

Disseminating the Cost of the Empty Chair: Improving Healthcare Access and No-Show
Rates
Through Age and Disease-Specific Education in the Pediatric Asthma Patient Populations

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Abstract

Introduction: The focus of this investigation was to ascertain if age and disease specific education had an effect in reducing no show rates, for follow up asthma management, in the adolescent pediatric patient population. No show rates have an effect in the quality and management of chronic health conditions, limits access for those waiting to be diagnosed and begin treatment and creates a financial hardship for provider's practices. **Methods:** A quasi-experimental, retrospective chart review was utilized for 8-18 y/o participant populations with a specific ICD-9 and ICD-10 asthma diagnosis code, within Mahoning, Trumbull, Stark and Franklin Counties, Ohio. Demographic variables of age, gender, race, type of healthcare coverage and geographic zone were compared to education received or not received. Slot utilization variables of kept, no show, rescheduled and cancelled appointments were also collected. Pertinent data analysis was performed by S.P.S.S statistical analysis software. Descriptive and inferential statistics were used to address all research questions. **Results:** Analyzed data revealed the only correlation to the slot utilization variable and education was the kept. Geographic zone revealed that the highest kept appointments were in Trumbull County, highest no show rates were between the border of Trumbull/Mahoning Counties. There was no appreciable correlation between no show rates and demographic variables. **Conclusion:** Although education had an integral relationship with kept appointments, it was not inversely proportionate to no show rates. Education encounters were clearly related to the kept variable leading to an assumed improvement in health literacy.

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I have long realized that we as individuals achieve nothing meaningful in life alone but rather we achieve humbly by those around us and by the genetics, traits, culture, and work ethics bestowed upon us by our ancestors and birth parents, God resting their souls. Remarkably, we surround ourselves with individuals who nurture the inner sole of our being and provide the stability and fortitude to achieve academically, logically, and synergistically.

As we surround ourselves with family, friends, and fellow colleagues, we draw strength and courage from the unwavering love and support of those individuals that care deeply for us, encouraging us to find the perseverance, determination, and sheer grit from within to challenge ourselves both mentally and physically in a cohesive endurance test of both body and mind that adds confidence to our spiritual fortitude and unwavering zest for academia.

For the Children

Matthew, Hannah, Eva and Natalie

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Chapter 1

Historical Perspectives

Chronic illness in the United States (U.S.) has been steadily increasing over the past several years and has become more prevalent in minority and underserved areas. This has placed an insurmountable financial pressure on achieving a healthier society, on an already overburdened, unaffordable, and unsustainable U.S. healthcare system (Social Security Advisory Board, 2009; Centers for Disease Control and Prevention [CDC], 2016; DeVoe, 2008; Glover et al., 2010; Adler & Hoagland, 2012). It has been noted that approximately 133 million U.S. citizens were afflicted with and suffering from at least one chronic health condition in 2005. Moreover, it is approximated that by 2020, more than 167 million individuals will be afflicted with and suffering from a single chronic illness. By the year 2020, it is further estimated that individuals living with multiple chronic health conditions will meet, or surpass, 81 million (Bodenheimer, Chen, & Bennett, 2009; CDC, 2015). The previous statistics represent many preventable diseases brought on by health determinants and individual unhealthy choices including certain cancers, diabetes, stroke, heart disease, and chronic pulmonary conditions, with pulmonary conditions as the number one reported chronic health condition in the U.S. (CDC, 2016c). Personal health risk behaviors, such as smoking and drinking, a lack of prudent healthy eating habits, and a lack of daily exercise, coupled with issues of health literacy, all compound the growing threat of preventable chronic health issues. Moreover, as of 2014, 86% of total

healthcare expenditures in the U.S. were directed towards individuals living with one or more chronic health diseases or conditions (Centers for Medicare and Medicaid Services, 2016a).

Asthma is one chronic health condition in the U.S. that has afflicted over 25 million Americans, including 7 million children under the age of 18. Asthma is considered the most common chronic disease in children for which there is no known cure, with 8.6% of children in the U.S. afflicted (U.S. Department of Health and Human Services, National Heart Lung and Blood Institutes, 2014b).

Asthma accounts for the majority of missed days of school, lost educational opportunities, missed days from work, and is responsible for over 439,000 hospitalizations, 14.2 million physician office visits, and 2 million emergency room visits, yearly. Moreover, there are 3,630 preventable deaths attributed, yearly, to poor asthma management, non-compliance with medications, and follow-up care, leading to a lack of asthma control of symptoms and resulting in 187 deaths, per year, in children. Disparities in asthma mortality are noted and death rates for asthma are 75% higher for ethnic minorities when compared with their White counterparts. (CDC, 2015; Asthma and Allergy Foundation of America [AAFA], 2015; American Academy of Allergy Asthma and Immunology, 2014; Moorman et al., 2012).

Maintaining and attending follow-up healthcare appointments, coupled with proper age- and disease-specific education, is paramount to preventing and managing asthma exacerbations, asthma flare ups, hospitalizations, an increase use of oral corticosteroids, and deaths from uncontrolled asthma symptoms (AAFA, 2015; U.S. Department of Health and Human Services, National Heart, Lung, and Blood Institute

(2014). Although many studies have been performed to ascertain reasons for non-compliance of follow-up healthcare visits or no-show rates within the adult patient populations, there is a dearth of investigations that have been performed comparing an improvement of no-show rates after the provision of age and disease-specific education in the adolescent patient asthma population.

The current investigation proposes to take a disseminating examination at the cost of the phenomenon in healthcare of the empty chair or no-show rates within the outpatient adolescent asthma patient populations, this is in an attempt to ascertain the strength or direction of moderator variables in reference to participant demographics that are related to age, gender, ethnicity, financial status or type of healthcare and geographic location and if there is a correlation to the educational encounter. This current investigation is in an attempted to ascertain if any obvious mediator variables may explain the relationship (Baron & Kenny, 1986), and if specific variables can be identified that may be responsible for the lack of compliance in follow-up care.

This study further sought to examine the question of whether disease and age specific education will promote better patient compliance in returning for follow-up asthma care and disease management. By identifying and rectifying the potential causes of no-show rates, a noticeable improvement in access for others waiting for available asthma outpatient follow-up appointment slots may be realized. There may also be an appreciable decrease in pain and suffering and a decrease in the diagnosis and time to begin treatment of disease (Goldman & Mayer, 2011; Molfenter & Brown, 2014).

Statement of the Problem

While there have been a multitude of studies investigating causal relationships, perceived and real patient barriers, or specific patient inconsistencies of compliance for follow-up healthcare or no-show rates in multiple health disciplines, there is a limited amount of studies in the role that disease- and age-specific education may play in maintaining asthma follow-up appointments for management of chronic disease in the pediatric asthma patient populations (Parikh, Gupta, Wilson, Fields, & Cosgrove, 2010; Dumontier, Rindfleisch, Pruszynski, & Frey, 2013; Philip, DuHamel, & Jandorf, 2010; Samuels et al., 2015; van Baar et al., 2006). Moreover, there needs to be exploratory research to ascertain if evidence-based disease and age-specific education have any effects on improving no-show rates. This may lead to an improvement in access for asthma follow-up care and maintenance, and for the effective treatment and maintenance of chronic lung disease and decreasing the mortality rates associated with the chronic healthcare condition of asthma (Personal communications Dec 5th, 2016, Marilyn Walton, Helen Spencer). Moreover, the problematic issue of no-show rates limit adequate distribution of available healthcare services further limiting equitable treatment and fairness, most notably, in underserved areas (Grogan, 2013).

Purpose and Rationale of the Study

Although many studies have been performed to ascertain the causal relationships for no-show rates and the implementation of alternative scheduling to compensate for lost revenue, few studies have been completed utilizing age and disease-specific education to improve the health literacy of one's condition so that an educated decision can be made

to return for follow-up health care. There are two issues that need to be explored: the high no-show rates at outpatient facilities, and if the implementation of a mandatory age- and disease-specific educational process has a significant effect on decreasing no-show rates in the pediatric asthma patient populations.

Research Design

This research study utilized a quasi-experimental research design through the use of a retrospective chart review (RCR) or medical record review that relied on past events to acquire and investigate subjects' data related to the inclusion criteria set forth in this study. Data collection and subsequent analysis were accumulated by direct retrieval from the pediatric subjects' Electronic Medical Record (EMR) data base and the Electronic Health Record (EHR) (Vassar & Holzmann, 2013).

Significance of the Study

Ascertaining causation for the issue of no-show rates, or the healthcare phenomenon of the empty chair, will assist the outpatient clinical facility and physicians in improving outpatient access to care by an overall improvement in patient appointment slot utilization. This improvement will also yield a significant improvement in decreased wait times for scheduled follow-up care, decreased healthcare time to treat, improve patient satisfaction and compliance, a positive effect on decreasing healthcare costs, and improve overall societal health (Molfenter, 2013)

Research Questions

1. What impact does age and disease-specific education have on no show rates for follow-up pediatric asthma management? More specifically:
 - a. What is the impact on appointment slot utilization: measurable by a decrease in individual no-show rates for follow-up asthma care?
2. If there is a measurable impact, are there specific moderators evident for the impact of education on no shows?
 - a. If an effect is found, is there an association of education to kept appointments
3. Do demographic moderator variables, such as, age, gender, ethnicity, financial status or type of healthcare coverage or geographic location, have an association to no show rates?

