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Increasing Immunization Adherence Among Infants of Low-income Parents: The Effects of Visually Enhanced Education

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ABSTRACT

Many children do not receive their recommended immunizations in a timely manner. In this study we compare a visually enhanced educational (VEE) intervention to usual care (UC) among infants of low-income parents. Parents in the intervention group ($n = 40$) received VEE, whereas control group participants ($n = 40$) received UC. Adherence (yes/no) to the recommended immunization schedule measured and the VEE group was significantly more adherent to the recommended immunization schedule at 2 ($P = .014$), 4 ($P = .041$), and 6 ($P = .042$) months compared with the control group. Using VEE may increase adherence to the recommended immunization schedule.

Keywords: adherence, education, immunizations, pictures

Immunizations are the most effective measure available to keep children free from communicable disease.[1] However, not all children are immunized or immunized on-time. This leaves many children at risk for disease and, possibly, death. Over the last 2 decades, pertussis and measles outbreaks have afflicted thousands of young children. In 2012, there were 48,277 pertussis cases; 4,994 cases were in infants < 1 year of age and 16 deaths were reported in children ≤ 11 months of age.[2] Although there was a decrease in the number of reported pertussis cases in 2014 (28,660), there were still 8 deaths in infants ≤ 11 months old.[3] In fact, 200 children die each year from vaccine-preventable diseases in the United States.[4]

Because vaccine-preventable diseases continue to affect the US, innovative solutions must be pursued to increase parental adherence to the recommended age-specific immunization schedule. The Advisory Committee on Immunization Practice (ACIP) provides practitioners with age-specific immunization schedule recommendations, which are endorsed by the American Academy of Pediatrics (AAP) and the American Academy of Family Physicians (AAFP).[5] The recommendations indicate the number of immunizations needed, specific ages to administer, and proper spacing intervals.[5]

Healthy People 2020 goals aim for 90% immunization adherence by age 2 years. Yet, national immunization survey data for 2014 revealed that only 72% of children in the US were adherent to the recommended immunization schedule by 35 months of age, with even lower rates in children from low-income families (67%).[6] These figures emphasize the need for further efforts to increase immunization rates. The catalyst for the current study was the substandard immunization adherence rate (58%) at 35 months of age within the study's intervention facility.

PICTURES AND MULTIMEDIA EFFECTIVENESS

Several studies have documented the effectiveness of using pictures and multimedia as a means to heighten patients' knowledge, increase attention, improve satisfaction, and deepen recall of information.[7-11] Bodurka and Schlumbrecht[7] recruited parents to watch an 8-minute educational video on the human

papillomavirus vaccine. At baseline, 57% of parents were supportive of the human papillomavirus immunization for their child.[7] This rose significantly to 94% after watching the video.[7] Horne et al.[12] used 3 components in the intervention group that focused on risk of disease: a mother's written perspective about her child with measles; pictures of children with measles, mumps, and rubella disease; and 3 warnings on the importance of immunization. Findings revealed a significant positive change in adult immunization attitudes from baseline to posttest in the intervention group, but not in the comparison groups.[12] The use of pictures and multimedia has demonstrated positive effects on patient outcomes and health communication. However, no research is available on the use of pictures of children with vaccine-preventable diseases to increase age-specific immunization adherence. The purpose of this study was to compare on-time immunization adherence at 2, 4, and 6 months between a group of infants whose parents received visually enhanced education (VEE) and a group whose parents received usual care (UC; ie, verbal education alone).

THEORETICAL FRAMEWORK

The theory of multimedia learning posits that learning occurs when people build mental images through words and pictures.[13] We postulated that showing parents pictures of children with vaccine-preventable diseases along with a brief discussion about the consequences of each disease may motivate parents to get their child immunized on-time. In this study, multimedia learning theory was applied through the use of pictures that corresponded to the most serious vaccine-preventable diseases immunized against during the study period. The 5 pictures of children who had pertussis, hepatitis B, meningitis, polio, and tetanus were obtained from the Immunization Action Coalition website.[14]

METHODS

Study Design

A 2-group quasi-experimental design was used. Institutional review board approval was received from the university and letters of agreement were obtained from both federally qualified health centers. Two data collection sites were used to reduce contamination between the VEE and UC groups. Both sites were well-established, federally qualified health centers in low-income areas serving mainly inner-city Medicaid patients from birth to 21 years of age. Both sites were located in the same midwestern state approximately 10 miles apart and part of a larger nonprofit organization with similar clinic routines, office reminder methods, and immunization schedules. Data were collected in both groups from November 2011 through October 2012. The immunizations tracked in this study included 3 doses of diphtheria, tetanus, and acellular pertussis (DTaP), inactivated polio, *Hemophilus influenzae* B, prevnar, and 2 doses of hepatitis B. Adherence (yes/no) to the recommended immunization schedule was defined as doses received when the infants were approximately 2 months (42-93 days), 4 months (94-156 days), and 6 months (157-218 days) of age. These age ranges followed guidelines approved by the ACIP, AAP, and AAFP to allow for parent-provider flexibility in scheduling.[15]

A sample size of 34 from the VEE site and 34 from the UC site achieved a power of 80% to detect a 20% difference in the proportion of patients with delayed immunizations. This sample size estimation was based on a 1-sided z-test with pooled variance with a targeted alpha level of 0.05 using PASS software (Version 2005).[16] Forty parents and infants were recruited at each site to accommodate dropout.

Sample

At the VEE site, parents of infants 4-14 days old were recruited for this study. This age was selected based on newborn first office visit recommendations by the AAP.[15] Eligibility included the parent's ability to speak and read English, and having an infant 4-14 days old at the first office visit. A flyer was displayed in the waiting room and eligible parents were asked if they were interested in more information about the study. Written informed consent by the parent was obtained by the principal investigator during the office visit in an examination room to protect privacy. No incentives were offered.

Participants in the UC group were identified through the institution's electronic health record system by the information technology staff. Because no personal identifiers or personal contact was made