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Influenza and Asthma: Evaluation of the Effectiveness of an Evidenced-Based Intervention Bundle on the Influenza Vaccination Rates Among Asthmatic Children Age Six Months to 18 Years

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APPENDIX A

INFLUENZA AND ASTHMA:
EVALUATION OF THE EFFECTIVENESS OF AN EVIDENCED-BASED INTERVENTION BUNDLE ON THE INFLUENZA VACCINATION RATES AMONG ASTHMATIC CHILDREN AGE SIX MONTHS TO 18 YEARS

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Abstract

The American Academy of Pediatrics has begun an initiative called Accelerating Improved Care for Children with Asthma Program Chapter Quality Network Asthma Project, Phase 3 (CQN3). This project is a conscious effort to enhance the quality of life in asthmatics. One important initiative included in this project is to achieve 90% or greater influenza vaccination rates in children age six months and older with asthma. This is because children with asthma who contract influenza have increased morbidity and mortality rates than do their non-asthmatic counterparts. Studies have shown vaccination rates for these children are typically between 9 to 26%, and vaccination is the best and safest way to prevent influenza.

The purpose of this study was to evaluate the effectiveness of an evidenced-based intervention bundle on the influenza vaccination rates among asthmatic children age six month to 18 years in one local pediatric office.

Data was collected through a retrospective chart review looking at vaccination rates for the (September to March) 2012-2013 influenza season and the 2013-2014 influenza season to see if an evidenced-based intervention bundle could make a difference in vaccination compliance.

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Chapter 1: Introduction and Literature Review

Children with asthma ages six-months to eighteen years are being under vaccinated against the influenza virus. This is of concern because children who have chronic illnesses, such as asthma, are at an increased risk for developing serious complications from influenza (Bhat et al., 2005; Erhart, Rangel, Lu, & Singleton, 2004; Neuzil, Wright, Mitchel, & Griffin, 2000). Influenza is attributable to more illness each year than any other illness that is preventable by a vaccine (Monto, 2002). The Centers for Disease Control and Prevention (CDC) estimates that approximately 100 children die each year from influenza and its complications (Fiore et al., 2008). Children with asthma who contract influenza are at a considerably higher risk for severe adverse complications than are children without asthma. These children have an increased mortality and morbidity, have more school absences, are at higher risk for developing pneumonia, require twice as many antibiotic therapies, and are more likely to visit a physician or other healthcare provider than are children without asthma (Glezen, 2000; Izurieta et al., 2000; Menec, Black, MacWilliam, & Aoki, 2003; Neuzil et al., 2000; O'Brien et al., 2004). These influenza related risks are of equal concern to every asthmatic child regardless of severity of disease (Robertson, Rubinfeld, & Bowes, 1992). This means that a child with mild asthma is equally at risk for developing serious influenza related complications, as is a child with severe asthma. It is also important to understand that research has shown that children with asthma are not more susceptible for getting influenza, they are simply at a higher risk for developing serious complications from the

flu, and this is why children with asthma should receive the flu vaccine (Centers for Disease Control and Prevention (CDC) seasonal influenza (flu) - information for people with asthma, 2013).

Asthma is the most common chronic disease in childhood. It currently affects an estimated 7.1 million children under 18 years (American Lung Association (ALA), 2012; Neuzil et al., 2000). A similar report by the National Heart, Lung, and Blood Institute Expert Panel Report 3 (2007), states asthma affects over 6 million children under the age of 18 in the United States, and places an extreme burden on the patient, families, and society. In 2008, asthma alone accounted for 10.5 million school absentees and cost the child's caretakers $726.1 million per year because of missed work related to the school absences (Akinbami, Moorman, & Liu, 2011; Sharma, 2013).

Asthma is a chronic inflammatory disease of the lung airways in which inflammation causes the airways to become swollen. It is a complex disorder that involves airflow obstruction, bronchial hyper-responsiveness and an underlying inflammatory response resulting in coughing, wheezing, shortness of breath, and chest tightness. These symptoms can be persistent or episodic. Despite not fully understanding the exact pathophysiology behind the inflammatory processes involved with asthma, research has implicated several factors that can trigger this inflammatory response. These factors have been identified as environmental factors such as tobacco smoke, airborne allergens, viral respiratory infections, cold air, and physical activity (Expert panel report 3 (EPR-3): Guidelines for the diagnosis and management of asthma

summary report 2007. 2007; CDC- seasonal influenza (flu)- information for people with asthma, 2013; Akinbami et al., 2011).

Studies have shown that upper respiratory tract infections are the main triggers for acute asthma exacerbation, accounting for up to 80% of the exacerbations in asthmatic children, and influenza accounts for a significant number of these respiratory infections. "The influenza-attributable burden is substantially greater among children with asthma than among healthy children" (Miller et al., 2008, p. 7). In fact, Miller et al., 2008 found there to be a 50-fold higher inpatient hospital burden for children with asthma than among healthy children.