Ethical Considerations

This retrospective chart review investigation followed all policies and procedures as designated by the Youngstown State University Institutional Review Board (IRB) to ensure that any and all research was conducted in an ethical manner. All attempts were made to protect any patient identifiers, including name, patient medical record number and an exposure limit, of the sensitive patient, data to those individuals who were listed on the IRB. This process was in an attempt to eliminate or minimize potential risks to personal health or identity information to participants or any inadvertent Health Insurance

Portability and Accountability Act (HIPAA) violations as set for by the Department of Health and Human Services (HHS) (U.S. Health and Human Services, 2003).

Limitations of the RCR Study

Limitations of any study conducted by a retrospective method include, but are not limited to, selection bias on the part of the researcher, unintentional mishandling of subject data while documenting in the EMR, and erroneous or invalid entering of data into the EMR, data entered into the wrong patient EMR. The data base could also be limited by the proper handling of and charting and retrieval of specific medical health records, or there could be incomplete or missing data from the subject EMR. This could be a result of individuals improperly handling and entering the data or by multiple individuals handling the data causing transcription errors that lead to erroneous results and outcomes (www.oxfordjournals.org; DeAngelis, Chambers, & Hall, 2010; Koppel, 2009; Vassar & Holzmann, 2013). This did not seem to be the case within this study as all retrieved data was randomly sampled for control of bias and to review a distributed sample of pertinent participants, all data was complete and multiple reviews were performed to control clerical errors and proper handling and transcription of data. Although, being a preexisting data base previously compiled some possible limitations were beyond control of this study.

Definition of Terms

American Academy of Allergy, Asthma and Immunology (AAAAI) - dating back to the 1920s, the Academy's mission has remained the same: the advancement of the knowledge of allergy, asthma, and immunology for optimal patient care (aaaai.org).

Asthma and Allergy foundation of America (AAFA) - a non-profit organization founded in 1953 dedicated to improving the quality of life for people with asthma and allergic diseases through education, advocacy, and research (aafa.org).

American Lung Association - American Lung Association is a completely voluntary organization with a mission to prevent lung disease and bring awareness, prevention, and education of lung health risks (lung.org).

Body Mass Index (BMI) - or the Quetelet Scale of adipose composition is based on weight in kg divided by height in meters squared or ($Wt \text{ in Kg}/Ht \text{ m}^2$) invented in 1972 by Ancel Keys, (1904-2004), effectively renamed to the Body Mass Index (Eknoyan, 2007) (U.S. Department of Health and Human Services, National Institutes of Health, 2013).

Centers for Disease Control and Prevention (CDC) - CDC began in 1946 and works 24/7 to protect America from health, safety, and security threats, both foreign and in the U.S. (cdc.gov).

Electronic Cigarettes (E-Cigarettes) - (also called e-cigarettes or electronic nicotine delivery systems) are battery-operated devices designed to deliver nicotine with flavorings and other chemicals to users in vapor instead of smoke (National Institute on Drug Abuse, 2016g).

Empty Chair Phenomenon - described by Molfenter (2013) as the patient appointment slot that has been missed or left unusable by the individual scheduled to be seen by the physician for initial treatment, disease management, or follow-up care (Personal correspondence, Dr. John McBride, April 11th 2016; (Molfenter, 2013).

Electronic Medical Health Record (EMR) - an electronic database of sensitive patient health information including family and patient health and birth history, lab, radiological and diagnostic testing results, medication records, allergies, and physician encounters including missed appointments and follow-up visits.

Expert Panel Report (EPR-3) - The EPR 3 Guidelines on Asthma was developed by an expert panel commissioned by the National Asthma Education and Prevention Program (NAEPP). The expert panel organized the literature review and final guidelines report around four essential components of asthma care (www.nhlbi.nih.gov).

Health Disparities - preventable differences in the burden of disease, injury, violence, or opportunities to achieve optimal health that are experienced by socially disadvantaged populations (cdc.gov).

Health Risk Behaviors - any activity undertaken by people with a frequency or intensity that increases risk of disease or injury (Steptoe & Wardle, 2004).

Health Determinants - the range of personal, social, economic, and environmental factors that influence health status are known as determinants of health (healthypeople.gov)

Health Literacy - the degree to which individuals have the capacity to obtain, process, and understand basic health information and services that are needed to make appropriate health care decisions for accepted or discussed treatment for disease and health conditions (health.gov).

Hookah- an oriental pipe for smoking marijuana, tobacco, etc, consisting of one or more long flexible stems connected to a container of water or other liquid through which smoke is drawn and cooled (dictionary.com).

Morbidity and Mortality Weekly Report (MMWR) - a scientific, weekly epidemiologic publication that brings awareness by discussing the incidence of healthcare morbidity and mortality on infectious and chronic health conditions and occupational health concerns, that are reported by local and state health departments (cdc.gov).

National Asthma Education and Prevention Program (NAEPP) - established in 1989, the National Asthma Education and Prevention Program (NAEPP), coordinated by the National Heart, Lung, and Blood Institute, raises awareness about asthma as a major public health problem, develops clinical practice guidelines and other supportive materials based on the latest scientific evidence, and uses multiple strategies to enhance guidelines implementation (www.nhlbi.nih.gov).

National Asthma Control Initiative (NACI) - the NACI is a multi-component, mobilizing, and action-oriented initiative to engage diverse stakeholders who are concerned about, or involved in improving asthma control (nhlbi.nih.gov).

National Institute of Health (NIH) - with roots beginning in 1887, it is a part of the U.S. Department of Health and Human Services, and is the nation's medical research agency, making important discoveries that improve health and save lives (www.nih.gov).

National Heart Lung and Blood Institute (NHLBI) - provides global leadership for a research, training, and education program to promote the prevention and treatment of heart, lung, and blood diseases and enhance the health of all individuals so that they can live longer and more fulfilling lives (nhlbi.gov).

No-show Rates - percentage of patient appointment slots for which patients did not show, cancelled or changed to another available slot time in a timely fashion; Typically, a 24-48 hr. notice prior to the healthcare appointment is sufficient notice for the healthcare facility (nih.org).

Quetelet Index- Adolphe Quetelet (1796–1874) was a Belgian mathematician, astronomer, and statistician, and some believe the founder of social sciences. He developed the first index of body adipose composition by calculating the individuals weight in kilograms divided by the individual's height in m² or (Wt in Kg/Ht m²) (Eknoyan, 2007).

World Health Organization (WHO) – is an arm of the United Nations' health organization located in 150 countries that monitors disease and outbreaks around the world, working with governments to improve the health of that country and the world (World Health Organization, 2017).

Summary

Chapter 1 was comprised of an introduction to the historical aspect of this dissertation topic, *Disseminating the cost of the empty chair: Improving access to care and no-show rates through age- and disease-specific education in the pediatric asthma patient population*. This introduction was followed by a statement of the problem, a purpose and rationale for the study, a gap in available pertinent research, a hypothesis of the study, the research design, any ethical considerations, limitations of the proposed study method, and a list of definitions and terms commonly referred to throughout this research study. Chapter 2 will disseminate the immense available literature on the historical aspects of chronic health conditions and the burden on healthcare expenditures

due to lifestyles, health behaviors, and lack of health care compliance, including available literature of the research topic of no-show rates for follow-up care. This will lead into Chapters 3, 4, and 5 presenting the methods section, data analysis, and discussion.

Chapter 2

Literature Review

Numerous studies in the adult and pediatric patient population have shown that an improvement of health literacy and access to affordable, available healthcare can improve overall societal health, decrease healthcare costs, and improve patient outcomes.

Moreover, studies have also concluded that no-show rates for healthcare appointments typically average 25-35% nationwide within various healthcare disciplines (Molfenter & Brown, 2014). These underutilized, patient appointment slots have further shown to prevent or block access to care for those needing follow-up evaluations, and increase the time to diagnose and treat, causing unneeded pain and suffering. Ultimately, this has a negative effect for the treatment and prevention of chronic health conditions and contributes to the overburdening of our present U.S. healthcare system (CDC, 2013). Moreover, in the pediatric patient populations, few studies have been performed to ascertain if age- and disease-specific education have an effect on improving no-show rates, thus, improving access to others in need, decreasing healthcare costs, and realizing an improvement in overall societal health.

This literature reviews methodically explored the most common reported, preventable chronic health conditions as documented by the CDC (2013) and linkage to environmental, cultural, societal, socioeconomic, and personal choices in the development of preventable chronic disease. This review also examined no-show rates for follow-up healthcare appointments and a dissemination of current literature pertaining to the chronic condition of asthma. The literature further examined the financial burdens placed on society for chronic illness, as well as the financial impact that no-show rates

had on society and the healthcare institutions. A summarization of the literature review is also provided.

Societal Burden of Chronic Disease

Chronic illness within the United States is steadily increasing, with a higher prevalence noted in underserved, minority, and low income patient population areas, thus creating a decreased quality of life, poorer health and health outcomes, and an increasing financial burden to our already unaffordable, unsustainable, healthcare system (DeVoe, 2008; Glover et al., 2010).

