# EVALUATING ASTHMA 411 PROGRAM IN TERMS OF REDUCTION OF THE USE OF AMBULANCE SERVICES

by

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As members of the DNP Project Committee, we certify that we have read the DNP project prepared by Chongsuh Bae, titled Evaluating Asthma 411 Program in Terms of Reduction of the Use of Ambulance Services and recommend that it be accepted as fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.

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Final approval and acceptance of this DNP project is contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

I hereby certify that I have read this DNP project prepared under my direction and recommend that it be accepted as fulfilling the DNP project requirement.

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# DEDICATION

This manuscript is dedicated to my wife, Minsuh Bae. Without her understanding, patience, and supports, my study would have been impossible. Therefore, my success in this program is not mine but hers. Thank you, Minsuh, for being the source of my hope and energy.

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# ABSTRACT

**Background:** Asthma is a common chronic, reversible airflow obstruction with the signs and symptoms of shortness of breath, chest tightness, use of accessory muscles to breathe, wheezing, coughing, increased breathing and pulse rates, and inability to make full sentences in talking for breathing difficulties. There is no cure for asthma currently, but only medications to treat the symptoms. In the United States (U.S.), asthma affected approximately 6.2 million children (8.4% of children under 18 years old) with 2 million emergency room visits in 2015. It is also a significant reason to call for ambulance services and to increase students' absences from schools and learning disabilities. Therefore, an independent school district (ISD) in the northwest region of Texas has adopted Asthma 411 program to treat students with asthma attacks at the school nurse offices without calling for ambulance services.

**Objective:** The purpose of this study was to determine the effectiveness of the Asthma 411 program in reducing the number of calls for ambulance services for students with asthma attacks.

**Design:** This project was a retrospective chart review utilizing a quantitative non-experimental study design utilizing descriptive statistics to identify the differences made by the Asthma 411 program.

**Setting:** An elementary school located in the northwest region of Texas.

**Participants:** One hundred twenty-six students with asthma at an elementary school located in the northwest region of Texas.

**Measurements:** Counting the number of ambulance calls for students with asthma attacks in two periods: before the adoptions of the Asthma 411 program and after the adoption of the program.

**Results**: Multiple calls out of 19 total ambulance calls were made in the academic year of August 2012 to May 2013 before the adoption of the Asthma 411 program. After the adoption of the program, only one ambulance call was made during the six academic years of August 2013 to May 2019.

**Conclusion:** The Asthma 411 program was successful in reducing the number of ambulance calls for students with asthma attacks.

# INTRODUCTION

## Problem Description

According to World Health Organization (WHO) (2017), asthma is a global non-communicable disease with approximately 338,000 deaths annually. Asthma is the 16th leading disease measured by years lived with disability (YLD) and the 28th leading disease measured by disability adjusted life years (DALY) ("Global Asthma Report," 2018). Although asthma is a global disease, its prevalence is strikingly different among countries worldwide (Asher & Pearce, 2014). Low- and middle-income countries have a 13 times greater prevalence than high-income countries (Asher & Pearce, 2014).

In the United States, asthma affected approximately 6.2 million children (8.4% of children under 18 years old) in 2015 (Centers for Disease Control and Prevention [CDC], 2017). The number of emergency room visits for asthma symptoms was approximately 2 million visits, and the number of deaths caused by asthma was 3,615 people in the same year (CDC, 2017). It is also a leading cause of students' absences from schools (Cicutto, Gleason, & Szefler, 2014). According to Fowler, Davenport and Garg (1992), the children with asthma were three times more likely to be absent than other children and 1.7 times more likely to have a learning disability. Therefore, Basch (2011) pointed out the critical issue of asthma, directly or indirectly, damaged academic performance of elementary and secondary school students by causing increased absences and reduced learning ability.

## Background Knowledge

Asthma is a common chronic disease that causes reversible airflow obstruction (CDC, 2018). There are three characteristics of the disease: airway inflammation, airway obstruction

and airway hyper-responsiveness (American Academy of Allergy, Asthma & Immunology [AAAAI], 2013). For the airway inflammation, the airway lining becomes swollen, which narrows the airway. For the airway obstruction, the muscles that encircle the airway become tightened and narrow the airway. For airway hyper-responsiveness, the airway muscles react more quickly and strongly to allergens and irritants, and narrow the airway (AAAAI, 2013).

The common signs and symptoms of asthma attack are feeling out of breath, chest tightness, use of accessary muscles to breathe, wheezing, coughing, increased breathing and pulse rates, and inability to make full sentences in talking for breathing difficulties caused by allergens and irritants (AAAAI, 2013). Although there are numerous allergens and triggers of asthma, some of them are pollens, molds, dust mite, animal hair, tobacco smoke, air pollution, perfumes, weather change, and physical exercise (AAAAI, 2013; WHO, 2019a).

Currently, there is no cure for asthma (WHO, 2019b). There are, however, medications to help people live enjoyable lives (WHO, 2019b). Those medications include short-acting bronchodilators, inhaled corticosteroids, and long acting bronchodilators (AAAAI, 2013; WHO, 2019a). The preferred way of administration of these medications is inhalation with the use of a spacer (AAAAI, 2013).

