Best Shot: The Use of Motivational Interviewing to Decrease Vaccine Hesitancy in Parents of Children 0-12 months of Age

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Problem Statement and Significance

The use of vaccines, which prevent up to 3 million deaths worldwide each year, have been identified as an economic solution for disease prevention (World Health Organization [WHO], 2019). Despite the well documented benefits of vaccines along with the historic eradication of preventable diseases such as the measles in the United States (US), the number of parents who choose not to vaccinate their children is increasing (Dubé et al., 2021). An analysis of national vaccine status data identified that over 40% of all children 19-35 months old in the US are not up to date on their vaccines and of those being vaccinated over 30% are utilizing an alternative or unknown schedule (Hargreaves et al., 2020). The term used to describe this decrease in vaccine confidence and acceptance is vaccine hesitancy (VH). The World Health Organization (WHO) Immunization Practices Advisory Committee (IPAC) defines VH as a fluid state that involves the refusal of or deviation from the recommended vaccine schedule despite vaccine access (Immunization Practices Advisory Committee [IPAC], 2019).

In 2019, WHO identified vaccine hesitancy as one of the top ten threats to global health (WHO, 2019). In the US each year, adherence of children to the standard seven vaccine series schedule precludes 14 million illnesses, prevents 33,000 deaths, and decreases direct costs of health care by nearly $10 billion (Office of Disease Prevention and Health Promotion [ODPHP], 2020). Understanding vaccine hesitancy and addressing parental apprehensions is imperative for clinicians to improve vaccination coverage.

One tool that may assist practitioners in addressing vaccine hesitancy among parents is the incorporation of motivational interviewing. Motivational interviewing (MI) is a communication tool that uses a guiding approach for “eliciting from patients their own good motivations for making behavior changes in the interest of their health (Rollnick et al., 2008, p. 6) Motivational interviewing allows the provider to work in partnership with the parent by eliciting and affirming vaccine concerns while guiding the individual towards a desire for change and vaccine compliance (Rosengren, 2018). Although some benefits of MI have been identified, additional research is essential to determine the impact of using MI in an outpatient clinic (Lemaitre et al., 2019; Limaye et al, 2021; Mical et al., 2021).

The purpose of this study was to determine if the use of motivational interviewing by pediatric providers during routine well child appointments, when compared to standard of care, increase vaccine rates in children 0-12 months of age? In addition, provider comfort talking to parents about vaccines, provider comfort using MI, provider confidence in the use of MI to decrease vaccine hesitancy, and caregiver vaccine hesitancy were also explored in this study.

Methodology

Design

Upon Institutional Review Board (IRB) approval from Purdue University and Beacon Health, a quasi-experimental study was conducted on a convenience sample of caregivers presenting with children for a 0-12 month well child check (WCC) from June 1, 2021, to August 31, 2021. A data-sharing agreement was completed between the researchers, the medical group, and the overseeing university. Retrospective data was obtained for both intervention and control providers in the corresponding months of 2019 and 2020 and repeated during the intervention period in 2021. Providers were recruited through an email with an attached provider flyer. Caregivers were recruited using informational cards in both English and Spanish that were displayed at all participating practices. Intervention providers received training on MI in May prior to the study onset. During the well child visit the Parent Attitudes about Childhood Vaccines (PACV) survey was completed, and the MI intervention was implemented.

Settings & Participants

The setting included three urban clinics in a midwestern county. Both family practice and pediatric providers participated in the study. All clinics accepted both private insurances and Medicaid. A range of clinics was used to increase the generalizability of findings. Caregivers of children who were less than 18 years of age were excluded from this study. Each caregiver only participated in the study once.

Intervention

Four providers completed education including a 2-hour in person training session by a certified Motivational Interviewing Network of Trainers (MINT) instructor and received a copy of the provider guide: MI & VH. The provider guide was designed by the researcher and adopted with permission from the copyrighted Modified Drug Adherence Work-Up (M-DRAW) tool (Lee et al., 2020). The provider guide gives prompting for applying the MI intervention and incorporates the attitude roots model (Hornsey & Fielding, 2017). This approach better explains the underlying incentive of knowledgeable parents who still choose to refuse vaccines for their children. Three attitude roots that were identified in the antivaccine attitudes of parents in 24 countries were “conspiratorial beliefs, reactance, and disgust/fear toward blood and needles” (Hornsey et al., 2018, p. 312). The provider guide also details recommendations from the American Academy of Pediatrics (AAP) on addressing VH (Edwards & Hackell, 2016). The final pages of the provider guide offer a list of reputable resources that may be given to parents.

