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Improving herpes zoster vaccine rates: The impact of a targeted educational program

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ABSTRACT

Background and purpose: Despite demonstrated efficacy, the utilization of herpes zoster vaccine (HZV), recommended by the Centers for Disease Control (CDC) for all immunocompetent adults aged above 60 years, is low (31%). The aim of this study was to identify nurse practitioner (NP) barriers to HZV administration and then to use these results to develop and evaluate the outcomes of an educational program.

Methods: This study used a two-phase design. In Phase I, barriers that obstruct the provision of HZV were identified and NPs were surveyed to determine current HZV practice. The second phase used a quasiexperimental pretest–posttest design to evaluate the impact of the constructed program.

Conclusions: In Phase I, NYS Primary Care NPs with practice years ranging from 1 to 24, who reported working in practice sites that ranged from 1 to 20 providers, possessed limited knowledge of the vaccine, especially, the financial aspects of the vaccination such as up-front cost (46%), cost to patients (39%), and reimbursement (29%), resulting in fewer provider recommendations. In Phase II, a paired-samples *t* test revealed a statistically significant difference between pretest scores (mean = 3.4, SD = 1.2) and posttest scores (mean = 4.7, SD = 1.3) on the knowledge survey, t (37) = −7.1, $p < .0$, demonstrating NPs' improved understanding of HZV.

Implications for practice: Nurse practitioners will increase compliance with the CDC recommendations for HZV administration.

Keywords: Education; herpes zoster; immunization; vaccination.

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Introduction

Herpes zoster

Herpes zoster (HZ), or "shingles," is a reactivation of a herpes varicella virus infection. After the initial diffuse-rash illness, known as "chicken-pox," the virus then travels through the sensory dorsal or cranial root ganglia, where it establishes permanent latency in nerve cells (Cohen, 2013; Doan, Ung, Ramirez-Fort, Khan, & Tyring, 2013; Harpaz, Ortega-Sanchez, & Seward, 2008; U.S. Department of Health and Human Services [USDHHS], 2010a; Yawn et al., 2007). Of note, 99% of persons aged above 50 years in the United States have serologic evidence of varicella virus and reactivation, which may occur decades after the original infection, and the virus spreads along the nerve root to a localized dermatome (Cohen, 2013; Johnson et al., 2015. A painful rash characterizes this spread of the virus, which is usually self-limiting (Cohen, 2013; Doan et al., 2013; Dooling, 2016; Yawn et al., 2017). However, 18% of the time, damage to the nerve tissue from the skin to the spinal cord can occur causing severe disabling pain, known as postherpetic neuralgia (PHN) (Centers for Disease Control (CDC), 2013; Dooling, 2016; Harpaz et al., 2008).

Postherpetic neuralgia presents as mild to excruciating pain, which may persist for months to years and may impact quality of life by affecting sleep, mood, work, activity level, and ability to exercise (CDC, 2013; Cohen, 2013; Dooling, 2016). The impact of PHN has been compared to congestive heart failure, major depression, and severe diabetes mellitus (Cohen, 2013). Serious neurologic complications include palsies, transverse myelitis, meningitis, stroke syndromes, and Ramsay Hunt syndrome (CDC, 2013; Cohen, 2013; Dooling, 2016; Harpaz, et al., 2008; Yawn et al., 2007). In addition, several ophthalmologic complications can occur—optic nerve involvement, keratitis, scleritis, and uveitis. There is the potential for deforming scars and bacterial skin infections (Cohen,

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2013; CDC, 2013; Dooling, 2016; Harpaz et al., 2008). Because there is a natural waning of immunogenicity with aging, the potential consequences of HZ most often affect older, more vulnerable fragile adults (CDC, 2013; Dooling, 2016; Hales, Harpaz, Ortega-Sanchez, & Bialek, 2014).

Herpes zoster incidence

Despite the availability of two safe and effective vaccines, approximately one in three persons will develop HZ during their lifetime, resulting in an estimated one million episodes in the United States annually (Doan et al., 2013; Dooling, 2016; Hurley et al., 2008; Yawn et al., 2007). There is a rapid increase in HZ beginning in the fifth decade of life, worsening at age 80, with one in four persons experiencing an HZ-related complication after acute infection (Dooling, 2016). Persons aged above 85 years have a 50% greater risk of having herpes zoster incidence if they are not vaccinated against HZ (Yawn et al., 2007). Analysis of claims data from the Truven Health MarketScan Research databases revealed that, when adjusted for age and gender, the annual incidence was 4.63 per 1,000 person-years. However, the incidence rate increases to 10.46 per 1,000 among those aged ≥60 years (Johnson, B.H.,Palmer, Gatwood, Lenhart, Kawai, & Acosta, 2015). Not only does the incidence of zoster increase with age but so does the risk for developing zoster-related complications (Dooling, 2016). "Approximately one in three persons in the general population will develop zoster during their lifetime" (Harpaz et al., 2008, p. 2).