Influenza, commonly known as the flu, is a contagious seasonal respiratory illness caused by influenza A or B viruses that occur in outbreaks each year during the winter months (Fiore et al., 2009; Maltezou, 2008; Neuzil et al., 2000). In the United States, influenza accounts for an average of 36,000 deaths each year from flu-related complications, and the risk of death is greatest among children with chronic medical conditions such as asthma (Thompson et al., 2003). The 36,000 death per year is the most often cited number, however, the CDC believes based over a 31 year span from 1976 to 2007 the more accurate number to be between 3,000 and 49,000 deaths from influenza each year due to the unpredictability and variability each year (CDC, 2011).

The total economic burden influenza alone place on Americans is quite substantial. Molinari et al. (2007), estimated the burden of direct medical costs to be 10.4 billion dollars (95% confidence interval [CI], 4.1 to 22.2 billion dollars) and found there

to be lost earnings of around 16.3 billion dollars (95% CI, 8.7 to 31.0 billion dollars) per year. When they added indirect costs this number inflated to 87.1 billion dollars (95% CI, 47.2 to 149.5 billion dollars) per year.

Considering the impact and burden that asthma and influenza present individually it is easy to see how the burden and health risk can be confounded when someone with asthma, especially a child with asthma, contracts the influenza virus. The risks and burden grow exponentially.

A report released by the CDC on March 22, 2013 reported that during the 2012-2013 flu season 105 children have died from the flu (CDC- influenza-associated pediatric mortality, 2013). Of the 105 children that died from influenza, 90 percent had not received the flu vaccine, and 60% of these unvaccinated children were from the high-risk group, with asthma being the most prevalent high-risk disease from this group (CDC-seasonal influenza (flu)- CDC reports about 90 percent of children who died from flu this season not vaccinated, 2013).

In a similar CDC report released January 17, 2014 they reported that of the 20 pediatric deaths that week only one child was fully vaccinated against influenza. In this report they again state that the single best way to protect children from the influenza virus is to have them vaccinated (CDC- flu season continues; severity indicators rise | news and spotlights | influenza (flu), 2014).

Despite this understanding, knowledge, and support for vaccination by the American Academy of Pediatrics, and the Advisory Committee on Immunization, which advises the CDC, vaccination rates among children with chronic, high-risk conditions

including asthma have traditionally remained low ranging from 9% to 26% (M. F. Daley et al., 2004; M. F. Daley et al., 2005; Kramarz et al., 2000). Considering the increased risk influenza presents to this population it is easy to see why increasing vaccination in this population should become a focal point for the healthcare provider.

Other studies have reported higher rates, up to 56%, in practice settings utilizing reminder/recall systems or year round scheduling of influenza vaccination in an attempt to increase vaccination rates among this high-risk population (Dombkowski, Harrington, Dong, & Clark, 2012; Esposito et al., 2009; Paul et al., 2006; Gaglani, Riggs, Kamenicky, & Glezen, 2001). These studies have begun to investigate ways to increase vaccination rates among asthmatic children, and improved rates are being seen in these practice settings. Additionally, these studies report how poor vaccination rates and steps needed to improve these rates are a multifactorial problem that will not easily be solved. They report further studies are needed, specifically directed at establishing evidenced–based directives and procedures for increasing vaccination rates.

In addition to the need for creation of evidenced-based multidimensional approaches to solving this problem, Fiore et al. (2010) reported that the strongest predictor and reason for vaccination compliance comes from healthcare provider recommendation. This is why every healthcare provider needs to encourage influenza vaccination, unless contraindicated, with particular emphasis on high-risk populations such as asthmatic children. Daley et al. (2005) reported that over 80% of pediatric asthma related-visits throughout the course of a year amount to missed opportunities for the healthcare provider to educate and encourage vaccination against influenza, and how

the primary care provider must be more diligent in incorporating vaccination discussions into more visits during the course of the year, not just during flu season. Similarly, Chen et al. (2011) discussed the importance of and the need for primary care providers to develop strategies to increase influenza vaccination rates among children with asthma.

Review of Literature

The literature review, for this study, has been extended beyond ten years to take into account a historical perspective on this issue. In reviewing the literature, multiple factors have been studied and discussed as it relates to vaccination rates in the United States and have found to include: the media, healthcare provider beliefs and recommendations, parental beliefs, epidemic factors, and systems factors. These factors have been found to both encourage and/or deter a person from receiving the influenza vaccination (Yoo, 2011). Each individual factor presents an avenue for future research for the development of a multidimensional approach for increasing vaccination rates that is both generalizable and applicable to everyone.