Procedures

Data was collected at three different time-points throughout this study. At time-point one, baseline vaccine data from 2019 and 2020 was obtained via the electronic health record (EHR) to identify the number of patients seen for a WCC and of those visits, the number of children who were not up to date on vaccines. Both years were obtained to account for the impact of the COVID-19 pandemic on WCCs. The same data was collected for three control providers that did not participate in MI training.

Providers trained in MI completed a survey identifying provider comfort when talking to parents about vaccines, provider comfort using MI, and provider confidence in the impact of MI on VH. Baseline data was collected from both control and intervention providers. At time-point two upon completion of the well child visit, clinical staff documented the vaccine status of the corresponding child. At time-point three upon completion of the three-month intervention period, vaccine data collection obtained at time point one was repeated. Also, at time-point three, intervention providers were given a post-study questionnaire.

All caregivers at least 18 years of age who presented with their children for a 0-12 month well child check with a participating provider were offered the PACV survey along with the study information sheet. Consent for participation in this study was obtained by including a consent statement in the study information sheet. Caregivers who completed the survey were considered enrolled in this study. During the well child visit providers utilized the motivational interviewing techniques taught in training and outlined in the provider guide.

Documents were kept in a secure folder on each unit, collected every one to two weeks, and stored in a locked file box. All electronic data was stored on a password-protected USB or within an online HIPPA protected L3 BOX file. All paper and electronic documents and data were maintained by the researcher KJ. All related study materials were kept within a secure location for a period of 3 years following completion of this study.

Tools

Caregiver demographics were obtained, and caregiver VH was measured using the PACV survey (Opel et al., 2011). This survey consisted of 23-items including eight demographic questions and 15 questions to assess parental VH (Opel et al., 2013). The parental hesitancy questions were a combination of yes or no questions as well as Likert-type questions on a 10-point and 5-point scale. The demographic data identified if the qualifying child was firstborn, the relationship of respondent to the child, parental age, marital status, caregiver education, household income, children per household, and race/ethnicity (Opel et al., 2013). In determining the validity and reliability of this survey, the 15 questions were divided into three groups including “safety and efficacy” with four items and a Cronbach α of 0.74, “general attitudes” with nine items and a Cronbach α of 0.84, and “behavior” with two items and a Cronbach α of 0.74 (Opel, Taylor, et al., 2011, p. 6603).

Statistical Analysis

Analysis was completed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics were calculated for provider data, caregiver data, and the PACV surveys. Wilcoxon Signed Rank tests were performed to assess change in provider comfort talking to parents about vaccines, provider comfort using MI, and provider confidence that MI would improve vaccine rates. An ordinal regression to predict vaccine status of the child post the intervention based on demographic data was performed. A difference in differences (DiD) analysis was completed to identify on average the impact MI had on improving VH while also considering natural trends related to VH.

Results

Caregiver Data

Participants included 66 caregivers who were predominately seen in the month of June (51.5%), presented with a child that was not their firstborn (69.7%), were mothers (81.8%), were thirty years of age or older (66.7%), were married (87.9%), had a 4-year college degree (47%), had a household income of $75,001 or more (51.5%), had two children in the household (47%), and identified as white (75.8%).

Of the 66 caregivers surveyed, 19.7% reported they had delayed a shot and 12.1% reported they had refused a shot for reasons other than illness or allergy. Caregivers identified concerns about the recommended shot schedule, the number of shots given at a time, safety, efficacy, and side effects from a vaccine. Of those surveyed 18.2% of caregivers said no or were unsure if they would want their next child to get all the recommended shots; 22.8% of caregivers rated themselves as very hesitant or somewhat hesitant about childhood shots; most caregivers (94%) indicated strong trust in their child’s provider (score of ≥ 9).

Of the 66 children seen with their caregivers, 65 vaccine status forms were completed. Recommended vaccines were given to 87.9% of the children while 6.1% delayed vaccines or used an alternative schedule and 4.5% refused all vaccines.The mean PACV score was 24.45 ± 24.17 and a range of 0-87. Of those parents surveyed, 15.2% of caregivers scored ≥ 50 consistent with vaccine hesitancy and under-immunization**.**

Researchers examined the relationship between vaccine status and caregiver demographics. Significant positive predictors of vaccine intervention status included the independent variable final total (*p* = 0.013) and children (*p* = 0.028). Significant negative predictors of vaccine status included age (*p* = 0.032) and Income3 (*p* = 0.036). All other independent variables (first born, relationship3, married vs other, race, and education) were not significant predictors of vaccine intervention status in the model.