Herpes zoster morbidity

In 2013, the CDC estimated that the United States spends 10 billion dollars annually on vaccine-preventable diseases. Herpes zoster results in hospitalizations for approximately 3% of patients (CDC, 2013). About 90% of HZ patients experience some level of pain (Dooling, 2016). Depending on a patient's comorbidities, preventing HZ and its sequelae results in savings of $82 to $103 million/year (CDC, 2013).

Herpes zoster vaccine

Zostavax, a live attenuated vaccine was approved by the United States Food and Drug Administration (FDA) in 2004 (Doan et al., 2013; Dooling, 2016; Hales et al., 2014; Yawn et al., 2007). In October 2017, the FDA approved an inactive recombinant subunit vaccine, Shingrix (James, Chahine, Sucher, & Hanna, 2018). The CDC recommends HZV for persons ≥ 60 years old (Doan et al.; Dooling; Hales et al.; James et al.). In 2011, the FDA expanded their recommendation for HZV to include immunocompetent persons ≥50 years of age (Doan et al.; Dooling; Hales et al.; Yawn et al.). However, the CDC has not changed their recommendation to include patients 50 to 60 years of age, citing reluctance until further evidence is available to confirm long-term efficacy of HZV (CDC, 2013; Hales et al., 2014; James, Chahine, Sucher, & Hanna, 2018). The greatest reduction in the burden of disease in the aging vulnerable population occurs when persons between the ages of 60–70 years are vaccinated, and the strategic timing of vaccination will reduce healthcare utilization, and overall costs (CDC, 2013; Doan et al., 2013; Harpaz, 2014).

Cost

Cost concerns are consistently identified as a barrier to the utilization of HZV. Many physicians are not aware of how to access each patient's reimbursement status, therefore they are not certain of costs to the patient (Bridges et al., 2014; Campos-Outcalt, Jeffcott-Pera, Carter-Smith, Schoof, & Young, 2010; Dooling, 2016; Elkin et al., 2013; Freed et al., 2014; Hurley et al., 2010; Hurley et al., 2014; USDHHS, 2010a; Ventola, 2016). Unlike other adult vaccinations, HZV is mandated as a benefit under Medicare Part D, not Part B, which makes reimbursements challenging. Under Medicare Part D, which is a pharmaceutical benefit, the cost of the vaccine is covered; however, the patient is subject to each plan's deductibles and copayments (Tan, 2012; Ventola, 2016). Most private insurance companies and government-sponsored health insurances, however, fully reimburse adult vaccinations according to CDC guidelines (Tan, 2012).

Safety

The HZV is considered very safe. The Zostavax is a live attenuated HZV vaccine, and Shingrix is an adjuvanted recombinant vaccine. There are several patient cohorts who should not receive the vaccine. The HZV is not recommended for persons undergoing chemotherapy, having HIV infection or acquired immune deficiency syndrome, or taking immune-modulating agents (Bridges et al., 2015; Doan et al., 2013; James et al., 2018; Simberkoff, Arbeit, Johnson, Oxman,, Boardman, Williams, & Annunziato, 2010; Yawn et al., 2007).

Despite CDC reassurances, skepticism prevails regarding vaccine safety and efficacy as a consideration for providers (Doan et al., 2013). Although the safety of HZV has been established, surveyed physicians expressed safety concerns such as providing vaccine to people with chronic medical conditions and fears that they may administer it to unfavorable candidates (Bridges et al., 2015; Campos-Outcalt et al., 2010; Elkin et al., 2013; Freed, Clark, Cowan, & Coleman, 2011; HHS; James et al., 2018; Hurley et al., 2008; Hurley et al., 2010; Hurley et al., 2014; Ventola, 2016). The risk for HZ in immunocompromised patients is high, therefore, it is important to review vaccination status and vaccinate when immunocompetent.