## Local Problem

When students who don’t have inhalers with themselves or in nurse offices come to a school nurse office at the independent school district (ISD) in the northwest region of Texas due to asthma attacks, school nurses have to call 911 as they don’t have standing orders and medications to treat those students. This results in the care and treatment for the students being delayed while waiting for the ambulance to arrive. Utilizing ambulance services is a barrier to

prompt care and treatment for students experiencing asthma attacks in the school. To address this problem, the ISD in the northwest region of Texas has adopted a program called Asthma 411, which is a public health program targeting asthma ("Asthma 411," 2017). The Asthma 411 program provides school nurses with a healthcare provider's standing order, a nebulizer and vials of albuterol ("Asthma 411," 2017). This allows school nurses to treat asthmatic students with an emergency asthma medication (nebulized albuterol) at the school nurse office without calling 911 ("Asthma 411," 2017). The goal of the Asthma 411 program implemented at the ISD in the northwest region of Texas is to improve health outcomes of the students experiencing asthma emergency by reducing time to treatment without calling for ambulance services ("Asthma 411: School based program," n.d.).

## Purpose

The purpose of this project is to evaluate if the Asthma 411 program reduces the number of uses of ambulance services. The project question is: Has the adoption of Asthma 411 program, compared to the period without Asthma 411 program, reduced the number of uses of ambulance services for acute asthma attacks in established asthmatic students in an elementary school at the ISD in the northwest region of Texas?

## Theoretical Framework

The framework for this project is the "Asthma Care Model (ACM-v1)" (Dima, Bruin, & Ganse, 2016). As seen below (Figure 1) this asthma care logic model presents the causal sequence of asthma management process in orderly manner: change of asthma symptoms, assessing the severity of the symptoms, prescribing drug regimen, the patient's adherence to the regimen, reducing asthma symptom triggers, increased asthma control, reduced risk of severe

asthma exacerbations (SAEs), and increased quality of life due to the reduced SAEs (Dima, Bruin, & Ganse, 2016). The model points out three moderators, which influence the causal sequence: the behaviors of patients and caregivers, the roles of healthcare providers, and the feedback loop (Dima, Bruin, & Ganse, 2016).

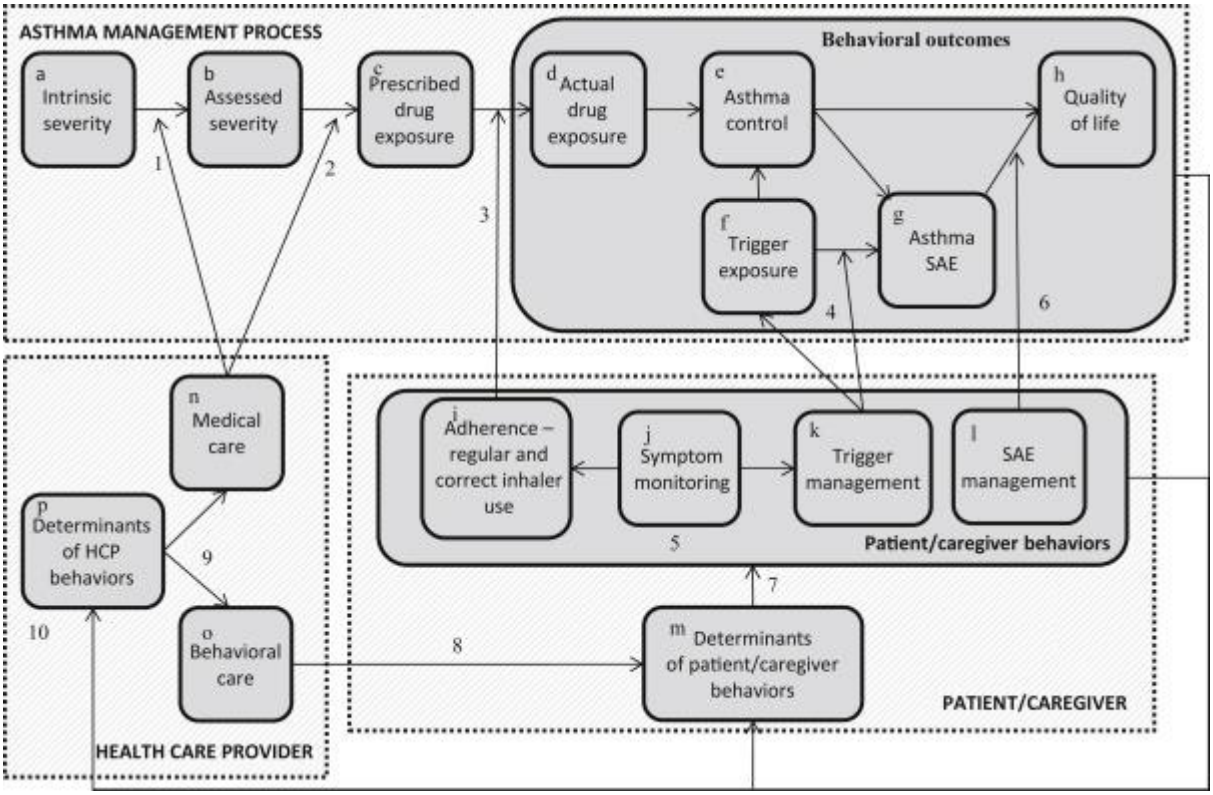


*FIGURE 1*. Graphical presentation of the Asthma Care Model (ACM-v1). (Dima, Bruin, & Ganse, 2016)

Dima, Bruin, and Ganse (2016) explain the desirable behaviors of patients or caregivers are adherence to proper use of controller inhalers, symptom monitoring, managing triggers, and the management of SAEs. These behaviors of patients or caregivers are also influenced by three modifiable factors and one nonmodifiable characteristics. The three modifiable factors are knowledge on the need for adherence, illness beliefs, and self-regulation skills. The one nonmodifiable characteristic is sociodemographics (Dima, Bruin, & Ganse, 2016). The authors

emphasize the importance of those four factors to understand hidden motivation of the behaviors of the patients or caregivers (Dima, Bruin, & Ganse, 2016).