It should also be noted that preventable chronic health conditions have a negative effect on the delivery and availability of healthcare services. Chronic conditions create an increase in the overall cost of care, an increase in comorbidities, create a reallocation of needed healthcare dollars for preventative services and research, and have a negative effect on societal health overall (Kheirkhah, Feng, Travis, Tavakoli-Tabasi, & Sharafkhaneh, 2015; Iuga & McGuire, 2014).

According to the CDC, as of 2000, trends in the U.S. population place individuals older than 65 years of age accounting for 12.4% of the population, or 35 million individuals, and it is projected that this patient population will reach 19.6%, or 71 million individuals, living beyond 65 years of age by 2030. Moreover, the number of individuals living beyond 80 years old, within the same time frame, is expected to rise exponentially from 9.3 million in 2000, to 19.3 million by 2030. As the population ages, and is trending towards living longer, there is also a greater proportion of U.S. citizens plagued with at least one chronic disease or health condition (CDC, 2016c). Although individuals are living longer, the cost of care when individuals live beyond 65 years, is three to five

times higher, or \$12,500 per capita, compared to the younger population group of less than 65 years of age. It is estimated that as the population continues to live longer due to advances in medical technology, financial pressures will continue to be a significant burden on our present, ailing healthcare system due to long term care, chronic illness, and preventable disease (CDC, 2016c).

Disparities are also noted between the prevalence of chronic disease and health conditions for individuals living in poverty or within underserved areas, and the prevalence of chronic diseases, in relationship to the national average, and the prevalence of chronic diseases within the average population (Bodenheimer et al., 2009; Glover et.al., 2010)

Preventable chronic diseases, including heart disease, stroke, and certain types of cancers, type 2 diabetes, obesity, arthritis, mental disorders, and lung disease have become the leading causes of death and disability in the United States. The CDC cited six of the most reported causes or prevalence of chronic disease as follows:

(In millions expressed as percent of U.S. population)

- Cancers: 10.6 (3.6%);
- Diabetes: 13.7 (4.7%);
- Heart disease: 19.1 (6.6%);
- Hypertension: 36.8 (12.6%);
- Mental disorders 30.3 (10.4%);
- Pulmonary conditions: 49.2 (15.9%)

Total reported cases of chronic diseases within the U.S. equaled 162.2 million or 55.8% of the population, with pulmonary disease and pulmonary related conditions as

the number one reported chronic disease or condition afflicting U.S. citizens (CDC, 2013).

According to Bodenheimer et al. (2009), The Office of Health Affairs posits that approximately 133 million U.S. citizens were afflicted and suffering with at least one chronic health condition in 2005. Moreover, it is predicted that by 2020, more than 167 million individuals will be afflicted and suffering with a single, chronic illness as well.

Individuals living with multiple chronic illnesses or health conditions in 2005 exceeded 63 million, and it is further estimated that the number of U.S. citizens suffering with multiple chronic health conditions will meet, or surpass, 81 million by the year 2020 (Bodenheimer et al., 2009; CDC, 2013).

Financial Burden of Chronic Disease

As of 2005, the financial burden to society, based on chronic healthcare care expenditures, accounted for approximately 78% of total healthcare dollars spent in the U.S., and according to the Centers for Disease Control and Prevention (CDC), as of 2010, that percentage has risen to 86% of total healthcare expenditures for individuals in the U.S. living with one or more chronic diseases or conditions. Moreover, research clearly establishes a correlation between the rising rates of obesity in the U.S. and the prevalence of many chronic diseases and conditions, and those rates are responsible for an exponential increase in healthcare spending (CDC, 2016d).

The diagnosis of obesity is ascertained by the National Institute of Health (NIH), with a select cut-off-point scale based on body mass index (BMI) or Quetelet index (Appendix A).

Although not a measurement of adipose directly, this index is calculated by an individual's weight in kilograms divided by their height in meters squared (Wt. in Kg/ Ht. m²) and then rounded to the nearest decimal place. There is also noted variability between body fat and BMI based on sex, age, race, and ethnic origin along with racial disparities associated with level of income and living within underprivileged neighborhoods. BMI measurement is used to determine an index of a condition of overweightness in adult males and females (U.S. Department of Health and Human Services, National Institutes of Health, 2013).

Adult individuals with a BMI at or near 30 are considered obese, whereas adults with a BMI greater than 30 are considered morbidly obese within those patient populations. Obesity in children is based on a percentage of height and weight placed on a scale of percentile for age. Obesity is defined, in children, by pediatric patients who are at the 95th percentile for height and weight, with morbid obesity in children considered above the 95th percentile for average height and weight.

Obesity affects more than 36% of adults in the U.S., and 17% of children. Obesity is higher for ethnic minorities than Whites and highest among women (38%) than men. It is interesting to note that, according to the CDC, obesity is a catalyst for multiple health risks such as heart disease, hypertension, diabetes, and incidence of asthma in adolescence and children (CDC, 2016d).

Annual healthcare expenditures for individuals suffering from obesity-related chronic health conditions are documented at \$1,429 higher than those individuals with lean, healthy weights (CDC, 2015). Normal BMI, defined by the National Heart Lung

and Blood Institute (nhlbi) would be considered a BMI of 18.5-24.9 in adult males and females (Appendix B) (nih.gov).

According to the CDC, as of 2014, the U.S. expenditures for chronic disease exceeded \$9,523, per capita, with a total, national expenditure of \$3 trillion, or 17.5% of the Gross Domestic Product (GDP) that is dedicated to overall U.S. healthcare. These overwhelming expenditures create a crippling financial burden to available healthcare dollars. Moreover, it is paramount that follow-up health care is affordable and readily available to those patient populations that are afflicted with chronic health conditions in a timely and affordable manner, thus relieving suffering, decreasing wait times to receive treatment, improving access, decreasing the financial burdens to society, and realizing an improvement in patient outcomes and quality of life (Bodenheimer et al., 2009; Glover et al., 2011; Myers & Tomasio, 2011).

It should also be noted that, according to the CDC's advisory committee, the projected number of elderly individuals living beyond 65 years of age will have a dramatic effect on the public health system, healthcare finance, and delivery of care. The CDC advisory committee has further identified five roles for a healthcare facility needed to promote societal health and prevent disease:

- To provide high-quality health information and resources to public health professionals, consumers, health-care providers, and aging experts;
- To support health-care providers and health-care organizations in prevention efforts;
- To integrate public health prevention expertise with the aging services network;

- To identify and implement effective prevention efforts
- To monitor changes in the health of older adults. (CDC, 2016a)

Unhealthy behaviors that place an individual at risk for chronic disease can also be rooted in our youth. Therefore, it is recommended by the NIH that healthcare systems provide quality, available healthcare and preventative education throughout the lifetime of the individual (NIH, 2013).

Subsequent financial costs related to, and having a direct impact on the U.S. economy, can be realized also. In 2013, chronic disease was accountable for \$277 billion in healthcare treatment expenditures, alone, with another \$1.04 billion in lost productivity and wages (milkeninstitute.org).

Personal Health Risk Behaviors

Health risk behaviors can be defined as personal risks, unhealthy behaviors, and activities that an individual chooses to engage in that can be inextricably linked to the incidence of chronic disease, a decrease in an individual's quality of life, poorer health outcomes, and an early risk for death. These health risk behaviors typically can only be modified by a strong, self-disciplined commitment by the individual, or as a result of a severe health crisis that forces the individuals to alter their lifestyle. According to the CDC, there are four main health-risk behaviors that have the largest impact on the incidence of illness, chronic diseases, health maladies, and early death.

- Lack of exercise or physical activity
- Poor nutrition or unhealthy eating habits
- Use of tobacco by means of smoking and chewing
- Overindulging in drinking alcohol (CDC, 2016d)

Moreover, the CDC points out that, as of 2011, over half the U.S. population, age 18 and over, did not meet the minimum daily requirement for exercise, and 78% of the individuals examined could not meet minimal, muscle strengthening requirements. The CDC further demonstrated that almost half of the population had a minimum of one risk factor for heart attack, stroke, and uncontrolled high blood pressure, further noting that 90% of the population consumed sodium above the daily requirements, putting them at risk for further health issues.

Healthy individual eating habits were also evaluated by the CDC, noting that 36% of the adolescent population and 38% of the adult populations audited, admittedly, did not include daily fruit within their dietary intake. Moreover, 38% of adolescents and 23% of adults verbalized that vegetables were not part of their daily food staple (CDC, 2016d).

Cigarette smoking in the U.S. is a problematic area of societal health, and is a major contributor to early death and chronic illness. Smoking tobacco has a negative impact on almost every major organ of the body including the heart, lungs, and the cardiovascular system that contributes to lung disease such as chronic obstructive pulmonary disease (COPD), heart disease, cancers, and strokes. It is estimated that, as an individual smokes tobacco, they will have a 25% higher chance of developing lung cancer for men, and a 25.7% incidence of lung cancer for women. It is further estimated that smoking cigarettes is responsible for 90% of all reported lung cancer deaths for men or women within the U.S. (CDC, 2016b).