**Provider Data**

Provider variables of comfort talking to parents about vaccines, comfort level using MI, and confidence in MI before and after the intervention period were analyzed using a Wilcoxon Signed Rank Test. This analysis did not reveal a statistically significant change in provider scores for any variable including comfort talking to parents about vaccines, z =1.414, n =4, p = 0.157, with a large effect size (r = 0.499), comfort level using MI, (z = -1.00, n=4, p= 1.00) with a medium effect size (r = 0.354), or confidence in MI , (z = -1.00, n=4, p= 1.00) with a medium effect size (r = 0.354).

Post intervention, 75% of providers either agreed or strongly agreed that the use of MI during a routine well child check to decrease vaccine hesitancy in parents was feasible, and 100% of providers either agreed or strongly agreed that they would continue to use MI in their practice. The number of well child visits seen in the months of June, July, and August decreased in the years during the COVID-19 pandemic with 649 well child visits being completed prior to the pandemic, only 388 visits being completed in 2020, and only 461 visits being completed in 2021.

Clinic Data

Considering both natural trends in vaccine status along with the impact of the MI intervention, an additional 2.6% of children 0-12 months of age in treatment clinics received vaccines because of the MI intervention. A logistic regression DiD model was utilized to assess the statistical significance of this change. It was found that the DiD among the intervention and control groups was not a statistically significant predictor of the vaccine rates of children 0-12 months of age, β = -0.330, OR = 0.719, p = 0.470.

Discussion

The present study identified gaps in the literature regarding the use of MI in the outpatient setting within the routine well child appointment and highlighted concerns related to current interventions requiring extensive provider training and time. This study aimed to determine the impact of MI on decreasing vaccine hesitancy in parents of children 0-12 months of age and the feasibility of the use of MI in an outpatient setting. Current findings support the use of a condensed MI training course and intervention within the routine well child visit to decrease vaccine hesitancy.

This study is the first to provide evidence regarding the impact of a condensed MI provider training session on vaccine hesitancy of parents of children 0-12 months of age in an outpatient setting. The present results support the use of MI as a feasible option within a well child visit and identify factors associated with vaccine refusal or delay that need to be recognized and addressed. This study also identifies caregiver characteristics associated with refusing or delaying childhood vaccines.

 It can be concluded that a brief training session for the MI intervention may provide a clinically significant increase in vaccine acceptance in the outpatient setting. Most providers identified the use of MI as feasible with a plan to continue to use MI in their practice in the future. Similar interventions may be beneficial to other outpatient clinics and should be considered as an option to decrease vaccine hesitancy in parents of children 0-12 months of age. Further research needs to be completed to identify why parents with larger families are more inclined to refuse or delay vaccines, a finding consistent across different cultures and socioeconomic statuses, so this population can be targeted to better address vaccine hesitancy.

Implications

Systems

One crucial system for tracking vaccine compliance is an immunization information system (IIS). An IIS allows for consistent management of childhood vaccines by providing secure digital access to this data (Murthy et al., 2017). A narrative review of IIS technology identified that these systems are underutilized and have the potential to improve vaccine compliance via reminder notifications, identifying demographics of those behind on vaccines, and providing regular reports of vaccine status to providers (Gianfredi et al., 2019). In Indiana, clinicians and parents have access to the Children and Hoosier Immunization Registry Program (CHIRP) and although some providers such as those who participate in Vaccines for Children (VFC) are mandated to use this system, immunization documentation is not required statewide (Indiana Department of Health [IDOH], 2021). This lack of consistency in immunization tracking and documentation contributes to low vaccine rates by hindering status tracking as well as adding to unnecessary costs when immunization schedules must be repeated due to incomplete immunization records (Murthy et al., 2017). Requiring all pediatric providers to utilize CHIRP would ensure continuity of care for pediatric immunizations and provide a database to alert providers to children who are behind on vaccines.

In addition to IISs, medical groups can monitor immunizations within an EHR system. Unfortunately, the EHR system utilized for this study was only set up to monitor the tracking of influenza vaccines. Although the 21st century cares act passed in 2016 which required EHRs to include pediatric centered tools, helped to improve the use of EHR systems in pediatrics, only 17% of providers identified having pediatric EHR functions including the ability to monitor well child visits, vaccines, and generate catch up schedules (Temple et al., 2019). Modifying EHR systems to also track childhood vaccines and issue a monthly report to providers or to trigger a text message to parents to notify of the need for a vaccine would be one way to use a current system to improve vaccine compliance.