According to Dima, Bruin, and Ganse (2016), healthcare providers have two important roles in the management of patients' asthma attacks. Those are medical care on the asthma symptoms and behavioral care for the patients' or caregivers' proper behaviors related to asthma control. The medical care includes proper assessment of the severity of the symptoms and pertinent regimen prescription. The behavioral care is also called as therapeutic education, which includes training how to use inhaler properly, how to identify asthma triggers, and providing individualized asthma action plans (Dima, Bruin, & Ganse, 2016).

The feedback loop of the model provides the chance to improve the asthma management process (Dima, Bruin, & Ganse, 2016). There are two modes of feedback loops in this model. The first is the feedback on health outcomes, which improves the assessment of symptoms and corresponding treatment regimen. The second one is the feedback on the patient's behaviors, which improves patient education for asthma control (Dima, Bruin, & Ganse, 2016).

This model provides the detailed view on the whole process related to the asthma control. However, this DNP project will focus more on the treatment side of SAEs than the whole process. The Asthma 411 program initiates its actions when a school nurse finds a student under asthma attack, which is one of the healthcare provider's roles: medical care on the asthma symptoms. Therefore, this project will utilize only the medical care part of the asthma control model (ACM).

## Synthesis of Evidence

Pediatric asthma is still one of the most common chronic diseases among children (Brigham, Goldenberg, Stolfi, Mueller, & Forbis, 2016). Children with moderate persistent asthma fall into a vicious cycle of obesity and more asthma attacks because they avoid engaging in physical activity (Haines & Kim, 2013). As asthma-related problems are serious with children, to obtain a better understanding of asthma prevention and treatment, several literature searches were performed using PubMed and Cumulative Index of Nursing and Allied Health Literature (CINAHL). The first keywords used included Asthma 411, asthma, asthma management, adolescent, children, youth, school, and school-based clinic. The limiters were English language, U.S., full text available, humans, and within the last five years. The keyword "Asthma 411" on CINAHL produced five articles. With the same keyword, PUBMED produced 45 articles. Among them, only two articles were directly related to Asthma 411 program. The second batch of keywords on CINAHL were education, asthma prevention and treatment, and asthma in children. The limiters were full text, abstract available, published date: 20130101-20190331, English language, peer reviewed, research article, human, geographic subset: USA, and age groups: child: 6-12 years. This second search produced 36 articles. Among them, seven articles were selected as they are most relevant to the search words of education, asthma prevention and treatment, and asthma in children. Eleven articles were reviewed and found to be relevant to this project (Appendix A).

### Asthma Treatment at Home

Children in low-income households especially suffer disproportionately more from asthma than the children in middle- or upper-income families (Brigham, Goldenberg, Stolfi,

Mueller, & Forbis, 2016). Although the causes of this asthma disparity are unclear, Brigham et al. (2016) explain that the aggravating factors may include the adverse environmental conditions such as inadequate ventilation and pest infestation in low-income families' homes. Turcotte, Alker, Chaves, Gore, and Woskie (2014) agree that there are many known indoor environmental asthma triggers including pet hair, dust, smoke and pests in low-income families' homes. According to the study of Turcotte et al. (2014), providing at-risk households with asthma prevention education and targeted environmental intervention resulted in statistically significant health improvement and cost reduction of $821,304 annually for medical care of asthma patients. The study of Sweet, Polivka, Chaudry, and Bouton (2014) shows the effectiveness of educating parents of children about asthma prevention and intervention. The education in six months significantly reduced emergency department visits, missed school days, and caregivers' missed work days (Sweet, Polivka, Chaudry, & Bouton, 2014).

The study of Brigham et al. (2016) found the association between the parents with higher health literacy and the usage of a written asthma management plan, which indicated the importance of education for parents of children with asthma. Archibald, Caine, Ali, Hartling, and Scott (2015) found that there were long-standing and persisting gaps between parents' information on asthma prevention and treatment and the needed information identified during the research teams' interpretation. Those knowledge gaps were present in areas of recognizing asthma severity, acute management and inhaler use, prevention versus crisis orientation, and knowing about asthma (Archibald, Caine, Ali, Hartling, & Scott, 2015).

**Asthma Prevention and Treatment at School**

As a school is a place where school-aged children stay a substantial portion of their weekdays, the role of school nurses is essential in caring for students with asthma (Liberatos et al., 2013). According to Liberatos et al. (2013), school nurses received children's asthma information not from their parents but through school records and encountering students presenting with asthma symptoms. One of the significant barriers to the role of school nurses for asthma prevention and treatment was the lack of communication between the nurses and parents (Liberatos et al., 2013).

While Liberatos et al. (2013) deal with barriers to asthma prevention and treatment, Francisco, Rood, Nevel, Foreman, and Homan (2017) focus on improving the knowledge of school nurses about asthma. School nurses were provided with asthma education by online in a pretest/posttest format in "Teaming Up for Asthma Control" (TUAC) program (Francisco, Rood, Nevel, Foreman, & Homan, 2017). The results of such education were meaningful. School nurses' knowledge scores increased significantly, and increased knowledge, in turn, improved students' FEV1 significantly (Francisco, Rood, Nevel, Foreman, & Homan, 2017). The cost of healthcare for TUAC students enrolled in Medicaid was reduced by $1,431 in the year as compared with other students with asthma (Francisco, Rood, Nevel, Foreman, & Homan, 2017).