Studies have been contradictory as to the safety, efficacy, and whether influenza vaccination can lead to reductions in asthma exacerbations. Several retrospective studies have shown reductions in asthma exacerbations, reductions in the number of lower respiratory infections, and decreased use of oral steroids in children with asthma who were vaccinated against influenza (Kramarz et al., 2001; Ong, Forester, & Fallot, 2009; Smits, A, J et al., 2002). While other studies have reported contradictory findings. Several randomized, double blind, placebo-controlled studies have failed to demonstrate this decrease in asthma exacerbations in asthmatic children after receiving the influenza

vaccination (Abadolu, Mungan, Paaoglu, Çelík, & Misirligil, 2005; Bueving et al., 2004; Christy, Aligne, Auinger, Pulcino, & Weitzman, 2004).

Reports of influenza vaccination being harmful to asthmatic children have been published in the past as well (Campbell & Edwards, 1984; De, Degenhart, Neijens, & al, 1984). These reports had small sample sizes and were mostly subjective, however this idea remains imbedded in the minds of Americans. In newer double blind, placebo-controlled studies the results indicate that the vaccine is safe for asthmatic children, and does not lead to increased asthma exacerbations in the weeks after receiving the influenza vaccine as compared to placebo injection (ALA, 2001; C. J. Cates, Jefferson, & Rowe, 2008; Tata et al., 2003).

In a systematic Cochrane review by Cates & Rowe (2013) to assess the safety and effectiveness of the influenza vaccine in patients with asthma concluded that evidence from randomized clinical trials has failed to show a decrease in the number of asthma exacerbations after receiving the influenza vaccine, but did report an increase in quality of life scores among children with confirmed influenza. This report also concluded that the influenza vaccine is safe for children with asthma.

Limitations for any study looking at these factors are exacerbated by the fluctuating virility and activity each influenza season presents, in addition the overall effectiveness of the vaccination each season comes into question. These factors can lead to skewed data when studies like these are performed over one or two influenza seasons. The need for larger studies, which include multiple locations spread over several influenza seasons, will provide increased reliability and generalizability of findings.

Support for the influenza vaccination comes directly from the historical success of the vaccine. According to Kidd, Wones, Momper, Bechtle, & Lewis (2012),"annual vaccination is the most effective method for preventing influenza (Fiore et al., 2008; Stewart, 2009), and vaccination is credited with preventing more death and illness over the past 100 years than any other medical achievement" (CDC, 1999; Field, 2009 (p. 1)). This is why, despite the conflicting and limited direct evidence in the literature that influenza vaccines are beneficial to children with asthma, as evidenced by failure of some research trials to demonstrate beneficial effects in preventing asthma exacerbations in children after influenza vaccination, the CDC, National Asthma Education and Prevention Program (NAEPP), the American Academy of Pediatrics (AAP), and various other experts strongly recommend annual vaccine administration to children with asthma. Their recommendations are based upon the whole of the evidence available to them and their clinical experience and expertise. These recommendations also take into account the potential risks and weigh them against the known benefits influenza vaccination gives to the asthmatic child.

As this literature review shows, influenza vaccination is often occurring less than one-third of the time in these high-risk children; universal vaccination is and will remain a challenge that must be overcome. The described increased risk influenza presents to children with asthma, the burden influenza presents for children with asthma, evidence that recent efforts by healthcare providers to increase vaccination rates work, and weighing the risks verses the benefits vaccination affords this population, is why the AAP

has begun an initiative called Accelerating Improved Care for Children with Asthma Program Chapter Quality Network Asthma Project, Phase 3 (CQN3).

This initiative is a conscious effort to implement the NAEPP and National Heart, Lung, and Blood Institute Expert Panel Report 3 (2007), asthma guidelines to help educate healthcare providers to improve the care of children with asthma. One of the key points in this initiative is to achieve influenza vaccination rates of 90% or better in children six months and older with asthma. However, this initiative does not offer an evidenced-based approach on achieving this goal. Thus, the goal of this research article was to evaluate the effectiveness of an evidenced-based intervention bundle on the influenza vaccination rates among asthmatic children age six-months to 18 years in one local pediatric office.

Chapter 2: Theoretical Framework and Model

The research conducted by Minor (2013) will be the guiding influence in creating the evidenced-based intervention bundle that will be implemented in this study. This research "appraised, graded, summarized, and synthesized 26 articles into strong, moderate, and weak practice guideline recommendations" (p. 16). Using these recommendations as a practical guide, an interventional bundle was constructed, adopted, and implemented at this local pediatric office.