Policy

One challenge that was identified during this study was the inability to accurately track when caregivers refused or delayed vaccines for children. Although numerous billing codes exist that relate to vaccine refusal, there is no standardization or requirement for providers to use these codes when documenting a well child visit. A policy that required all providers to use vaccine refusal or delay codes would allow for accurate tracking of vaccine refusal rates within an organization. This data could be added to provider quality metric reports that are regularly monitored to help target providers or populations that may require more education on vaccines.

The use of stricter vaccine mandates is another policy consideration to address vaccine compliance. A systematic review of the impact of vaccine rates before and after mandates identified that these policies did help to improve vaccine coverage (Lee & Robinson, 2016). However, even though mandates promote changes in behavior to increase vaccine rates, these policies also bring into question the obstruction of individual rights (Attwell et al., 2021). Other unintended consequences of vaccine mandates identified in California after the passing of Senate Bill 277 which only recognized medical exemptions for vaccine refusal included lawsuits from parents, providers charging for the completion of medical exemptions, and clinicians being penalized for signing exemptions under false pretenses (Mohanty et al., 2018). The original intent of Senate Bill 277 has been further strengthened by the passing of Senate Bill 276 in 2019 which reviews medical exemptions and the providers issuing these documents (S. Resolution 276, 2019). Using California as a guide, expansion of vaccine mandates is one option to address vaccine hesitancy.

A better approach may be the regulation of media advertisement. An analysis of just under 100 million Facebook users identified that a small number of antivaccine groups are proficient at influencing over 50 million vaccine hesitant users (Johnson et al., 2020). Even more alarming, Facebook’s current system hinders advertisements from reputable government sites while allowing for the spread of vaccine misinformation and disinformation by other groups (Jamison et al., 2020). Regulation of social media advertisement brings up concerns for impeding freedom of speech. However, it is argued that tortious liability applies when false information causes harm directly to those who follow this advice in addition to those who can be indirectly affected (Arthur, 2016). This is particularly true in the case of groups sharing disinformation identified as intentionally spreading false information (Lewandowsky et al., 2020).

Economics

An investment to train providers in MI and maintain competency will be required. For this study, training was offered for $500 to train 20 providers for up to 8 hours. This is a small investment that can have a large impact on patients as well as the community. The economic savings of childhood vaccines are well documented. Based on findings from the 2001 birth cohort in the US, it is estimated that every dollar spent to support the routine vaccine schedule will provide a minimum cost savings of 10 dollars (Zhou et al., 2014). An economic model looking at the 2009 birth cohort in the US estimated that routine childhood vaccinations will save 1.2 million quality-adjusted-life-years (QALYs) resulting in a societal benefit of over $184 billion total or $45,000 per child vaccinated (Philipson et al., 2017).

The VFC program is essential to ensure access to vaccines for all children. Looking at children born between 1994-2013 utilizing VFC immunizations, adherence to routine vaccination was expected to significantly decrease illnesses, hospitalizations, and deaths leading to an estimated direct cost savings of $295 billion and societal net savings of $1.38 trillion (Whitney et al., 2014). Unfortunately, reimbursement available to providers for the VFC program can be insufficient resulting in providers choosing to no longer participate (O’Leary et al., 2020). Reevaluating incentives for providers to ensure participation in the VFC program will be necessary for these cost savings to continue.

Practice

One major barrier to the use of MI is the time and resources required for providers to complete training to obtain positive outcomes in practice (Gabarda & Butterworth, 2021). This study found that a condensed MI training may result in clinically significant changes in the number of parents who chose to vaccinate their children per the recommended vaccine schedule. One item to consider is the experience level of the participating providers. Consideration of a similar condensed MI training course offered quarterly or bi-annually may be a feasible option for health systems to improve vaccine refusal rates among children 0-12 months of age.

This study also recognizes caregivers’ concerns about childhood vaccines which need to be identified and consistently addressed. The regular use of a vaccine hesitancy survey like the PACV, coupled with provider MI training would be beneficial to be completed with all expectant caregivers or caregivers of newborns to establish a baseline of vaccine hesitancy. Starting the vaccine conversation during pregnancy is particularly important as strong evidence identifies this period as a crucial time to influence vaccine hesitancy (Chopra et al., 2020; Garcia et al., 2021; & Olson et al., 2020).

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