Health care providers

Health care providers are an influential source of information about vaccinations and exert a strong

influence over the decisions of even resistant patients (CDC, 2013). A lack of provider recommendation for HZV immunization has been consistently identified as the most significant patient barrier to vaccination (Bridges et al., 2015; Elkin, Cohen, Goldberg, Gillespie, & Li, 2013; Hurley et al., 2016; Johnson, Nichol, & Lipczynski, 2008; Teeter et al., 2014). Most of the studies analyzing barriers to HZV evaluate physician attitudes and practices. There is only one study that included NPs, along with physician's assistants and registered nurses (Johnson et al., 2008).

Many physician studies identify barriers to provider recommendation for HZV, such as lack of knowledge regarding HZV guidelines, safety concerns of administration, perceptions of disease burden, reimbursement and cost to patient and provider, capacity to store a frozen vaccine, and lack of integration of vaccinations into routine visits (Bridges et al., 2015; Campos-Outcalt, Jeffcott-Pera, Carter-Smith, Schoof, & Young, 2010; Elkin et al., 2013; Freed, Clark, Cowan, & Coleman, 2011; Johnson et al., 2008; Hurley et al., 2008; Hurley et al., 2010; Hurley et al., 2014; Ventola, 2016). The physicians' perceptions of low HZ disease burden, coupled with the fragmentation of preventive care for seniors, give rise to a prioritization of acute illnesses rather than addressing primary prevention (Bridges et al., 2015; Campos-Outcalt et al., 2013; Dooling, 2016; Elkin et al., 2013; Freed et al., 2010; Hurley et al., 2014, Hurley et al., 2016; Ventola, 2016).

Additional barriers to provider recommendation include the underutilization of administrative systems such as electronic medical record, flagging systems, protocols, immunization information systems, and underutilization of alternative vaccinators (i.e., public health department, pharmacists, specialists) (Gannon, Qaseem, Snooks, & Snow, 2012.; Teeter et al., 2014; USDHHS, 2010b; Ventola., 2016).

Methods

Design

This study was conducted in two phases after Institutional Review Board approval. In Phase I, a cross-sectional survey design study was used to assist in identifying any entity that restrains or obstructs the provision of the CDC recommended HZV by NPs. This information informed the development of a targeted educational program designed to address the challenges and deficits identified in the survey. In Phase II, a quasiexperimental pretest–posttest research design was used to evaluate to what extent an education program, developed to target barriers identified by the NP survey in Phase I of this study, improved HZV barriers and knowledge.