The bundle includes making vaccination an obvious priority at the office, physician recommendation for vaccination, providing education about why vaccinations are important, why it is recommended, and debunking any misinformation or misconceptions the parents' or patients' may have, and lastly implementing a reminder system using phone call and mailed card reminders.

The local office has created a registry for its asthmatic child with the specific intent of tracking vaccination rates, and they have signage up in their office and front door supporting and endorsing influenza vaccination for all patients and parents to see. They have influenza specific educational packets and booklets from the CDC and the American Lung Association that they are utilizing and handing out to all the asthmatic patients, and each physician is making it a priority to have a conversation about their support for and reasons why they personally recommend the influenza vaccination.

These interventions are either strong or moderate levels of recommendation from Minors' (2013) systematic literature review. This research showed that education was by far the strongest influence on improving vaccination rates. When reminder systems are

utilized children are five times more likely to be vaccinated as compared to offices not using a reminder system. Studies have also shown improved vaccination compliance when physicians personally recommend the vaccine and when the office makes vaccination a priority there is heightened patient/parent perception towards disease prevention if they choose to vaccinate.

Study Design

The study is a quasi-experimental design study. The variables of interest include 1) children with asthma (six-months to 18 years of age), 2) influenza, 3) flu vaccine, and 4) subsequently examining number of those children with asthma choosing to receive the flu vaccine. Then comparing vaccination rates from 2012-2013 flu season with the 2013-2014 flu season to evaluate if the implemented bundle of evidenced-based educational interventions improved these rates. Ultimately, there is a goal for 90% vaccination rates among these asthmatic children as set forth by the AAP asthma initiative.

Definition of terms

Asthma is defined as a common chronic disorder of the airways that involves a complex interaction of airflow obstruction, bronchial hyper-responsiveness and an underlying inflammatory response resulting in coughing, wheezing, shortness of breath, and chest tightness (Expert panel report 3 (EPR-3): Guidelines for the diagnosis and management of asthma-summary report 2007, 2007). For this study, a child with asthma is determined by their ICD code diagnosis of asthma. Influenza is defined as a seasonal contagious respiratory illness caused by influenza A or B viruses that occur in outbreaks each year during the winter months (Fiore et al., 2009; Maltezou, 2008). The flu vaccine

is defined as an injectable solution containing trivalent inactivated (killed) influenza viruses that are given with a needle, usually in the arm to protect a person against getting influenza. The intranasal form containing the live-attenuated influenza vaccine is only indicated for children age two or older. This form is not indicated for children with chronic medical conditions, such as asthma because of the increased risk of complications the flu presents to this population and increased reports of wheezing with this formulation (Committee on Infectious Diseases, 2012).

The evidenced based educational bundle is defined 1) as the office making vaccination an obvious priority at the office, 2) physician recommendation for vaccination, 3) providing education about why vaccinations are important, why it is recommended, and debunking any misinformation or misconceptions the parents' or patients' may have, and 4) implementing a reminder system using phone call and mailed card.

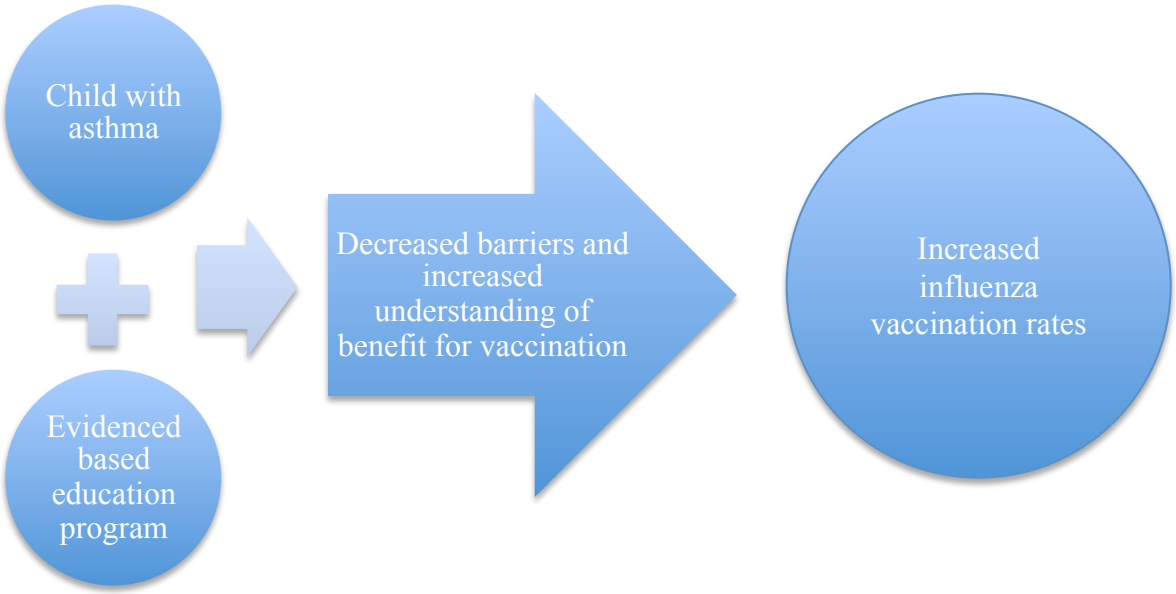
The barriers are defined as the misconceptions about the safety and efficacy of the vaccine, the idea, stemming from older literature, that the vaccine will worsen asthma in children, the lack of education for parents of asthmatic children, and the failure of the healthcare provider and office to make vaccination a priority.