COPD, with a differential diagnosis of emphysema and bronchitis, has a direct correlation to tobacco use and is responsible for the deterioration of the sensitive structures in the lungs, including airways and air sacs known as alveoli. The condition of

emphysema is responsible for 80% of all deaths caused by COPD. It is noted that there are 42 million adults, nearly one in five individuals surveyed, who openly admitted to smoking. Unhealthy lifestyle choices or participating in health risk behaviors, such as smoking, leads to 480,000, or nearly 1 out of 5 premature deaths per year, and is responsible for a higher incidence of premature, stillbirths, and sudden infant death syndrome (SIDS), further contributing to the need for chronic healthcare conditions in America (CDC, 2016c).

The financial impact, or overall cost, to society for preventable chronic disease and individual health risk behaviors within the U.S. are listed below in billions per year:

- Total economic cost for heart attack and stroke: \$315.4;
- Total economic cost for cancer: \$157;
- Total economic cost for diabetes: \$245.0;
- Total economic cost of healthcare issues linked to obesity: \$147;
- Total economic cost due to overindulgence in alcohol consumption: \$223.5; and
- Total economic cost due to smoking: \$289 (CDC, 2016c)

Health Impact of Addiction and Youth smoking

According to Singh et al. (2016), of the 5.6 million individuals older than 18 years of age who use tobacco in the U.S., most will die prematurely due to their chosen health risk behaviors if they continue using tobacco and smokeless tobacco products. Moreover, the CDC cites tobacco as the leading cause of preventable death and chronic disease in the U.S. According to the Morbidity and Mortality Weekly Report (MMWR), analyzed data from the National Youth Tobacco Survey (NYTS) 2011-2015, a cross-sectional, school-based pencil and paper questionnaire, clearly revealed a correlation between the

addictions to tobacco-related products and those individuals having an early exposure to tobacco products in adolescence and early adulthood. In 2015, an estimated 4.7 million U.S. school-aged children in middle school, grades 6-9 (5.3%), and high schools, grades 9-12 (16%), openly admitted to being exposed and using tobacco products within the past 30 days (Singh et al., 2016).

Early exposure to tobacco-related products in pre-teen or adolescent years is known to cause tobacco addiction, have an adverse effect on brain development, and contribute to chronic health issues, including COPD, which, in definition, includes a class of pulmonary diseases including emphysema, chronic bronchitis, and asthma (Singh et al.).

Of the 4.7 million U.S. high school and middle school students admitting to personal use of tobacco products, 2.3 million students admitted to using more than two tobacco products; the tobacco usage breakdown, for 2015, is as follows:

- 3.0 million middle and high school students used e-cigarettes;
- 1.6 million middle and high school students used cigarettes;
- 1.4 million middle and high school students used cigars;
- 1.2 million middle and high school students used hookahs; and
- 1.1million middle and high school students used smokeless tobacco

(Singh et al., 2016)

During the time period from 2011-2015, a measurable increase was shown in middle and high school students use of the following:

- E-cigarettes (1.5% -16%); and
- Hookah use of (4.1% - 7.2%)

And a lineal decrease in the following tobacco products:

- A decrease in cigarette usage in middle and high school students from 15.8% - 9.3%;
- A decrease in smokeless tobacco in middle and high school students from 9.0%-7.9%;
- A decrease in cigar usage in middle and high school aged students from 11.6%-8.6%; and
- A decrease in pipe tobacco in middle and high school students from 4.0%-1.0%

Although there is a significant decrease in the use of the typical tobacco products, cigarettes, cigars, pipe, and smokeless tobacco, significant increases in alternative products have been realized. Singh et al. (2016) posited, during the time period, between 2011-2015, there was no significant change in the total number of middle and high school students that utilized tobacco in some form, but as of 2014, nearly 3 million students chose E-cigarettes, an emerging tobacco product, as an alternative for cigars and cigarettes (Singh et al.; CDC, 2016e).

According to MMWR, the increased use of alternative tobacco products is of great concern as approximately 80% of all adult smokers who are exposed and become addicted to tobacco-related products before the age of 18, continue to contribute to the decline of personal and societal health overall (Singh et al., 2016; CDC, 2016b).

There are many governmental programs that have been instituted to discourage the use of tobacco-related products in an attempt to improve personal health risk behavior. Most notably, an increase of tobacco pricing and taxation, smoke-free laws for

public health, concern of non-smokers and the use of public education and media campaigns that have shown to decrease usage of typical tobacco products (Singh et al., 2016).

The CDC recommends a sustained effort to implement control policies in an attempt to prevent youth tobacco use and has issued a proposal that would allow the Food and Drug Administration (FDA) overall control over products made or derived from tobacco. The proposed policy remediation also allows the procurement of educational funding to continually improve awareness through extensive, ongoing education of the health hazards and risks of engaging in the unhealthy behavior with the use of tobacco related products (Singh et al., 2016; CDC, 2016e).

Chronic Pulmonary Diseases

According to the National Heart Lung and Blood institute (NHLBI), as of 2014, pulmonary conditions, such as asthma, afflicted 25 million Americans, including 7 million children under the age of 18. Asthma is the most common, chronic disease in children, with 8.6% of children in the U.S. affected, and it is also more prevalent in adolescent patient populations than adult. Asthma in adolescence is documented as the main reason for absenteeism from school or missed time in classroom activities (AAFA, 2015). Asthma is classified as a long term, chronic health condition of the lungs and connective airways that causes airway inflammation, chronic wheezing, coughing, and shortness of breath, of which there is no known cure. It is also noted that most symptoms of asthma occur during the night time hours, for unknown reasons, and can be exacerbated during periods of exercise and exertion in the form of exercised-induced

asthma (EIA) (U. S. Department of Health and Human Services, National Heart, Lung, and Blood Institute, 2014b).

The prevalence of asthma is documented higher in the African American populations and in individuals living at, or below, the poverty level. Hispanics, more notably, and non-White, Hispanic populations from Puerto Rico are twice as likely to have asthma than White, non-Hispanic populations, and 1.5 times more likely to have asthma than non-Hispanic Black individuals. (U. S. Department of Health and Human Services, National Heart, Lung, and Blood Institute, 2012).

Asthma Disparities

Disparities in asthma are clearly evident and are directly related to financial wherewithal, poverty, substandard housing, poor access to affordable care, and affordability of daily controller medications. Urban children suffer a disproportionate burden of asthma that is attributed to insufficient housing, exposure to asbestos, cockroaches, dust mites, and rodent droppings. There is also an increase in nitrogen dioxide, known to cause airway inflammation and irritation to the soft tissue in the airways, prevalent in urban area environments due to the increased use of fossil fuels in automobiles and unvented space heaters. Nitrogen dioxide has been found to be particularly irritating to children's underdeveloped airways causing irritation, inflammation, and asthma exacerbations (Gillespie, Pierse, Wickens, Crane, & Howden, 2011; Sterling, 2012; (Delfino, Tjoa, Gullessarian, & Nickerson, 2012).

There is also a measurable educational gap noted by individuals lacking the knowledge needed to self-control and recognize changing asthma conditions. According to Coffman, Cabana, Halpin, and Yelin (2008), a study performed by the American

Academy of Pediatrics (AAP) analyzed educational interventions, compared with usual asthma care, and found that proper asthma education, performed by qualified asthma educators, had a significant effect on the mean average of hospitalizations, and reduced the return rate for emergency room visits (Adams, 2010; Coffman et al., 2007; Gaudreau et al., 2014).

Disparities exist, as well, as to where a patient lives, works and plays. This can have an effect on healthcare costs, outcomes, and disease management of their asthma condition. This is evident in the rurality of the pediatric patient and suburban living, where there is a clear correlation between emergency room visits and a lack of follow-up, or primary, asthma care and management in the rural and suburban settings (Canino et al., 2012). Underserved rural areas have been shown to have an increase in asthma exacerbations requiring an increase in preventable emergency room visits, a more expensive option of care. Resource barriers in rural areas may include a lack of theory-based interventions that allow for better management and early self-control of asthma symptoms. This is also evident in rural school systems, as there is a lack of access to school-based asthma education and management programs that are typically available in suburban and inner-city school settings (Personal communication, M. Walton, November 11th, 2016; Sorita, Funakoshi, Kashan, Young, & Park, 2014).

It is important to note that to be effective, timely access to asthma follow-up care and education is paramount in preventing adverse outcomes, decreasing hospitalizations, and reducing overall healthcare costs associated with asthma (AAFA, 2014; Glover et al., 2010; (Sorita et al., 2014; Schatz, Rachelefsky, & Krishnan, 2009; NHLBI, 2016).

Environmental Causes of Asthma

According to the American Lung Association (ALA) (2016), the importance of the quality of air we breathe is paramount to our quality of life. Conversely, poor air quality or air pollution can cause a litany of respiratory, cardiovascular, and immunological risk factors for the development of chronic health issues (Darcin, 2014; Environmental Protection Agency [EPA], 2016a). The quality of air we breathe is extremely important to children, as their immature bodies are still developing and growing. Poor air quality can affect lung development and the promotion of chronic lung disease throughout a child's lifetime. Moreover, poor air quality has a direct link to lower birth weights in children, chronic respiratory infections, and the development and chronic exacerbations of asthma (ALA, 2016; EPA, 2016; Delfino et al., 2014; Myers & Tomasio, 2011).