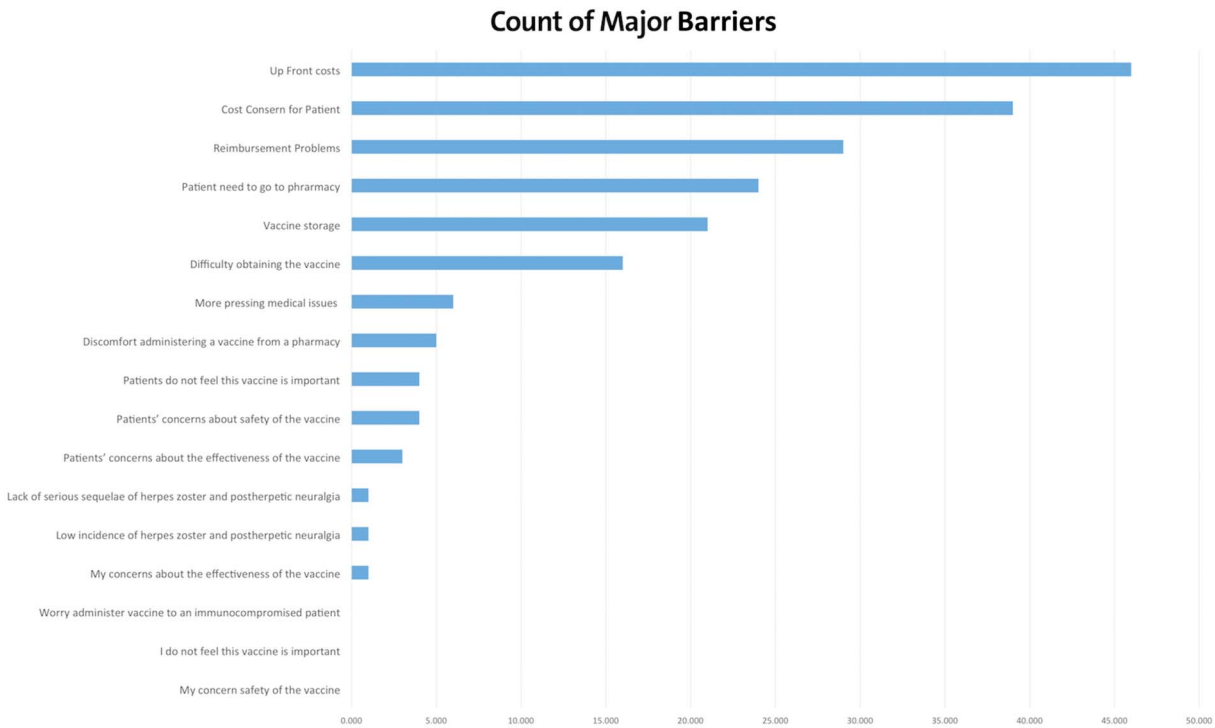

Figure 1. Participant responses to the survey question: Whether or not you have administered the zoster vaccine in your practice; please tell us how important the following types of barriers are to administering zoster vaccine in your office?

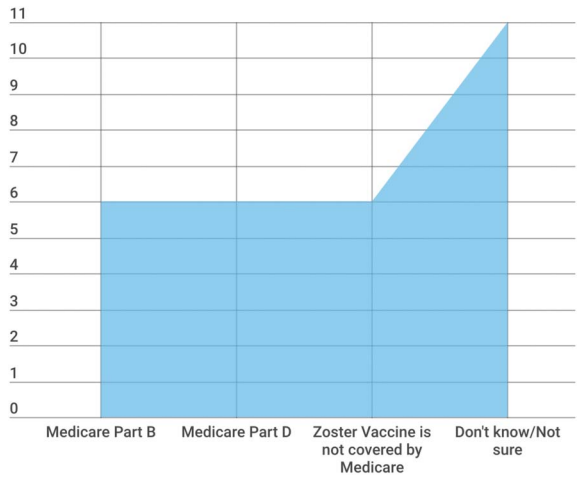

Figure 2. Participant responses to survey question: As of January 2008, in your experience, through what part of the Medicare system is the Zoster Vaccine reimbursed?

Sample

Study participants for Phase I, the cross-sectional survey design study included primary care NPs, who were members of the Nurse Practitioner Association of New York State and were actively providing care to adults aged above 50 years. Nurse practitioners were invited to voluntarily participate through a website posting, which provided a link that directed them to an anonymous web-based survey tool, Qualtrics. The survey instrument used was developed for physician study, by the University of Colorado Health Outcomes program, Vaccine Policy Collaborative Initiative, in collaboration with the CDC. The survey was modified to include NP language and used to collect data with the expressed consent of the author. The questionnaire consists of 29 questions whose validity is based on existing questionnaires used by three previously published studies regarding physician barriers to the utilization of HZV. Pediatric and specialty NPs were excluded from this study because they do not generally administer HZV.

For Phase II, New York State NPs, who were potential providers of the vaccine, were invited to voluntarily participate in a live 60-minute educational program. The program was offered twice: once at a local community hospital setting and again at a regional annual professional meeting. The live 60-minute interactive program was provided by an expert on HZV. Both programs were provided by the same expert, and the content delivered was identical. The content objectives were developed from the survey data and were tailored to the learners' identified needs. The participants were asked to complete anonymous questionnaires before and after the program.

Results

In Phase I, survey data were similar to those reported in the literature regarding physicians and HZV (Bridges et al., 2015; Campos-Outcalt et al., 2010; Hurley et al., 2010; Hurley et al., 2014). IBM SPSS statistics and Excel programs were used to analyze data. There was a fair response rate to the survey request (n = 112). The participants in phase I included all primary care providers in New York State who graduated from an NP school between 1982 and 2016. There were 11 males and 101 female participants. The participants reported working in practice sites that ranged from 1 to 20 providers.

The majority of NPs reported that approximately 50% of their patient population is eligible for vaccination; however, more than half of the NPs surveyed reported that they gave 0 to 9 vaccines in the past 12 months. Three major barriers identified were up-front cost of purchasing HZV (46%), cost concerns for patients (39%), and reimbursement issues (29%) (Figures 1–3).