Theoretical Framework

The framework for this project is based from the Health Belief Model. This model was developed in the 1950s by social psychologists Hochbaum, Rosenstock, and Kegels. This psychological model attempts to explain and predict healthy behaviors by focusing on the attitudes and beliefs of individuals. This model was developed in

response to failure of a free tuberculosis health-screening program (Chen et al., 2011). The described psychological conceptual model and the theoretical model mirror each other, in that the focus is on the physiological effects of the asthmatic child contracting influenza, and how influenza vaccination can thwart the established increased burden and risk for serious complications influenza possesses for asthmatic children.

The evidenced-based educational program was developed with the Health Belief Model as the guide, and this research will be to evaluate the effectiveness of these interventions to determine if, once implemented, they influenced compliance in the number of asthmatic children, from this one pediatric office, who received the influenza vaccine during the 2012-2013 season as compared to the 2013-2014 season. The implementation of this bundle should demonstrate increased influenza vaccination compliance for this study population. Therefore, a map was developed to explain the psychological concept that is the basis for the recommendation of influenza vaccination. The map is as follows:



This map shows the psychological idea that with the implementation of an evidenced-based educational program barriers and misunderstanding will be decreased resulting in increased influenza vaccination rates. This model defines the population at risk, and shows that an intervention will occur to help reduce the barriers for vaccination and increase the understanding of the benefits of vaccination in children with asthma. The evidenced-based program will identify and reduce the barriers, provide information, provide awareness, and provide guidance in why it is important to vaccinate children with asthma against the flu virus. These are all key elements of the health belief model.

Chapter 3: Methodology

Subjects

A retrospective chart review was completed to determine the number and percentage of children with asthma who receive the influenza vaccine during the September 2012-March 2013 and September 2013-March 2014 flu seasons. The data for the project will come from a local pediatrician office in Xenia, Ohio. This is the only pediatric office located in this city of 25,000 residents. This practice is estimated to have approximately 5000 patients. Approximately 60% are self-pay or have private insurance, and either Medicare or Medicaid covers the remaining 40% of the patients. The practice employs two pediatricians and they have a supportive nursing and administrative staff available to care for these patients. This practice is committed to serving the children of this area, but more specifically they are committed to improving vaccination rates among the asthmatic children in their care.

The convenience sample will be obtained by utilizing the office billing system looking for asthma ICD codes, pulling these patients charts, and then obtaining information as to whether they received the influenza vaccine or not. The office has also established an asthma/influenza registry, which was also utilized in obtaining this needed information. Additionally, the Ohio Statewide Immunization Information System (SIIS) was used to assure a comprehensive review of vaccination compliance among these children. The SIIS was utilized to ascertain children not vaccinated at this office to again ensure a more comprehensive review of vaccinated individuals. From this information the number and percentage of asthmatic children who received the influenza

vaccine was determined. Using the historical data gathered by Minor, 2013 and the data gathered by this researcher the two influenza seasons at this one pediatric office was then be compared and contrasted.

Inclusion criteria comprised children age six-months to eighteen years of age belonging to this pediatric practice with an asthma diagnosis determined by ICD codes 493.00, 493.01, 493.02, 493.10, 493.11, 493.12, 493.20, 493.21, 493.22, 493.80, 493.81, 493.82, 493.90, 493.91, and 493.92. The immunization status had to been known for the patient to be included in the study. Children with confirmed allergies to eggs were excluded. Individual billing numbers were used as the patient identifier in an attempt to avoid duplication and to assure patient confidentiality and anonymity. These billing numbers were destroyed after the data collection was completed to further minimize any potential risk.

Ethical considerations

Cedarville University's Institutional Review Board reviewed the proposal for this research and approved the ethical considerations of this thesis on February 19, 2014. The data was then obtained from the local pediatric office. Absolute care was taken to ensure the anonymity, privacy, and safety of the subjects was preserved during the data collection and subsequent statistical analyses and results review.