For more prompt treatment of students with asthma symptoms, Richmond, Sterling, Huang, Wilson, and Pike (2006) explains about the Asthma 411 program. The Asthma 411 program provides school nurses with a consulting physician's standing order and medication of albuterol. Such provision enables the school nurses to treat students under asthma attack without calling for the ambulance or sending the students home (Richmond, Sterling, Huang, Wilson, &

Pike, 2006). Although asthma action plans (AAPs) were necessary for school nurses to treat students as the action plans describe necessary actions for those students who are under an asthma attack, it was difficult for school nurses to receive them from parents who do not go to see doctors for them (Richmond, Hobson, Pike, Kleiss, Wottowa, & Sterling, 2010). Richmond, Hobson, Pike, Kleiss, Wottowa, and Sterling (2010) developed "Breathe Your Best for School Success" (BYB) program to address the problem. The program utilized a "passport" system, which recommended the three steps on how to submit AAP to schools. The three steps were: 1) receiving an AAP from a health care provider via parents; 2) filling prescriptions; and 3) submitting AAP and med(s) to the school nurse (Richmond, Hobson, Pike, Kleiss, Wottowa, & Sterling, 2010).

For successful asthma management, asthma self-help workshops or text messages could be utilized. According to Rhee, Belyea, Hunt, and Brasch (2011), a one-day camp of peer-led asthma self-management workshop program was more effective than that of the adult-led workshop program. The adults were physicians and nurses. The effects of peer-led workshop lasted long, at least nine months, after the day of the workshop (Rhee, Belyea, Hunt, & Brasch, 2011). Johnson et al. (2016) describe using electronic text messages to increase asthmatic students' medication adherence. The authors found that the text messages increased asthmatic students' medication adherence, self-efficacy on asthma self-management, and the quality of life (Johnson et al., 2016). However, the intervention lasted for only three weeks, and the outcomes were measured at the end of the three weeks. Therefore, it is uncertain that this method has any long-term effects as people generally become used to new technologies and less responsive to them.

All 11 articles deal with asthma problems of school-aged children between 6-12 years old (Appendix A). However, all are not related to the specific topic of Asthma 411 program, which is the writer's primary interest. The literature search did not produce more than two articles on the program. It reveals the scarcity of studies on the Asthma 411 program. However, knowledge such as prevention and treatment of asthma-related symptoms at home or school from this literature review is still valuable and useful in helping children with asthma.

## METHODS

### Design

This DNP project is a quantitative non-experimental study design utilizing descriptive statistics to identify the differences made by the Asthma 411 program. The basic descriptive statistics of counts and percentages will be used for comparing two groups of unpaired data at this project. The first group represents the number of ambulance uses by students with asthma before the adoption of the Asthma 411 program during the period of August 2012 through May 2013. The second group represents the corresponding number after the adoption of the program from August 2013 through May 2019. Comparing these two groups will allow for the percentage change in ambulance services to be calculated. The findings of this project will be reported back to the school district in the northwest region of Texas and the ISD will disseminate the findings to each school for the benefits of all asthmatic students in the ISD.

### Setting

The setting of this study is an elementary school located in the northwest region of Texas. The school serves 725 students from prekindergarten through fifth grade in a high poverty zone of the city ("Eastern Hills Elementary School," 2019). The student body is composed of Black

(53%), Hispanic (34%), White (5%), and Asian (5%) students. Among them, 53% are female, and 47% are male ("Eastern Hills Elementary School," 2019). At this school, which had only one nurse, the pilot Asthma 411 program was implemented for two academic years between August 2013 and May 2015 ("Asthma 411: A pilot program," n.d.). This study will evaluate the Asthma 411 program at the elementary school located in the northwest region of Texas because this school has the longest history of using the program at the independent school district (ISD) in the northwest region of Texas.

## Participants

For this project, there will be no human contact because this study is a retrospective chart review. The inclusion criteria of the program participants are: 1) students from kindergarten through fifth grade; 2) with asthma; 3) who attended the elementary school located in the northwest region of Texas ; 4) from August 2012 through May 2019. The exclusion criterion is students without asthma.

## Data Collection

This DNP project is to evaluate the effectiveness of the Asthma 411 program adopted at the ISD in the northwest region of Texas. As the Asthma 411 pilot program started in August 2013, the data from August 2012 through May 2013 are the baseline data which will be compared with the data from August 2013 through May 2019. The data from August 2013 through May 2019 were electronically stored at the central office of the ISD as the school nurse of the elementary school had reported the Asthma 411 program-related data and ambulance call data to the central office. The ISD provided the data on asthmatic students of the elementary school during the period of the six years after the Asthma 411 program was adopted at the school

in August 2013 (“Asthma 411: A pilot program,” n.d.). The principal investigator removed any personal identifying information such as names, student ID numbers, and gender from the ISD data. The variables that were extracted from the ISD data included grade, academic year, the number of asthma attacks, and the number of ambulance referrals. The baseline data were obtained from the published research report by the University of North Texas (UNT) Health Science Center (“Asthma 411: A pilot program,” n.d.). These data were presented without any identifiable information to protect students’ identity and privacy. All the presented data were grouped and compared by the criterion of pre and post the adoption of Asthma 411 program. A total of 126 records were reviewed. Among the 126 records, 38 records were undated without specific academic years indicated, and therefore, were excluded for the analysis as it was uncertain to which academic years they belonged to: before or after the adoption of the Asthma 411 program.

## Ethical Considerations

According to the Belmont Report of 1979 (USDHHS, 2018), there are three ethical principles in conducting research with human subjects. Those are respect for persons, beneficence, and justice (USDHHS, 2018). As this project was, however, a retrospective chart review, it was minimal that this project would have caused any significant interactions with these basic ethical principles.