In Phase II, pretest and posttest written questionnaires were collected and analyzed using SPSS statistics and Excel programs. Of the study participants, 92% were female and 8% were male. Of the participants, 13% reported bachelor's degrees, 63% master's degrees, and 24% doctorate degrees, and 54% of them reported

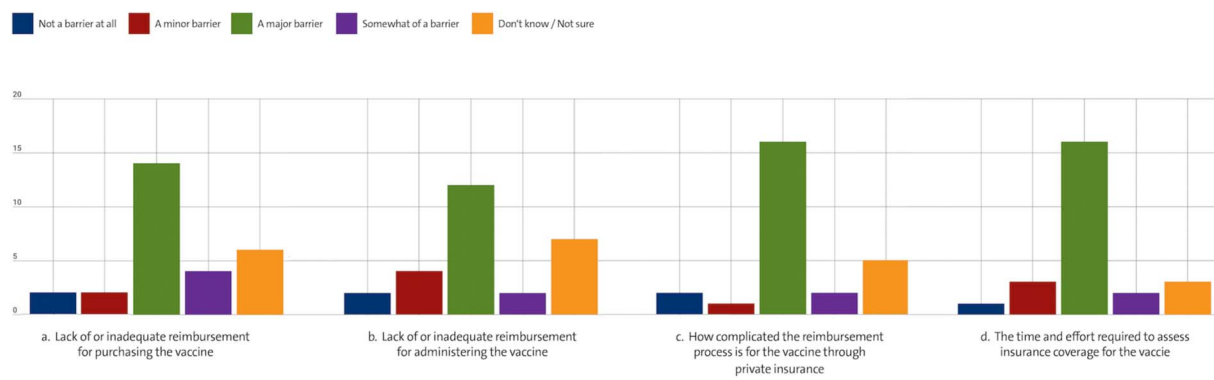

Figure 3. Participant responses to survey question: As of January 2008, please indicate to what degree the following are barriers to administering the vaccine to your patients with private insurance only (i.e., Medicare supplement or other private insurance).

working in out-patient settings and 46% in inpatient settings.

A paired-samples *t* test was conducted to compare test scores before and after the 60-minute interactive program. There was a statistically significant difference between pretest scores (mean = 3.4, SD = 1.2) and posttest scores (mean = 4.7, SD = 1.3) on the knowledge survey, t (37) = −7.1, $p < .0$. The education program improved NPs' understanding of HZV.

Limitations

There were several limitations to this research. As with any survey design study, survey results represent reported but not observed practice. In addition, the results are not generalizable because the NPs sampled may not be representative of all providers collected at a single point in time. This cross-sectional survey enhances our understanding of this important issue, but it cannot be used to demonstrate causality.

Conclusions

It is identified that NPs confront similar barriers to the provision of the CDC recommended HZV as our physician colleagues, in particular, a lack of knowledge regarding several aspects of HZV administration. These results add to the growing body of evidence that supports the need for widespread dissemination of information for providers and prompted Part two of this project. The educational programs were well received, and results were statistically significant in terms of increased provider knowledge.

Discussion

Nurse practitioners are charged with fulfilling their potential as primary care providers; therefore, this evaluation was essential to our state of this science (Institute of Medicine, 2010). This information will inform strategies to improve NP practices and allow for their full participation in vaccine discussions with their patients. Further education of NPs by dissemination of information through peer-reviewed journals, podium presentations, social media, newsletters, medical updates, and webcasts are essential. Industry can support these efforts with direct-to-consumer messaging and by providing educational materials.

A recent article demonstrated superior utilization of the HZV (70.3%) in two NP-managed clinics in New Hampshire (Wright, Morrell, Lee, Cuellar, & White, 2017). The clinics studied had proactively used several techniques such as stocking vaccines in the office, enrolling in Medicare Part D billing programs, recommending vaccines at every visit, educating medical assistants, using reminder systems, and planning preventative care before visits (Wright et al., 2017). This demonstrates that with the proper tools and education, NPs can use HZV far more effectively than is noted in many practices. Using a team approach to Adult Vaccination has been shown to be beneficial (Gannon et al., 2012). Ventola (2016), states that a successful vaccine program should include trained staff, standing orders to maximize opportunities for vaccination, adequate physical space, and documentation of policies and procedures with patient screening and education.

"The National Adult Immunization Plan" and the "National Adult Immunization Plan: A Path to Implementation" are articles developed by The U.S. Department of Health and Health Services, which outline their comprehensive program to enhance the utilization of adult vaccinations, including HZV. Several Health and Human Services programs aligned their goals, such as National Vaccine Plan, Healthy People 2020, the National Prevention Strategy, and the HHS Strategic Plan. This collaborative effort culminated in a program to improve access to adult vaccines, increase community demand for adult immunizations, and encourage innovation in adult vaccine with research and development. The implementation of this information will enhance the utilization of HZV.

Competing interests: *The authors report no conflicts of interest.*

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