Chronic respiratory infections that can lead to asthma and COPD also have a direct link to exposure of environmental air pollution and are caused by its particulate irritation and inflammatory effects within the sensitive tissue and the bronchiole airways in the lungs (EPA, 2016a; ALA, 2016).

According to the ALA, over 6 million children, a year, worldwide, under the age of five, will lose their lives due to poor indoor and outdoor air quality and lung disease. Moreover, the ALA posited that 3% of all cardiopulmonary deaths in the U.S. have a direct relationship to poor air quality. It is also noted that poor children, and those living in high pollution areas, are at the greatest health risk for developing chronic pulmonary disease (ALA, 2016). The development of lung cancer is also inextricably linked to the quality of the air we breathe and is the leading cause of death in both men and women in

the U.S.; there is a woman diagnosed with lung cancer every five minutes in the U.S. (ALA, 2016; Darcin, 2014; WHO, 2016).

Asthma in children is a very complex chronic condition that can be difficult to control, diagnose, and treat. Triggers to asthma, or the mechanisms that begins the inflammatory airway response, can be caused by mitigating factors that include intrinsic and extrinsic issues that are associated with asthma flair-ups and chronic airway inflammation. This inflammatory response can be caused by many factors including environmental exposures to pollution, traffic-related pollution, viruses, climate change, and sometimes genetics (Sveum et al., 2012; Delfino et al., 2014).

Indoor environmental exposures are of particular concern for pediatric asthma control as most individuals spend the majority of their time indoors and are estimated to be at 90% risk. (Sterling, 2012). Environmental exposure that may trigger the inflammatory process within an individual's airway indoors can include radon gas, rodents, dust mites, and strong odors such as cleaning solvents and chemicals. Molds, dog and cat dander and second-hand smoke are all allergens that can trigger asthma flair-ups and prevent long term asthma control. It is interesting to note that approximately 80% of all asthma patients have allergic responses to known allergens and have the diagnosis classification of allergic asthma. These patients are sometimes the most difficult to control unless allergy interventions are utilized to find an asthmatic patient's specific triggers. Children's asthma triggers pose the most difficult to ascertain as young children can have a multitude of allergies at a very young age, making it difficult to isolate and treat their asthma triggers (EPA, 2016b; Defino et al., 2014; ALA, 2016).

Children living within the inner-city suffer a disproportionate incidence of asthma due to an increase in ozone, smog, and ambient air pollutants; even if exposures are for a short period, which can be a contributing factor to the inflammatory response within the airways.

High traffic levels have also been shown to produce elevated levels of nitrogen dioxide, a byproduct of fossil fuels and burnt hydrocarbons, further contributing to an increase in airway inflammation. Causation is attributed to an inflammatory response to finite ambient air pollution, including those with particulate matter size of less than or equal to 2.5 microns, leading to airway hyper-responsiveness resulting in asthma exacerbations, flare ups, emergency room visits, and hospitalizations due to ambient air pollution (Delfino, et al., 2014; Wang, McGeady, & Yousef, 2007; Mellerson, 2014).

Asthma and Climate Change

The debate over climate change and its effects on the environment remain a topic of discussion and concerns of public health issues. An ensuing increase in Greenhouse gases caused by global warming would have an untoward effect on an individual's health, and, most specifically, pediatric asthma patients (Szema, 2014).

According to Szema (2014) global warming would result in harsher colder winters realized in the northern hemisphere, and hotter temperatures southward. There is a direct correlation between severe prolonged cold weather and an increase in asthma flare ups, and emergency room (ER) asthma visits by children. This is based on a New York City study conducted by the Mount Sinai School of Medicine. This study reviewed temperature change, ozone levels, and emergency room visits in 14 New York counties, noting a 7.3% increase in asthma-related ER visits in children 0-17 years old, when

extremely low temperatures were noted (Szema, 2014). Moreover, as global warming may extend warmer growing seasons, high pollen plants, such as birch trees, grass pollen, and ragweed would all propagate higher levels of pollens into the air with an earlier and longer growing season. This is of concern as over 10% of the population has a sensitivity to ragweed (American Academy of Allergy, Asthma, and Immunology [AAAAI], 2014). An increase in the growing season would also yield an increase in Greenhouse gases, most notably carbon dioxide (CO₂), causing an increase in plant bio mass effectively increasing production, and levels of pollen and spores into the environment (Szema, 2014).

Social Environment and Asthma

Social environments can be thought of as moderators that are brought about by cultural and societal influences. Asthma can be exacerbated as a result of these influences, including events that would be deemed stressful to the individual, such as a violent home environment or the loss of a parent. In a study of 150 children subjected to a stressful environment in childhood, 145 out of 150 children who had a predisposition to asthma already had developed asthma symptoms by age eight. The results were based on variables with predictive relationships such as parenting difficulties and maternal depression that all had a higher risk relationship with the development of childhood asthma (Sterling, 2012).

Aligning itself with the social environment of asthma, within which individuals must live and accept medical treatment, are the social environment issues of ethnic diversity and cultural competency. Cultural competency issues and language barriers can also play a significant role in asthma management and control. Health care providers who

are unable to understand cultural differences, or lack the ability to communicate medical advice to the individual, can effectively create a barrier to care and health outcomes through a lack of medical understanding. This shortfall in health literacy and medical understanding ultimately leads to non-compliance of needed preventative and follow-up healthcare, and a compromised patient and physicians trusting relationship. A lack of approved medical interpreters, or use of a non-medical family member as an interpreter, can be problematic and may lead to a misunderstanding of physician advice and a breakdown of the physician-patient relationship (Bloomberg, et al., 2009; Coker, Kaplan, & Chung, 2012; Grineski, 2008; Myers & Tomasio, 2011).

Financial Cost of Asthma to Society

Medical related costs for asthma, in 2015, exceeded \$56 billion in the U.S. (Appendix C), including direct medical expenditures, lost time from work, including wages and productivity. Asthma was also cited as the number one reason for missed days of school and loss of learning opportunities. Uncontrolled asthma is responsible for an increase in emergency room visits for uncontrolled symptoms and lack of control, hospitalizations, and admission to intensive care units. Moreover, annually, asthma is responsible for 439,000 hospitalizations, 14.2 million office visits, and 2 million emergency room visits (AAFA, 2015; CMS, 2016).

Indirect and direct costs of asthma can also be attributed to non-compliance with medications and lack of follow-up care with a patient's primary care physician or pulmonologist. According to the AAFA (2015), as of 2015, 54.9 % of adults and 78.3% of children were not compliant with daily asthma controller medications. This non-compliance concern adds directly to missed days from school and work, higher

emergency room utilization, an increase in the use of oral steroids, and a poorer control of the patient's asthma condition. Ultimately, this will lead to a decrease in a patient's quality of life, resulting in an increase on the financial burden on the U.S. healthcare system, an increase in unneeded pain and suffering, and an increase in preventable mortality and morbidity (AAFA, 2015).

Deaths from Asthma

In the U.S., 3,651 people die from asthma each year or 10 individuals every day. There are also 187 preventable deaths per year for children that are attributed to uncontrolled asthma. Disparities exist for the rate of asthma deaths and, deaths from asthma are 30% higher for females (65% of all asthma deaths), and 75% higher for ethnic minorities than their White counterparts with asthma. Notably, deaths from asthma are preventable with proper education, personal awareness of symptoms, and early detection and management to prevent exacerbations. Compliance with daily, asthma controller medications that include inhaled corticosteroids and maintaining asthma follow-up care are all paramount for asthma control, management and prevention of comorbidities and mortality (AAAAI, 2014; AAFA, 2015).

Asthma Control

Asthma is the most common cause of chronic lung disease in children for which there is no known cure (NHLBI, 2014b; AAFA, 2015). Asthma control is achieved through diligence with follow-up care, diagnostic Pediatric Assessment Measure (PRAM) (Arnold, Gebretsadik, & Hartert, 2012), compliance with physician-ordered medications, avoidance of triggers, and strict adherence to the nationally accepted asthma action treatment plan that would be prescribed by their healthcare provider. Disease and age-

specific education for asthma will bring awareness to the patient and care giver for self-management and self-recognition of symptoms that encourage early treatment and prevention of exacerbation of their chronic condition, before an exacerbation creates an emergent situation (NHLBI, 2014b).

The ultimate goal of asthma treatment is to control a patient's symptoms, prevent life-threatening exacerbations, and affect an improvement in pulmonary lung function resulting in a healthier, more productive quality of life. Attending and participating in disease and age-specific asthma education programs has been found to improve the patients' self-management skills, improve understanding of the pathophysiology of their disease process, and bring earlier recognition and awareness of their level of control. By patients maintaining control of their asthma condition, there will be a significant decrease in overall cost of chronic care and an improvement in outcomes and quality of life. This process is achieved through diligence and compliance with follow-up care, avoiding triggers that worsen asthma symptoms, specific age and disease education, and timely access to follow-up healthcare appointments for asthma control, evaluation of action care plan, and flare up prevention (Al-Jahdali et al., 2013; Boise, 2014; NHLBI, 2014b; Myers & Tomasio, 2011).