### Respect for Persons

Respect for persons was upheld in gathering and processing the data from the student records. When the data, provided by the independent school district in the northwest region of Texas and used for this project, had personal identifying information including names, student

ID numbers, and gender, such information was kept confidential and private, and was removed at the earliest stage of the study by the principal investigator (Breault, 2013; Polit & Beck, 2017).

**Beneficence**

Beneficence focuses on increasing the betterment of others by altruistically promoting their welfare and safety (Pieper & Thomson, 2016). This project aimed to evaluate the effectiveness of the Asthma 411 program. The results of this project might reduce harm to participants and contribute to better services for them and future students with asthma by providing information on the effectiveness of the program to administrators at the school's ISD (Polit & Beck, 2017).

**Justice**

The ethical principle of justice emphasizes equality and fairness in distributing the burdens and benefits of research (Polit & Beck, 2017; USDHHS, 2018). This project promoted justice by treating each student's data equally and the same high standard of privacy. Any data were excluded only according to the exclusion criterion mentioned earlier. All data were equally protected from the breach of privacy during this study by keeping the data anonymous. The results from this project will be shared with the independent school district, which, in turn, will promote the results for the benefits of all participants. The IRB of the University of Arizona reviewed this project and decided that this project did not require oversight by the University of Arizona as human subjects review was not required for this project (Appendix B).

# RESULTS

## Data Analysis

The study examined data beginning in August of 2012 through May of 2019. The first group of data was from August 2012 through May 2013 as two schools in the ISD adopted the Asthma 411 pilot program from August 2013 ("Asthma 411: A pilot program," n.d.). The next six years of data were from August of 2013 through May of 2019. The basic descriptive statistics of counts and percentages was utilized for comparing two groups of unpaired data at this project: pre- and post-adoption of the Asthma 411 program. Comparing the two groups shows the percentage change in using ambulance services.

MedStar Mobile Healthcare is an ambulance service company in Fort Worth, Texas ("MedStar," 2020). According to its report, there were 19 ambulance calls for students with asthma attacks from the two pilot schools in the school year from August 2012 to May 2013 ("Asthma 411: A pilot program," n.d.).

Although it was not clear how many ambulance calls were made from the participating elementary school, it might be reasonable to believe that multiple calls out of the total 19 calls were made from the participating elementary school as it is unlikely that the non-participating school only made most of the calls.

TABLE 1. *Number of students with asthma and the number of ambulance calls for students with asthma attacks per academic year*.

| Academic Year | Number of Students with Asthma (1) | Number of Ambulance Calls for Asthma Attacks (2) | Percentage by [(2)/(1)]x100% |
|---|---|---|---|
| August 2012 - May 2013 | No data available | Multiple out of 19 calls | Unavailable |
| August 2013 - May 2014 | No data available | 0 | Unavailable |
| August 2014 - May 2015 | 17 | 0 | 0% |
| August 2015 - May 2016 | 25 | 1 | 4% |
| August 2016 - May 2017 | 20 | 0 | 0% |
| August 2017 - May 2018 | 15 | 0 | 0% |
| August 2018 - May 2019 | 11 | 0 | 0% |
| Undated | 38 | 0 | 0% |

## Findings Related to the Project Question

Table 1 shows the reduction of the number of ambulance calls for asthma attacks after the adoption of the Asthma 411 program. The multiple calls during the academic year of August 2012 through May 2013, when the Asthma 411 program was not adopted, have reduced to only one call during the following six years, which had the Asthma 411 program in force.

## DISCUSSION

This study has several limitations. The first limitation is that there was not the baseline data on the number of ambulance calls from specifically the participating elementary school, before the adoption of the Asthma 411 program. Therefore, the baseline data had to be presumed as multiple calls out of the 19 total calls, which were made from the two schools that participated in the pilot program of the Asthma 411 program during the academic year of August 2012 through May 2013 (“Asthma 411: A pilot program,” n.d.).

The second limitation is that there was no data on the number of students with asthma for the two academic years: August 2012 through May 2013 and August 2013 through May 2014. These two limitations made it difficult to utilize any advanced statistical tools. However, the low

frequency of ambulance calls after the adoption of the Asthma 411 program (only one call during six academic years) made it highly probable to conclude that the Asthma 411 program was successful in reducing the number of ambulance calls for the students' asthma attacks.

The final limitation is that there were 38 undated students with asthma without specific academic years indicated. It would be more desirable that all those undated students had their respective academic years. The undated students, however, did not affect the conclusion on the success of the Asthma 411 program in reducing the number of ambulance calls for students with asthma attacks because the number of the ambulance calls for those undated students was zero.

In conclusion, this study gave the affirmative answer to the project question: Has the adoption of Asthma 411 program, compared to the period without Asthma 411 program, reduced the number of uses of ambulance services for acute asthma attacks in established asthmatic students in an elementary school at the ISD in the northwest region of Texas? The results of this study illuminated the reduction of the number of ambulance calls for asthma attacks, which indicated the success of the Asthma 411 program.

Asthma 411 program provides school nurses with healthcare providers' standing orders that enable school nurses to administer the medications to students with asthma attacks at the school nurse offices without calling for ambulance services. The APRNs may participate in the Asthma 411 program as the healthcare providers that provide the standing orders and are the leaders and sources of information for school nurses.

As mentioned earlier, there is scarcity in researches on the Asthma 411 program. This study focused on one school in one ISD for a limited time span. Therefore, more studies on the

program, based on more participating schools and more extended time, are necessary to better evaluate the program and to better serve the students with asthma in schools.