Design

Weaknesses of this research include the use of a retrospective quasi-experimental study design that is simple observation and data collection. This researcher also had no control over the actual delivery of the evidenced-based interventional bundle.

The interventions were established and adopted by the physicians of this pediatric office from the recommendations made by Minor, (2013). Another weakness is the fact that this research used convenience sampling without randomization.

This design allowed for some examination into possible associations between the variables, and helped establish if the evidenced-based education bundle improved influenza vaccination rates in this population of study. Also, these findings may not be generalizable to the population as a whole, but do give some insight into the success of this evidenced-based intervention. This is because the design included a specific subset of the pediatric population and was limited to two influenza seasons; both may affect the generalizability of the study, but still gives some insight into the population of interest.

Another limitation of this study came from the theoretical model guiding the studies conception. Like all theoretical models each has its own limitations, and the Health Belief Model is not beyond this certainty. The Health Belief Model does not allow for a decision-making process in the model and because of this the model itself has limitations (Keenan, Campbell, & Evans, 2007). Issues such as the one examined in this study are complex and have personal multifactorial issues involved in each individual's decision as it relates to their healthcare choices.

The strengths of this design stems from the practicality involved in the employment of convenience sampling method. The design was constructed in a manner that allowed this researcher to acquire the specific data needed to for the study. This design allowed for an adequate sample size for the study, and time constraints were limited since this design required data collection from existing records. The researcher

was able to obtain the needed data relatively quickly, and this type of design is inexpensive to complete. The sample and setting were correct and adequately met the purpose, design, and data needs for the study. The study design creates limited ethical considerations for the subjects involved since this is not a true experimental design, in that there is no direct intervention on part of the researcher, no control group, thus resulting in little if any risk of harm to the subjects.

The research was conducted at a practice open and receptive to implementing the education bundle with the goal of achieving higher vaccination compliance rates. This study was completed at a single practice setting thus minimized organizational factors that may have existed between practices. These factors could potentially have accounted for and affected the findings.

Measurement tools

This research did not utilize any special measurement tools as it pertains to the studies data collection or analysis. The data gathered on the children with the diagnosis of asthma included: medical record number, influenza immunization status, age, gender, and type of insurance. The data was collected and entered into the PSPP program as numerical values that were stored online and encrypted, and then descriptive and correlational statistics were performed to determine if the implementation of the evidence-based education bundle made a statistically significant difference in influenza vaccination rates among these children with asthma.

Data Analysis

The data analysis for this study is specifically to determine if there was a

statistically significant change in the number of children with asthma who receive the flu vaccine during the 2012-2013 flu season verses the number of children with asthma receiving the flu vaccine during the 2013-2014 flu season at one particular pediatrician office in Xenia, Ohio after implementing the evidenced-based educational bundle for one year.

An analysis was performed to see if the evidenced-based bundle influenced and altered a difference in the number of children who received the vaccine pre-education (2012-2013 influenza season) to the number of children who receive the vaccine post education (2013-2014 influenza season). This researcher tested whether there were differences between the two groups (2012-2013 flu season vs. 2013-2014 flu season). This was ascertained by performing Chi-Squared statistical analyses on the described data. Then looked at the vaccination rates to determine if these rates improved, worsened, or remained unchanged with the implementation of the evidenced-based recommendations when comparing the two respective influenza seasons. Additional demographic data such as specific age, gender, and type of insurance was collected in this research study to see if significant differences were present among these variables.

Chapter 4: Results

2012-2013

A retrospective chart review completed by Minor (2013), showed a total of 315 patient charts meeting the inclusion criteria for the study for the 2012-2013 influenza season. From the 315 patients, 312 charts were retrievable and reviewed. The findings (Table 1) showed those vaccinated to be at 42% (n= 129), while 58% (n= 183) did not receive an influenza vaccination. The population demographics were as follows: age ranged between 6 months to 18 years, 55% male (n= 171) and 45% female (n= 140), 69% Medicaid (n= 215), 31% private insurance (n= 96), and one patient was identified as self-pay. In regards to statistical analyses discussed in this research the statistical significance was set at ($p \leq .05$). Chi-squared analysis revealed a statistically significant correlation between the type of insurance and vaccination ($p= .01$). Children with Medicaid were vaccinated at a rate of 36 percent (n= 78) while their private insurance counterparts were vaccinated at a rate of 53 percent (n= 51). Minor (2013) found no other significant correlations.

2013-2014

A retrospective chart review was conducted for the 2013-2014 influenza season in adherence with the previously discussed methods. A total of 625 patient charts met the inclusion criteria for the study. All 625 charts were retrievable and reviewed. No charts were excluded based on exclusion criteria. The result of this chart review (Table 2) showed that while many children did receive the influenza vaccination 42% (n= 262), the

majority 58% (n= 363) of these patients were unvaccinated against influenza. The population revealed it was marginally male dominated at 56% (n= 348) as compared to 44% females (n= 277). Medicaid once again was the principal type of insurance at 62% (n= 386) as compared to private insurance at 38% (n= 239).