Socioeconomic Factors Affecting Asthma Control

Socioeconomic issues have been found to have a profound effect on asthma control. Low income families and African American children who have a disproportionate incidence of morbidity and mortality (Celano, Holsey, & Kobrynski, 2012), and substandard housing, most notably older buildings containing asbestos and dust, homes with mold, cockroach and rodent infestations, can also create an allergic

environment that causes an inflammatory response within the soft tissues of the airways (ALA, 2016). This response to environmental irritants will ultimately result in an increase in the incidence of asthma, asthma flare ups, and poor control of asthma symptoms. Poor heating systems, poorly maintained and cleaned air ducts, or lack of adequate heat also play a significant role in the development and inability to control chronic health conditions such as asthma. Poor indoor quality of air and cool, damp environments are all found to be causal in creating mold, mildew, and unhealthy environments (Environmental Protection Agency [EPA], 2016a).

Family dynamics that include parents or single parents who may need to work away from home, patients with at least one family member with asthma and maternal employment outside of the home all have a direct effect on control and compliance within the adolescent patient populations due to the lack of parental supervision (Tamesis et al., 2013). Insurance concerns, including the underinsured, living in underserved or limited access to affordable care areas, patients rely on Medicaid or Medicare insurance for healthcare, are all disparities associated with the incidence of asthma and poor asthma control. Individuals with asthma, on government insurance, were also found to have a higher level of emergency room visits, denoting a poorer level of disease control (Chang et al., 2014). This adversity in the delivery of affordable, available health contributes to the lack of control for patients' asthma symptoms, and can be directly attributed to disparities brought about by the lack of reasonable access and affordability of follow-up management of the disease. Barriers to care, perceived and real, can also be problematic in controlling asthma. Children living in poorer environments may not have the financial wherewithal to buy insurance, have transportation to and from appointments, or be able

to afford healthy, nutritious produce to eat and maintain a healthy weight and stave off respiratory infections, a known trigger of asthma. Financial barriers also prevent children with asthma from receiving continuous, quality healthcare that is needed to manage asthma and other chronic health conditions. Children from low income families, typically, have a higher incidence of not only asthma, but other health issues also and contribute to the public health burden on society (Bloomberg et al., 2009; Tamesis et al., 2013).

Health Literacy

Health literacy, or the degree to which an individual can process and understand basic health information, is paramount in making sound medical, or life- and-death decisions about chronic or acute medical conditions. Patient portals, by means of an Electronic Medical Record (EMR), provide health records' access to the patient or the family of adolescent children in an attempt to self-manage symptoms and assist the individual in making educated decisions concerning treatment options for their disease or chronic condition. These patient portals have been established to improve health outcome, allow the patient a better understanding of their past healthcare and treatment paths, decrease healthcare costs, and improve the patient's productivity and quality of life. On-line patient portals are a way for care providers to support their role in health, and have become a vehicle for the patient to improve communication, improve health behaviors, and increase awareness of their chronic disease or health condition (Tieu et al., 2015).

Technological disparities exist within society as well, as a barrier to care and access, as not all patient populations have similar access to computers and availability of

the Internet. Minorities are also less likely to use or have access to the available healthcare portal websites from their healthcare institution, or primary care and specialty healthcare providers. These minority groups may have lower income, lower level of technical education, and may not have the financial wherewithal to access the higher degree of technology due to societal disparities (Tieu et al., 2015, p. 275; Grineski, 2008; HRSA, 2016).

A study by the National Centers for Biotechnology Information (NCBI), a division of the National Institutes of Health (NIH), was performed in a safety net healthcare facility in San Francisco, California, within a limited health literacy patient population, in an attempt to ascertain support for self-management of certain chronic diseases, including a secondary analysis of both patients and caregivers. The study focused on the ability to use current technology, accessibility of the use of patient portals, or EHR, and accessibility and availability to access of the Internet. Individuals within the study admitted real barriers to portal use including reading, typing, fear of security breaches and computer viruses, poor past experiences, lack of technologic proficiency, lack of access to computers, and limited computer skills and remembering passwords. The inquiry also determined how access to personal healthcare records could improve the transparency about health and understanding of disease processes. Of the patients interviewed, 90 % felt use of the portal improved their “ability to seek medical advice in between visits on topics including medication side effects, test results, symptoms, and new treatments seen in the media” although, some participants voiced preference of a face-to-face encounter with their primary healthcare provider for information concerning their condition (Tieu et al., 2015 p. 275).

While the solutions to access may appear logical, additional solutions for expansion of access to the Internet in underserved areas, in conjunction with a portal system awareness and education, appear warranted. It should also be duly noted that technology proficiency may not always compliment the vulnerable patient with a chronic conditions or disease. Thus, health information technology does not guarantee accessibility, usability, or usefulness to all patients, especially to those with limited technology access or literacy. Nor will it negate the importance of follow-up healthcare to reduce patient suffering and promote disease control, as this is the sole responsibility of the physician, and not the patient. This lack of follow-up for disease management may represent a failure of the patient or caregiver to fully understand the dangers that untreated chronic conditions pose, or the inability of the individual to understand and deal with barriers to care that can be real or perceived (Dreier, Goldbart, Hershkovich, Vardy, & Cohen, 2008; McDonough & Mault, 2013).

Problematic No-Show Rates

Chronic no-show rates in any healthcare discipline can have a devastating effect on the healthcare providers' ability to diagnose, treat, and manage healthcare conditions before they become a chronic health issue (Dumontier et al., 2013; Kheirkhah et al., 2015). No-show rates also have an untoward effect on the timely access to see a physician, the length of time to begin disease-specific treatment, and the efficiency and effectiveness of the healthcare being delivered (Chakraborty, Muthuraman, & Lawley, 2013). No-show rates can also have an overall negative effect on patient and physician satisfaction (Tuli et al., 2010). Non-compliance with follow-up healthcare also has an adverse effect on patient outcomes as it is directly related to a failure of compliance with

the medical action or specific medical treatments that was prescribed. This failure of compliance leads to a varying degree of disease control and is, in part, due to the lack of follow-up care assessment of the initial ordered plan of action by the prescribing caregiver. When a patient does not follow-up with their provider, a loss of treatment assessment and evaluation of outcomes of the disease-specific improvement plan is realized. The physician required follow-up care would allow for needed adjustment or redirection of therapy, in a timely manner, greatly improving control or prevention of chronic disease. This disruption in care is usually a direct result of the patient or caregiver not returning for assessment of treatment or an outcome evaluation of the initial course of action implemented (Schauman, Aschan, Arias, Beards, & Clement, 2013; Schatz et al., 2009).

No-show rates are also problematic because they create an underutilization of physician or provider resources and promote non-compliance with directed physician or healthcare provider's plan of action. However, they also serve as a quality indicator as this creates a perceived reduction of cohesiveness between the patient and the primary care physician or specialty provider of care. Moreover, financial losses brought about by no-show appointments to a facility can interrupt availability of care for others waiting to be seen, thus affecting the health of others (Guzek, Gentry, & Golomb, 2015; Samorani & LaGanga, 2015; Rodrigues-Pacheco et al., 2008; Schatz et al).

No-shows rates also have an untoward effect on patient and caregiver satisfaction, decrease specialty healthcare accessibility, create a waste of healthcare staff and facility resources, and ultimately, cause a disruption in the management of chronic illness and diseases. As a result, the healthcare facility may be unable to withstand the losses

incurred by the no-show patient and may be unable to continue to provide needed follow-up healthcare services.

The resulting no-show rates further limit expansion of services in underserved areas, and create a healthcare vacuum of individuals utilizing emergency room services as a primary care modality, most notably in the pediatric asthma patient populations. This overutilization of emergency room services for preventable asthma exacerbations can overwhelm hospitals, have a significant impact in financial burdens to healthcare expenditures, and block access to true emergency room patients (Gaudreu et al., 2014).

Measurements of the effectiveness of healthcare treatment can be directly related to the timeliness and the accessibility to gain needed treatment. Timeliness of delivered care is also problematic from a high level of no-show rates in a healthcare facility due to improper utilization of appointment slots being improperly utilized. As of 2015, nationwide, missed appointment rates, or no-show rates, in the U.S., have exceeded 55% in certain disciplines of outpatient care, with most areas having an average of 30% missed appointments overall (Samuels et al., 2015; DuMontier et al., 2013; Tsai & Teng, 2014; Molfenter, 2013; nih.gov; Parikh et al., 2010; Van Dieren, Rijckmans, Mathijssen, Lobbestael, & Arntz, 2013). As Molfenter (2013) posited, “It is very difficult to treat an empty chair” (p. 634).

No-Show Demographics

Mixed success has been realized in decreasing no-show rates in non-specific disciplines of care but remains problematic due to the lack of specificity of no-show demographics within varying fields of healthcare. This makes it difficult to isolate causation across multidisciplinary health care arenas, but, was seen to be somewhat

dependent of “practice specific populations” (DuMontier et al., (2013), p. 634; Zorc et al., 2003). The following patient demographic profile (Appendix 4) represents the patient population break down of no-show rates including a cohort study vs. general clinic patient populations. The patient population breakdown represented all age groups of patients, including considerations for gender, ethnicity, and the services’ payer.

