format are shown in Table 3.

DISCUSSION

Using a combination of general and disease-specific data on the value of vaccination and the risks of adverse events, input from veterans, and reliance on theories of attitudes and behavior change, a brief multimedia message was created to target veterans with SCI&D. Data from a convenience sample of veterans with SCI&D at a single facility indicate that the message was effective in shifting patients' knowledge toward better understanding of the seriousness of respiratory complications in SCI&D, the value of influenza and pneumonia vaccinations, and increasing positive attitudes and beliefs toward vaccination.

Influenza

In particular, significant positive changes in mean scores from pretest to posttest were made in reference to beliefs that influenza is a serious health problem in persons with SCI&D; in fact, a little more than one half strongly agreed with this statement at baseline, which increased to 80% after viewing the message. Significant positive changes in beliefs were also seen for the item that assessed whether getting a vaccination is a proactive method of protecting friends and family from getting influenza, as shown by the decrease from 28% to 8% in those who strongly disagreed before and after the educational message. The educational message reiterated the seriousness of influenza in this cohort and the protective nature of the vaccination, in part, by emphasizing that the VA and the Advisory Committee on Immunization Practices (AACIP) recommend annual influenza vaccination of all persons at high risk for respiratory complication such as those with SCI&D (1,33).

There was also a moderately statistically significant change in agreement that the flu shot will make them feel ill. This finding was not unexpected, given that the intention of the educational message was to clarify facts. As such, a segment of the message did clarify that individuals might experience mild cold-like symptoms but that people cannot get influenza from the vaccine. This is supported by the decreased percentage of individuals who believed that people get the flu from the flu shot from pretest to posttest, although the difference in means was not statistically significant ($P = 0.09$), which could be a result of the limited sample size. Given that past research (SCI QUERI, unpublished data) has identified the fear of getting influenza from the vaccine as 1 of the top 2 reasons cited by veterans with SCI&D for not receiving an annual vaccination, it is promising that this message provided some clarification.

Pneumonia

As indicated by significant changes in mean scores before and after viewing the multimedia educational message, there were positive changes in beliefs on most items regarding pneumonia. Similar to the influenza response,

there was a significant positive change in the belief that pneumonia is a serious health problem in persons with SCI&D; this positive attitude change is highlighted by the finding that disagreement with the statement that pneumonia is serious in this cohort dropped from more than one fifth of respondents to an impressive “none” after viewing the message. Study participants recognized the seriousness of pneumonia in persons with SCI&D after being exposed to the message. The findings also showed that there were significant positive differences in participants’ mean values from pre- to posttest in beliefs that getting pneumonia this year is in their control, in that fewer were in disagreement after the intervention.

It is important to point out that, after viewing the educational message, participants were more likely to agree that if their health care provider or family encouraged them to get the vaccine, they would do so. The belief that PPV helps avoid pneumonia increased significantly after viewing the message. The tailored multimedia educational message was effective in eliciting agreement that individuals would be taking care of themselves by getting a vaccine and that PPV will protect friends and family from pneumonia.

Conclusions

Examining the results collectively for influenza and pneumonia, a few findings stand out. It is interesting that there was no significant change in beliefs about “whether or not I get the flu this year is in my control,” but that there was a positive shift regarding whether getting pneumonia is in “my control.” It is plausible that the inconsistency is related to the fact that PPV may be obtained at any time and that it is not needed annually (5), whereas the influenza vaccine is recommended annually but for a limited time. This explanation is consistent with the finding that more participants had received the pneumonia vaccine (78%) than the influenza vaccine (64%) (data not shown). It is also possible that individuals simply feel more exposed to influenza because it is an annual occurrence.

The educational message made an impressive impact from baseline to follow-up regarding beliefs about protecting family and friends by getting a vaccine (influenza and PPV). The individuals who took part in the focus groups had strongly suggested emphasizing this point in the video content. It is important, therefore, to emphasize the value of consumer-directed input when developing interventions intended to modify beliefs and/or change behavior. The other area that saw the largest positive significant changes was in beliefs that pneumonia and influenza are serious health problems specifically in persons with SCI&D. Highlighting the seriousness of these respiratory diseases in persons with SCI&D was a primary objective for this project, and it is encouraging that this brief multimedia format heightened awareness in this high-risk group.