While Minor (2013) revealed a statistically significant correlation between the type of insurance and vaccination status this researcher found no correlation present. A Chi-squared analysis was completed for the 2013-2014 influenza season data and the analysis demonstrated no statistically significant differences in immunization rates amongst this sample population, including insurance type and vaccination status. This researcher found that Medicaid patients were vaccinated at a rate of 44% (n= 171) while the private insurance patients were vaccinated at a rate of 38% (n= 91).

2012-2013 vs. 2013-2014

Correlational statistics were then run comparing the two respective influenza seasons. The Chi-squared analysis demonstrated no statistical improvement in the overall vaccination rates between the two respective seasons (p= .87). However, Chi-square analysis between the two years specifically looking at the demographic subsets demonstrated statistically significant correlations between some of the variables (Table 3).

Looking at the total population differences regarding type of insurance coverage the analysis revealed statistically significant differences to exist (p= .03). During the 2012-2013 season Medicaid patients made up 69% (n= 215) while the 2013-2014 season Medicaid patients made up 62% (n= 386), and the number of children with private

insurance changed from 2012-2013 season which revealed 31% (n=96) to 38% (n=239) during the 2013-2014 season.

Comparing specifically the Medicaid patient vaccination status during these two seasons the analysis revealed (p= .05) a statistically significant correlation. The 2012-2013 Medicaid patients were vaccinated at 36% (n= 78), and those not vaccinated were at 64% (n= 137). Compared to the 2013-2014 season that showed Medicaid patients were vaccinated at a rate of 44% (n= 171), and those not vaccinated were at 56% (n= 215).

The private insurance patients also revealed statistically significant correlation (p= .01) between these two seasons. The 2012-2013 private insurance patients were vaccinated at 53% (n= 51), and those not vaccinated were at 47% (n= 45). Compared to the 2013-2014 season that showed private insurance patients were vaccinated at a rate of 38% (n= 91), and those not vaccinated were at 62% (n= 148).

Additional significant findings were found as it related to the overall pediatric population at this office, and insurance coverage. As noted, this office has approximately 5000 patients, of which, 40% are Medicaid patients while the remaining 60% are either private insurance or self-pay patients. When looking specifically at the asthma population these change significantly. During the 2012-2013 season, of the 312 patients Medicaid made up 69% while private insurance or self-pay made up 31%. This is a significant shift in insurance coverage of the population of interest (p= .0001). During the 2013-2014 season, of the 625 patients Medicaid made up 62% of the population while private insurance or self-pay made up 38%. This is also represents a significant shift in the insurance coverage for the population of interest (p= .002).

Table 1

Population Demographics 2012-2013 season

	Number 2012-2013	**Percent 2012-2013**
Ages		
Preschool (0-5 years)	111	36%
School-Aged (6-12 years)	132	42%
Adolescent (13-18 years)	69	22%
Gender		
Male	171	55%
Female	140	45%
Insurance		
Medicaid	215	69%
Private Insurance	96	31%
Self Pay	1	<1%
Vaccination Status Totals		
Vaccinated	129	42%
Unvaccinated	183	58%
*Medicaid Vaccination		
Vaccinated	78	36%
Unvaccinated	137	64%
Private Insurance Vaccination		
Vaccinated	51	53%
Unvaccinated	45	47%
Total population size	312	100%

***Statistical significance observed (p= .01)**

Table 2

Population Demographics 2013-2014 season

	Number 2013-2014	**Percent 2012-2013**
Ages		
Preschool (0-5 years)	153	24%
School-Aged (6-12 years)	298	48%
Adolescent (13-18 years)	174	28%
Gender		
Male	348	56%
Female	277	44%
Insurance		
Medicaid	386	62%
Private Insurance	239	38%
Self Pay	0	0%
Vaccination Status Totals		
Vaccinated	262	42%
Unvaccinated	363	58%
Medicaid Vaccination		
Vaccinated	171	44%
Unvaccinated	215	56%
Private Insurance Vaccination		
Vaccinated	91	38%
Unvaccinated	148	62%
Total population size	625	100%

Table 3

Significant differences between 2012-2013 and the 2013-2014 season

	2012-2013	**2013-2014**	**P value**
Insurance Type Medicaid Private Insurance Self Pay	 215 (69%) 96 (31%) 1 (<1%)	 386 (62%) 239 (38%) 0 (0%)	 .03
Medicaid Vaccination Vaccinated Unvaccinated	 78 (36%) 137 (64%)	 171 (44%) 215 (56%)	 .05
Private Insurance Vaccination Vaccinated Unvaccinated	 51 (53%) 45 (47%)	 91 (38%) 148 (62%)	 .01
Total population size	312	625	

Statistical Significance = ($p \leq .05$)

Chapter 5: Discussion

The literature clearly shows that children with asthma who contract influenza have increased morbidity and mortality rates, and the economic burden of these diseases are great. Expert consensus states that vaccination is the best way to prevent influenza. Research has shown that this population is falling well below the national objective being set forth by the AAP.