A multi-method cohort study conducted by DuMontier et al., (2013) revealed that individuals living in underserved and deprived areas demonstrated no-show rates that were three times the rate compared with individuals that did not live in underserved areas, along with those individuals on government healthcare such as Medicare or Medicaid, including children, than those individuals with commercial insurance, or those patient populations who were self-pay patients. There is also an inference from the research data that suggested high no-show rates may constitute a smaller group of individuals who no-showed more frequently than other groups of patients or single patients (DuMontier et al., 2013). The study further revealed that 2% of the total participant populations were responsible for one sixth of all missed appointments. This effectively identified patient populations that are largely at risk for missed clinical follow-up care, further placing the patient group at risk for the development of chronic disease. This isolation of patient population may have an impact on an improvement in access to healthcare, and improve societal health overall if causation is ascertained. (DuMontier et al., 2013).

Cost of Missed Follow-Up Care

Missed follow-up appointments, or patients not showing up for scheduled appointments, can have a detrimental effect in the delivery of health care in the U.S. No-

show rates not only result in financial losses to physicians and healthcare facilities, they also have a vacuum effect on healthcare resources causing a decrease in the efficiency and effectiveness of delivered healthcare services and ultimately increasing the pain and suffering of others waiting for healthcare intervention. This not only monetarily discourages individuals from pursuing a physician specialist vocation, but puts a financial strain on healthcare facilities preventing expansion of services or maintenance of present services, thereby having an untoward effect on access to care and on societal health.

High levels of no-show patients also create a vacuum effect of healthcare resources and create a delay in initiation of healthcare needed to prevent and manage asthma and other chronic disease and conditions (McDonough & Mault, 2013; Parikh et al., 2010; Dreiherr et al., 2008).

According to the CDC, the incidence of asthma has steadily increased by 2.9% yearly, beginning in 2000, with approximately 20.3 million individuals afflicted, to an astounding 25.7 million individuals afflicted with asthma as of 2010. This statistic also includes 8.6% of asthma in children and adolescents under the age of 18. This increase makes timely access to affordable healthcare paramount in the development, prevention, and management of chronic disease such as childhood asthma (HHS.gov; NHLBI, 2014a).

No-show rates vary from area to area and across different health disciplines. According to Kheirkhah et al., (2015), several studies performed in a community health setting, revealed that no-show rates can be as low as 5% in some areas of healthcare, and some rates as high as 80%, with the highest no-show rates realized in subspecialty care. The average loss per appointment averaged \$196. This financial loss was compounded by

an average of 62 no-show appointments, per day, with an annual loss of \$3 million in lost revenue and patient care hours (Kheirkhah et al., 2015). Another study reported 25% no-show rates, with another 31% of the patient population arriving late. Within this family practice of 45,000 patients seen, per year, the average cost of missed appointments could exceed \$ 3.2 million in lost revenue and underutilized patient appointment slots. This represents a loss percentage of 3% to 14%, respectively (Kheirkhah et al., 2015).

There is also a considerable cost associated with missed appointments, not only to individuals waiting for care, but on society overall in the form of wasted resources. Costs may also be incurred due to a missed diagnosis or a delay in treatment as the condition may develop into a more serious chronic health care condition that will require greater healthcare resources to treat and maintain (Kheirkhah et al., 2015). This not only results in an increase in pain and suffering for individuals waiting for care, but puts an insurmountable financial strain on an already unsustainable healthcare system (Social Security Advisory Board, 2009).

A recent study conducted by Grant, Bowen, Neidell, Prinz, and Redlener (2010) revealed that, within the pediatric patient population suffering from asthma, implementation of best practices, with integration of evidence-based medicine practices, yielded an appreciable savings to the healthcare system and a decrease in flare ups, emergency room visits, hospitalizations, and an improvement in the overall health of the asthmatic patient (Grant et al., 2010). Pediatric patients, ages 36 months to 19 years ($n=244$) and follow-up ($n=202$) were evaluated after implementation of advanced education and enhanced treatments in primary care. The subjects then followed up with strict management and care. This was then evaluated for overall costs associated with

management of their asthma condition. The savings attributed to overall costs of managing each patient was reduced by \$4,525 per patient, or \$4.2 million in annual savings overall (Grant et al., 2010).

In summation, asthma is one of the most common, chronic healthcare conditions afflicting children for which there is no known cure (NHLBI, 2014b). Diligence with scheduled follow-up appointments for disease management and control, and compliance with daily controller medications coupled with evidence-based physician practices, is paramount in controlling the morbidity and mortality associated with patient and caregiver non-compliance (DuMontier et al., 2013). Specific patient and caregiver education have been shown to have an effect in decreasing no-show rates, but is not widely performed in an age- and disease-specific manner uniformly in outpatient facilities. This may leave patients and families with health illiteracy, or medical disparities, and unable to comprehend and perform needed medical procedures such as proper inhaler techniques and medication selection for self-management of symptoms for their chronic asthma condition (al-Jahdali et al., 2013; ACAAI, 2014; Bloomberg et al., 2009).

The results of the exhaustive literature review revealed only a miniscule amount of data in ascertaining information related to the improvement in no-show rates and an overall improvement in access to asthma follow-up care achieved through asthma education. Moreover, studies pertaining to the pediatric asthma patient populations further revealed a lack of coordinated cohort studies, comparing return rates for follow-up care and pediatric asthma patients receiving age- and disease-specific asthma education. Moderator variables comparing patient demographics, such as references to

participant demographics related to age, gender, ethnicity, education level, financial status, geographic location, co-morbidities, such as obesity, or type of healthcare coverage, may explain the relationship (Baron & Kenny, 1986). Considering these results, it is assured that further, pertinent studies may prove beneficial to the overall health and welfare of infants, children, and adolescent asthma patient populations. Further studies may ascertain causation for the missed patient appointment slots that may decrease wait times for assessment and disease management, decrease healthcare costs, and improve overall patient and societal health.

Summary

Chapter 2 disseminated a literature review of the development and financial burden to the U.S. healthcare system that is overburdened with preventable chronic diseases. Included is a discussion of the financial fallout of chronic health conditions has on the present healthcare system and summarizes the six of the most reported, preventable, chronic health conditions afflicting Americans' health.

Chapter 2 discussed the importance of follow-up care and the barriers that no-show rates inflict on an individual's ability in attaining care and management of chronic disease. Included, also, are causation for asthma, environmental, socioeconomic, asthma disparities, and asthma issues related to climate change. In Chapter 2, there were statistics for the financial burden on society deaths from asthma, and problems with control, due to health literacy, cultural competency issues, and the cost associated with lack of follow-up care and the development of chronic disease. Chapter 2 formatted the foundation complimenting the need for age and disease-specific education to improve health literacy, decrease no-show rates, and improve access to care.

Chapter 3

Methodology

Current investigations have been performed to ascertain the causation for missed appointments, or no-show rates, for follow-up care for a multitude of patient populations and disciplines of care, but where the gap may lay is in the few studies that have been performed pertaining to missed appointments in the pediatric asthma patient populations due to the lack of health literacy: more specifically, what effect age- and disease-specific education may have on decreasing no-show rates and improving access to care for others. There also seems to be a gap in the investigation of moderators and the strength of impact they may have in the lack of follow-up care in the pediatric asthma patient population. This gap includes moderator variables in reference to participant demographics related to age, gender, ethnicity, education level, financial status, geographic location, co-morbidities, such as obesity, or type of healthcare coverage, and if any obvious mediator variables may explain the relationship (Baron & Kenny, 1986; Goldman & Mayer, 2011; Adams, 2010; McDonough & Mault, 2013; Dreiherr et al., 2008; DuMontier et al., 2013).

Current research also reveals that chronic healthcare has created an immense burden to societal health care expenditures, and places a financial burden to an already overburdened, unaffordable, unsustainable healthcare system (Social Security Advisory Board, 2009; Bodenheimer et al., 2009). Moreover, missed appointments leave underutilized patient time slots that could be filled, thereby improving access to those waiting for an appointment and needed follow-up care (DuMontier et al., 2013; Samuels et al., 2015). This study sought to investigate if individuals are more likely to return for follow-up care and management of their chronic condition of asthma, if proper disease-

and age-specific education is instituted and accepted by the family, care giver, and/or patient, prior to making the next follow-up appointment. Moderator variables were also investigated for a defined causal relationship, and the strength of that relationship, between variables for missed follow-up asthma management and mediators that may be exposed for the reasoning behind the moderator relationship (Baron & Kenny, 1986).

Research Method

The research method for this study involved a quasi-experimental research design through a retrospective data review, commonly referred to as a retrospective chart review (RCR) or medical record review (MRR) of existing patient records utilizing the electronic medical records for retrieval of pertinent medical data pertaining to no-show rates and the educational discharge process. Retrospective chart reviews are a popular methodological research method used frequently in multiple healthcare disciplines, including residency training programs, quality control and assessment, healthcare educational programs, epidemiological studies, inpatient and outpatient studies, and other types of clinical research. Nearly one quarter of medical research is through retrospective chart reviews (Vassar & Holzmann, 2013; www.oxfordjournal.org).