# APPENDIX A:

# SYNTHESIS OF EVIDENCE

| Reference | Research Question/Hypothesis | Study Design | Sample and Setting | Method/Intervention/ Data Collection | Findings |
|---|---|---|---|---|---|
| Archibald, M. M., Caine, V., Ali, S., Hartling, L., & Scott, S. D. (2015). What is left unsaid: An interpretive description of the information needs of parents of children with asthma. *Research in Nursing & Health*, *38*(1), 19-28. | To assess the information needs and information deficits of parents of children with asthma. | Interpretive description | Sample:<br>Purposive and convenience sampling method - 20 families, including 20 mothers and one father (21 parents) of 23 children with asthma<br><br>Setting:<br>Two pediatric asthma clinics and one pediatric emergency department (ED) in a Canadian urban center (population 1,159,869) | Parents consented to participate and completed demographic information forms.<br><br>The first author conducted 20 semi-structured interviews each for approximately 25 minutes. | There was gaps between parents' information they felt they needed and the information identified during the research teams' interpretation. The gaps in knowledge were long-standing, in some cases persisting for years following diagnosis |
| Brigham, E. L., Goldenberg, L., Stolfi, A., Mueller, G. A., & Forbis, S. G. (2016). Associations between parental health literacy, use of asthma management plans, and child's asthma control. *Clinical Pediatrics*, *55*(2), 111-117. | To determine the associations between parental health literacy (HL), parental ability to use a written asthma management plan (WAMP), and child's asthma control. | Interpretive description | Sample:<br>186 parents of children with asthma, selected by convenience sampling<br><br>Setting:<br>Four practice sites within a practice-based research network, Southwestern Ohio Ambulatory Research Network (SOAR-Net) | Parents completed a survey (score 0-32) with questions on child's asthma, written asthma management plan (WAMPs), a HL screening tool, and 5 asthma vignettes. | HL is associated with parental ability to use WAMPs to respond to asthma scenarios.<br><br>Parental HL may play a role in parents' ability to appropriately use WAMPs.<br><br>WAMP score was not associated with asthma control. |

| Reference | Research Question/Hypothesis | Study Design | Sample and Setting | Method/Intervention/ Data Collection | Findings |
|---|---|---|---|---|---|
| Francisco, B., Rood, T., Nevel, R., Foreman, P., & Homan, S. (2017). Teaming up for asthma control: EPR-3 compliant school program in Missouri is effective and cost-efficient. *Preventing Chronic Disease*, *14*, 1-11. | Hypothesis that Teaming Up for Asthma Control (TUAC) will improve the knowledge and skills of participating school nurses and this change would positively affect students' asthma health and reduce health care utilization cost. | Pre-/post-evaluation study | Sample:<br>54 school nurses and 178 students who participate in TUAC<br><br>Setting:<br>Missouri | Data Collection:<br>School nurses were provided with Asthma education by online in a pretest/posttest format.<br><br>Expert evaluators identified students with persistent asthma and evaluated in preassessments/ postassessments before and after the three asthma checkups.<br><br>The costs of health care were assessed using Medicaid administrative claims data. | School nurses' knowledge scores significantly increased who completed the online education (n = 42, 77.8%), from pretest (49.1%) to posttest (90.7%, P < .001).<br><br>The results of students' FEV1 were significantly improved (82.9% to 92.1% predicted), and self-reported impairment and tobacco smoke exposure were significantly reduced (P< .001).<br><br>The cost of healthcare for TUAC students enrolled in Medicaid reduced by $1,431 during 12 months as compared with controls. |
| Haines M. S. & Kim, D. H. (2013). A study of the effects of physical activity on asthmatic symptoms and obesity risk in | To determine the effectiveness of the Breathe LA's Lung Power program in reducing asthma symptoms during physical activity. | quantitative, nonexperimental, longitudinal design | Sample:<br>10 volunteer participants for the program, who were 7 to 12 years old | Data Collection:<br>The participants were surveyed before and after the program to assess the levels of physical activity, asthma symptoms, hospitalization, | The number of weekly and monthly emergency visits among participants was reduced (P, .01). |

| Reference | Research Question/Hypothesis | Study Design | Sample and Setting | Method/Intervention/ Data Collection | Findings |
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| elementary school-aged children. *American Journal of Health Education*, *44*(3), 156-161. | | | Setting:<br>San Diego County, in the Breath LA facility located in Los Angeles | and missed school days. The program consisted of two-hour afternoon sessions each week for six weeks (total 6 session). | The improvement of participants' lung function was indicated by the increased average FVC volume from 1.93 ^ 0.30 L to 2.74 ^ 0.37 L (P, .01).<br><br>The participants' participation in physical activities was increased (P, .01). |
| Johnson, K. B., Patterson, B. L., Ho, Y., Chen, Q., Nian, H., Davison, C. L., Slagle, J., & Mulvaney, S. A. (2016). The feasibility of text reminders to improve medication adherence in adolescents with asthma. *Journal of the American Medical Informatics Association,23,* 449-455. | To test the effectiveness of text reminders on increasing the medication adherence | RCT<br>(Block Randomized Controlled Trial) | Sample:<br>Selection of 98 samples of adolescent asthma patients through flyers, interest card boxes, advertisement, and letters of invitation.<br><br>Inclusion criteria:<br>1. English speaking<br>2. Age 12-17 years<br>3. Having a prescribed asthma med<br>4. Ability to access internet<br>5. Possession of cellphone with SMS plan. | Experimental Group:<br>N=46<br><br>Intervention:<br>1. Creating MyMediHealth (MMH) account for setting a medication schedule<br>2. Receive SMS reminders at designated medication administration times for three weeks<br><br>High attrition rate: 47.8% (22 participants dropped out of 46 participants in the intervention group)<br><br>Control Group<br>Receiving action lists as a part of their usual care | The intervention group reported significant improvement in self-reported seven-day adherence (average gain: 1-day adherence), when compared with control group (p=0.001).<br><br>Self-efficacy in asthma management rose from a median of 4.1 to 4.4 (p=0.016).<br><br>Quality of life increased from a |