The literature review also reveals efforts are being made to increase these rates, however, no one method has been identified that will deliver the most influential and sustaining desired effect. If fact, the consensus of the literature reports this to be a multifactorial issue that will take a multifactorial intervention to reach these objectives.

The evidenced-based intervention bundle identified by Minor's (2013) research was utilized for this study because of the multifaceted aspects of the bundle. The goal of this researcher was not to find out which intervention made the change rather if the whole of the bundle could offer a means to increase vaccination compliance among the children with asthma at one local pediatric office. While the results of this study did fail to show an overall significant improvement in the whole of the vaccination rates it did show significant changes as it related to the type of insurance carried. Medicaid patients had a significant increase in the number of children vaccinated (36% up to 44%), while the private insurers had a significant decrease in the number of children vaccinated (53% to 38%).

Several factors may be attributable to these findings. This intervention created an increased awareness, and led to diligence in influenza vaccination among these children.

This urged the office to create a registry system specifically designed to track and log the asthmatic children and their vaccination status. It is also important to note that Minor (2013) excluded any asthmatic patient in this practice that did not visit the office during the 2012-2013 influenza season. Whereas, this researcher included every asthmatic patient in the practice regardless of whether a visit to the office occurred during the 2013-2014 influenza season. These may have been contributing factors into the increased population size between the two respective influenza seasons, the indifference in the whole of the results, and the differences observed with insurance types between the two respective influenza seasons. This method of data collection was altered to ensure comprehensive insight into the asthmatic children at this office.

Systems issues may have also contributed to some of the differences or lack of difference observed between the two seasons. During the 2012-2013 influenza season the office reported limited supplies for their Medicaid patients to utilize, wherein the office reported no problems during the 2013-2014 season relating to the Medicaid vaccination supply.

Another consideration that may have contributed to these results is that the office had been made aware of the findings from Minor (2013) and may also have contributed to increased diligence in vaccinating the Medicaid population. With this knowledge a greater effort to increase this population may have occurred which could have potentially and unwittingly also affected the private insurance group as well. Thus leading to the significant decline in that groups vaccination rates. This research was not designed nor intended to answer these questions.

Other factors that could have affected vaccination status include the perceptions regarding the threat of influenza. The 2011-2012 influenza season resulted in (total deaths, not just asthmatic deaths) 35 pediatric deaths, while the 2012-2013 season resulted in 171 pediatric deaths (CDC- seasonal influenza (flu)- weekly report: influenza summary update, 2014).

No one factor can be attributed to these differences and indifferences. Increasing vaccination rates among this population must first start with effort. Effort was made by Minor (2013) to synthesize the data to offer this population the best available modality to influence positive change. Effort was made by this pediatric office, as evidenced by their adoption of this educational bundle and the creation of the asthma registry, which will allow for better tracking of their asthmatic children.

When considering the significant changes as it related to the total pediatric office population and insurance coverage verses the asthma population and insurance coverage it is important to note that during both respective seasons the asthma patients were predominantly Medicaid patients. This could be an important finding in that the Medicaid patients presumably consist of lower income families and may live in situations that expose these children to asthma risks (increased dust mites, pollution, pet dander, older housing, and etc…) that may predispose them to the development of asthma in the first place (ALA, 2014).

Future Implications

This study has begun to create a change at this office, and future research should be continued to observe if, indeed, the educational intervention created by Minor (2013)

will have effective and lasting effects on vaccination rates among asthmatic children at this one pediatric office.

This research design will allow any potential future data analysis at this office to include baseline comprehensive knowledge of the children with asthma. The design is also easily reproducible. Additionally, future data analysis could include gathering data on days missed from school related to flu symptoms and subsequent asthma exacerbations to determine if increased influenza vaccination compliance will result in fewer school absences and fewer asthma exacerbations during flu season. Medical record numbers could be compared between two influenza seasons to determine those children who receive the vaccination one year and then elect not to receive the vaccination the next year. Follow up questions could then be obtained to help determine the why behind choosing to decline the vaccination the subsequent year. The same could hold true for those who do not get the vaccine the prior year and elect to the following year. Follow up questions could be obtained from this group to help guide future interventions and to help determine which interventions are most effective in influencing vaccination compliance.

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