Although past intervention efforts have succeeded in maintaining and/or increasing vaccination rates among individuals with SCI&D (12,16), it is still necessary to not only encourage continued positive vaccination behavior but also to identify and address barriers that remain among this population. Younger (<50 years), unmarried individuals with SCI&D have been shown to have lower vaccination rates than other individuals with SCI&D, yet they remain a high-risk group (16). These lower vaccination rates suggest that unique barriers exist among these veterans that previous intervention efforts have failed to address. Development of targeted interventions, such as the one created in this study, is one avenue to pursue in attempts to address these barriers and increase vaccination rates. Targeted interventions/messages, which are designed to reach a defined population, differ from tailored interventions/messages, which are created for individuals (34). Both targeted and tailored messages have been effective in health promotion efforts, including those related to influenza vaccination (26,34,35). The results of this study indicate that such targeted messages can be effective in populations with SCI&D.

This type of brief educational message may hold promise in other areas where individual health behaviors are important in the determination of improved patient outcomes and/or the receipt of preventive health services. Future research might address whether attitude changes are achievable among persons with SCI&D with regards to other event-based messages (eg, annual screenings) and/or messages that are directed toward sustained behavioral changes (eg, tobacco cessation).

Limitations

This was a small pilot study using a convenience sample at 1 site; as such, the generalizability to the SCI&D veteran population is limited. However, because the goal of this study was to ascertain if creating targeted messages for a SCI&D cohort using a multimedia format showed promise, this pilot study succeeded. The multimedia education program elicited a positive response, both in terms of attitude change and feedback from individuals with SCI&D and providers related to the multimedia program itself. Testing the intervention in a larger population would provide greater generalizability.

The fact that the multimedia message did not seem to increase perceived susceptibility to contraction of influenza could indicate that alterations to the message are necessary. However, because of the timing of the project, many of the participants (64%) had already received an influenza vaccination before participating in the study. It is possible that they did not feel susceptible at the pretest, because they had already been immunized, and they believed that the vaccination would indeed protect them from contracting influenza. If this was the case, we would not expect to see an increase in susceptibility from pretest to posttest. In fact, there was only a slight difference in the percentage of individuals

who strongly disagreed with the statement “I will probably get the flu this year” from pretest (53%) to posttest (50%).

Behavioral intentions related to receiving the influenza vaccine within the next month did not change from pretest to posttest, which may suggest that the message was ineffective in producing change. However, as with susceptibility, it is possible that the intentions did not change as many of the participants had already received the influenza vaccine. We did not question whether participants intended to get the pneumococcal vaccine within a certain time period because the PPV is effective for multiple years, and there are conflicting recommendations from health care agencies (5) as to the appropriate length of time between PPV—some recommend every 5 years, and others recommend every 10 years. It will be necessary to carefully document prior receipt of either influenza or pneumonia vaccine in future studies to eliminate this potential confounder. The nature and content of the visit with the health care provider that occurred between the pretest and posttest (after the message was viewed) was not ascertained. It is possible that discussion or interaction during the course of the visit may have influenced the posttest responses.

Finally, although attitude change was achieved, the study design did not allow us to ascertain whether or not there was affiliated behavior change (immediate or delayed). The theoretical models used as the basis for this study posit that attitude change is a precursor to behavioral intention and behavior change. As such, it is possible if the participants had been followed over time, or if a medical chart review had been included, there may have been related behavior change.

CONCLUSIONS

In summary, a multimedia message targeted to a high-risk population that is likely to benefit from respiratory vaccinations was effective in changing knowledge and attitudes in favor of vaccination. In addition, health care providers saw the value of this tool and thought that it was feasible for use within the SCI&D population. This intervention format, perhaps in combination with other proven strategies (such as computerized clinical reminders and standing orders), is likely to increase vaccination rates in this high-risk population.

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