| Reference | Research Question/Hypothesis | Study Design | Sample and Setting | Method/Intervention/ Data Collection | Findings |
|---|---|---|---|---|---|
| | | | Setting:<br>Geographical setting: Academic outpatient setting.<br><br>Structural setting:<br>1. Baseline survey at the start of the intervention.<br><br>2. Follow up survey after three weeks of the intervention. | | median of 5.7 to 6.3 (p=0.037). |
| Liberatos, P., Leone, J., Craig, A. M., Frei, E., Fuentes, N., & Harris, I. M. (2013). Challenges of asthma management for school nurses in districts with high asthma hospitalization rates. *Journal of School Health*, *83*(12), 867-875. | To identify barriers to school nurses' asthma management in higher-risk school districts and to assess the usage of National Asthma Education and Prevention Program (NAEPP) recommendations in the districts. | Survey research design | Sample:<br>Nurses in 44 elementary schools with high asthma hospitalization rates among children (0-14 years)<br><br>Setting:<br>New York State | Data Collection:<br>Quantitative and qualitative data were collected from the survey of nurses in 44 elementary schools about asthma management. | Nurses learned of children's asthma mainly not from their parents but through school records and encountering students presented with symptoms.<br><br>The major barrier to asthma management was the lack of communication with parents and their support.<br><br>Some physicians' reluctance to diagnose asthma in these children was also a barrier |

| Reference | Research Question/Hypothesis | Study Design | Sample and Setting | Method/Intervention/ Data Collection | Findings |
|---|---|---|---|---|---|
| | | | | | The usage of the NAEPP school recommendations was inconsistent. |
| Rhee, H., Belyea, M. J., Hunt, J. F., & Brasch, J. (2011). Effects of a peer-led asthma self-management program for adolescents. *Archives of Pediatrics & Adolescent Medicine, 165*(6). | To determine if the peer-led asthma management workshop is more effective than the adult-led workshop on increasing the quality of life for asthmatic students. | RCT (randomized controlled trial) | Sample:<br>N=112 adolescents with asthma.<br><br>Inclusion criteria:<br>1. Age: 13-17 years,<br>2. Asthma diagnosed at least 1 year ago<br>3. No other chronic or emotional health conditions (e.g., diabetes, cystic fibrosis, and major depression)<br>4. Ability to understand English.<br><br>Exclusion criterion:<br>Learning disabilities<br><br>Sampling method:<br>Through flyers and referrals from physicians and school Nurses. The samples were randomly assigned to either the peer-led or the adult-led group. | Experimental Group:<br>Peer-led one-day camp workshop. Peer leaders were trained for three weeks, paired, and assigned to groups comprised of 6 to 10 participants. The peer leaders conducted the workshop using the adapted Power Breathing Program.<br><br>Subjects of workshop:<br>1. Basic asthma education.<br>2. Psychosocial issues.<br>3. Asthma self-management skills.<br>Each session was for 45 to 60 minutes.<br><br>Control Group:<br>Adult-led one-day camp workshop held another day on the same site.<br>The adult leaders were two nurse practitioners and a physician.<br>The length of the day camp and the content of the asthma program were comparable with those of the intervention group. | The improvement of attitudes was greater in the intervention group than in the control group at 6 months (mean difference, 4.11; 95% confidence interval [CI], 0.65-7.56; *P*=.02).<br><br>The intervention group having significantly higher quality of life at 6 months (difference, 11.38; 95% CI, 0.96-21.79; *P*=.03) and 9months (12.97; 3.46-22.48; *P*=.008).<br><br>No statistically significant changes in percentage of predicted FEV1 and percentage of FEV1/forced vital capacity were found as a result of the intervention for either group |

| Reference | Research Question/Hypothesis | Study Design | Sample and Setting | Method/Intervention/ Data Collection | Findings |
|---|---|---|---|---|---|
| | | | Setting:<br>Geographical setting: A city and adjacent suburbs in upstate New York | | |
| Richmond, C. M., Hobson, A., Pike, E., Kleiss, J., Wottowa, J., & Sterling, D. A. (2010). Breathe your best for school success: Evaluation of an initiative to enhance asthma action plans in the school setting. *Journal of Urban Health, 88*(1). | To promote the submission of healthcare provider-written asthma action plans (AAPs) to the school nurse at the beginning of the school year. | Observational research design by cross-sectional phone survey on the "Breathe Your Best" (BYB) program | Sample:<br>N= 149.<br>1. 193 families of asthmatic students selected out of total 491 families of asthmatic students by random selection.<br>2. However, 43 out of the 193 families had moved out of the two districts or the phone numbers were inoperable.<br><br>Inclusion condition: families of asthmatic students in the participating two districts.<br><br>Setting:<br>Elementary schools in two school districts. One district participated in Asthma 411 for two years while another district for one year. BYB is "a feasibility | 1. Phone survey with up to three attempts per phone number.<br><br>2. Interview of 64 successful contacts | 44 (68.8%) out of 64 families reported knowledge of the BYB program.<br><br>24 (37.5%) out of 64 reported participation in BYB steps.<br><br>13 (54.2%) out of 24 participants reported turning in AAP.<br><br>18 (75%) of 24 families who participated in BYB steps visited a HCP. |

| Reference | Research Question/Hypothesis | Study Design | Sample and Setting | Method/Intervention/ Data Collection | Findings |
|---|---|---|---|---|---|
| | | | program of Asthma 411." | | |
| Richmond, C. M., Sterling, D., Huang, X., Wilson, k., & Pike, E. (2006). Asthma 411— Addition of a consulting physician to enhance school health. *Journal of School Health, 76*(6). | To demonstrate how a consulting physician can enhance the role of the school nurse to reduce school absences among students with asthma. The findings will help reduce school absenteeism caused by asthma attacks. | Quasi-experimental study with pre-intervention and post-intervention design | Sample:<br>N=1030 asthmatic students (12% of student body, 8583).<br><br>Setting:<br>Physical setting is an urban school district comprised of 8583 students from 9 elementary schools, 2 middle schools, and 1 high school.<br>The student body is predominantly African American students (95%) and 75% of the total students qualify for free or reduced-price Meals. The nurse-to-student ratio is 1:621.<br><br>Time setting:<br>2004-2005 academic year (post-intervention) which is compared with 2003-2004 academic year (pre-intervention). | Experimental Group:<br>Asthma 411 program was executed.<br>According to the program, asthmatic students were provided with asthma education software for students, services of a consulting physician (CP) such as standing orders and services of school nurses such as administering albuterol.<br><br>Control Group:<br>No control group formed for the study | The rate of absence due to asthma reduced from 10.4% (2003-2004 academic year) to 9.74% (2004-2005 academic year).<br><br>The number of children sent to home due to asthmatic symptoms reduced from 114 (2003-2004 academic year) cases to 103 cases (2004-2005 academic year).<br><br>The number of 911 calls for asthma symptoms reduced from 7 calls (2003-2004 academic year) to 2 calls (2004-2005 academic year).<br><br>The number of asthma action plans given to schools increased from 68 (2003-2004 academic year) to 88 (2004-2005 academic year). |

| Reference | Research Question/Hypothesis | Study Design | Sample and Setting | Method/Intervention/ Data Collection | Findings |
|---|---|---|---|---|---|
| Sweet, L. L., Polivka, B. J., Chaudry, R. V., & Bouton, P. (2013). The impact of an urban home-based intervention program on asthma outcomes in children. *Public Health Nursing*, *31*(3), 243-252. | To control indoor asthma triggers in the home environment for better asthma outcomes | Pre-/post-evaluation study | Sample:<br>115 participants for whom baseline and follow-up data | Data Collection:<br>Data collected by parent self-report, which were collected through baseline and follow-up surveys administered by program staff. | Significantly reduction of emergency department visits, missed school days, and caregiver missed work days.<br><br>Improved caregiver quality of life. |
| Turcotte, D., Alker, H., Chaves, E., Gore, R. & Woskie, S. (2014). Healthy homes: In-home environmental asthma intervention in a diverse urban community. *American Journal of Public Health*, *104*(4), 665-671. | To evaluate health outcomes associated with in-home interventions in low-income urban households with children with asthma. | Observational study | 116 households with 170 enrolled children with asthma<br><br>Setting<br>Lowell Community Health Center in Massachusetts | Intervention:<br>Providing households with safety, asthma prevention education, and targeted environmental intervention to decrease asthma triggers and improve household safety.<br><br>Data Collection:<br>Collecting of environmental data with questionnaire and dust samples and health information with a questionnaire incorporating the American Academy of Pediatrics Children's Health Survey for Asthma and other instruments at baseline and at follow-up 11 to 12 months later to evaluate the impact of the intervention on the health of the child and family | The intervention resulted in a statistically significant health improvement from baseline to follow-up. While the cost of the interventions (not including personnel) was $36,240, the estimated medical savings over a four-week assessment period was $71,162, which is an estimated annual savings of about $821 304. |

# APPENDIX B:

# THE UNIVERSITY OF ARIZONA INSTITUTIONAL REVIEW BOARD APPROVAL LETTER

THE UNIVERSITY OF ARIZONA
Research, Discovery & Innovation

Human Subjects Protection Program

1618 E. Helen St.
P.O Box 245137
Tucson, AZ 85724-5137
Tel: (520) 626-6721
http://rgw.arizona.edu/compliance/home

| | |
|---|---|
| **Date:** | November 13, 2019 |
| **Principal Investigator:** | Chongsuh Bae |
| **Protocol Number:** | 1911140871 |
| **Protocol Title:** | EVALUATING ASTHMA 411 PROGRAM IN TERMS OF REDUCTION OF THE USE OF AMBULANCE SERVICES |
| **Determination:** | Human Subjects Review not Required |

**Documents Reviewed Concurrently:**

**HSPP Forms/Correspondence:** *2019-07-17 Determination of Research- Chongsuh Bae.pdf*

**Regulatory Determinations/Comments:**

- Not Research as defined by 45 CFR 46.102(l): As presented, the activities described above do not meet the definition of research cited in the regulations issued by U.S. Department of Health and Human Services which state that "Research means a systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge. Activities that meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported under a program that is considered research for other purposes. For example, some demonstration and service programs may include research activities. For purposes of this part, the following activities are deemed not to be research."

The project listed above does not require oversight by the University of Arizona.

If the nature of the project changes, submit a new determination form to the Human Subjects Protection Program (HSPP) for reassessment. Changes include addition of research with children, specimen collection, participant observation, prospective collection of data when the study was previously retrospective in nature, and broadening the scope or nature of the study activity. Please contact the HSPP to consult on whether the proposed changes need further review.

The University of Arizona maintains a Federalwide Assurance with the Office for Human Research Protections (FWA #00004218).

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