Advantages of a Retrospective Chart Review

There are several advantages to this type of research method, including ease of attaining existing pertinent patient data and that it can be conducted efficiently and quickly, and can be disseminated efficiently for medical concerns, such as the case of medical time constraints for needed treatments. Properly chosen cohorts can give a direct representation of incidence of diseases and health conditions, rather than relying on an odds' ratio; and, RCR allows a study to be designed to allow for multiple outcome

evaluations to be performed at the same time based on variables chosen (www.oxfordjournal.org).

Disadvantages of a Retrospective Chart Review

Disadvantages of a retrospective chart review studies include infrequent outcomes that may require a larger population for the study, causing delays in the outcomes as the study would need to be performed over a longer period of time, increasing utilization costs for staff, time, and possibly, transportation issues. Another disadvantage of an RCR is that incidents of disease may be present at the forefront of the study and can be misdiagnosed, causing a skew in the available data (www.oxfordjournals.org).

Rational for the Retrospective Chart Review

A retrospective chart review method of research was chosen for this study due to the availability and wealth of pertinent patient data pertaining to this research topic. The intent was to disseminate available asthma cohort data ascertaining a correlation between the acceptance or refusal of age- and disease-specific asthma educational support, and the return rate of no-show or missed appointments after an adolescent patient, family member, or caregiver completed the medical education process. The ease of access to a recent, readily available, pediatric asthma patient population database was also a consideration for utilization of a RCR research design.

For continuity of research and avoidance of commonly reported RCR mistakes, a literature review was conducted and reviewed that included a summary of evaluations to prevent common mistakes within a RCR research model. Common reported research short-falls within a RCR study is highlighted in Appendix D (www.oxfordjournals.org; Trochim & Donnelly, 2008; Vassar & Holtzmann, 2013).

Inclusion Criteria

Participants were randomly inclusive of males and females between the ages of 8 and 18. Participation in the study included all ethnicities and racial groups in the existing patient database. Participants were also selected based on a review of the EMR to ascertain if the individuals had a documented problem with not showing for follow-up care using the following criteria. The specific parameters for no-show rates were set at patients that had missed or no-showed for two consecutive appointments in a rolling year, and did not change or call to cancel their appointment prior to not showing up for evaluation of their chronic asthma condition within the scheduled time slot. A stratified random sample of asthma patients without a no show issue was also collected for comparison purposes across groups.

Exclusion Criteria

Participants were excluded from this study for multiple health comorbidities, such as cardiac insufficiencies, metabolic or psychological health issues, or for not having the cognitive function to understand the educational process such as individuals with traumatic brain injury.

Participants

Participants for this study were selected with the specific intent to evaluate the available EMR database within the pediatric pulmonary, allergy, and immunology outpatient clinic facility including only pediatric subjects who had a specific diagnosis of asthma. The participants were chosen randomly considering the specific health need of requiring follow-up care for control of their asthma condition, over time, and negated those subjects that were discharged from the specialty practice, hence, not requiring

follow-up asthma visits. Allergy patients, with a specific diagnosis of asthma, were also included in this study as allergists and pulmonologists typically treat the pediatric patients and manage the classification of asthma concurrently. Patients with an ICD-9/10 diagnostic code of hyperactive airway disease were also included within this study as well. As this is also treated as asthma within certain medical practices. Participants or families who refused disease and age-specific education were also included in this study to ascertain if this participant population returned for follow-up care, as directed by their physician, or may have received prior education pertaining to their asthma condition through their primary care or a community outreach center, as both processes are well documented within the patients EMR.

Research Procedure

The research procedure for this study began with a request of information from the supervising individuals from the Epic administrators of the EMR system after approval of an IRB proposals had been received. The attempt was to ascertain a list of individuals who were between the age of 8 and 18, with a diagnosis of asthma, who had not shown up for at least two consecutive appointments in one year. The EMR search was limited to subjects within the department of pediatric pulmonary medicine, including both specific pulmonary and pediatric allergy disciplines of care. Individuals were then randomly chosen based on the inclusion and exclusion criteria set forth within this study until $n = 193$ subjects were identified. Randomly chosen subjects were then placed into a category of disease and age-specific asthma education received, or not received, and compared with when the education had been received.

The subjects were analyzed to ascertain if, after the completion of the educational process, the next appointment was completed and the missed appointments, or no-show rates, had declined. The subjects were also compared for compliance with follow-up appointments with those subjects who did not receive, or refused age and disease-specific education at the time of their appointment, or by other means through the community outreach asthma education center located near the outpatient facility. This was also documented in the patients' EMR.

Data Analysis

Pertinent data were compiled, and analysis was completed by utilization of S.P.S.S statistical analysis software (Field, 2009). In order to address all stated research questions in this analysis, both descriptive and inferential statistics were used. Reliability estimates were calculated where appropriate. Regression analysis was used to evaluate existing relationships.

Chapter 4

Results

The Focus of this study was to ascertain if age and disease specific education has an effect on improving the no show rates or the healthcare phenomenon of the empty chair, for follow up healthcare management in the adolescent patient asthma populations. A decrease in no show rates could conceivably effect access to those waiting for care. By improving patient appointment slot utilization, improve disease management and outcomes, improving overall societal health and decreasing healthcare costs.

The following research questions were instrumental in guiding the analysis of the collected data:

1. What impact does age and disease specific education have on no show rates for follow up pediatric asthma management? More specifically
 - a. What is the impact on appointment slot utilization: measurable by a decrease in individual no show rates for follow up asthma care?
2. If there is a measurable impact, are there specific moderators evident for the impact of education on NO SHOWS?
 - a. If no effect is found, is there an association of education to KEPT appointments?
3. Do demographic moderator variables such as age, gender, ethnicity, financial status or type of healthcare coverage or geographic location, have an association to NO SHOW rates.

This chapter will disseminate the specific data collected to ascertain if health education, delivered in an age and disease specific manner, has an effect on reducing the incidence

of no show rates for follow up healthcare management within the pediatric asthma patient populations. The specific research questions will be addressed individually within this chapter as well by utilizing appropriate regression analysis software.

Demographics

Demographic moderator variables of age, gender, race, level of insurance and geographic zone were collected and analyzed by means of a retrospective electronic medical record data base review study that collected participant data from 1-1 2012 through 2-28-17. This information was crucial in the development of the overview and representation of participant populations within this study.

A random sample of data included participants from a population within Mahoning, Trumbull, Stark and Franklin counties, Ohio with a specific ICD-9 or ICD-10 code for varying degrees of asthma diagnosis or hyperactive airway disease. All participants were between the ages of 8 and 18 respectively with those individuals suffering from severe comorbidities or the inability to cognitively understand the educational process being excluded from this study. Inclusion criteria evaluated individuals that had missed 2 or more follow up asthma management appointments over a rolling year with a random cross sectional sample also taken for those individuals that did not have an issue with not showing for their follow up asthma management appointments for comparison.

Participants within the study yielded an $n=193$ with a gender distribution of 101 males or (52%) and 92 females or (47.7%) of the participant population, the results are illustrated in Table 1.

Table 1. *Gender Distribution*

	Frequency	Percent
Male	101	52.3
Female	92	47.7

The racial distribution of the participant populations revealed that 90 or 46.6% were black, 63 participants or 32.6 % of the participant distribution was White, 10 or 5.2% were Hispanic/Latino and 15.5% of the participants were listed as other. This breakdown is within Table 2.

Table 2. *Racial Distribution*

	Frequency	Percent
African American/Black	90	46.6
White	63	32.6
Hispanic/Latino	10	5.2
Other/Unknown	30	15.5

This data was also analyzed to determine the race and gender representation of the participants' the results are illustrated in table 3.

Table 3. *Race, Gender Cross Comparison*

	African American/Black	White	Hispanic/Latino	Other/Unknown
Male	44	34	5	18
Female	46	29	5	12

As indicated in table 3., a slightly higher African American distribution of race and gender represented within this cross comparison

The next analysis looked at type of insurance coverage as a type of financial indicator. Medicaid Medical is a straight Medicaid type of government supplied medical

coverage for those individuals who are 100% Medicaid dependent. Medicaid/Medical Care Organization (MCO) included those participants that were covered under a government assisted Health Maintenance Organization (HMO). Commercial insurance comprised is the type of insurance that individuals have through their employer with some individual monthly contribution. Data analysis for the type of insurance coverage for the individual participants, or financial distribution, is presented in Table 4.

Table 4. *Financial distribution*

	Frequency	Percent
Medicaid		
Medical	10	5.2
Medicaid MCO	166	86
Commercial	17	8.8

As indicated in Table 4, the sample of participants for this investigation included primarily Medicaid MCO (86%), followed by Commercial (8.8%), Followed by Medicaid Medical (5.2%). This indicates that most of the participants' families have some source of income, however limited. The data was further examined to determine if the financial class or type of healthcare insurance had an equal distribution across the male and female participants as well or if certain disparities may exist across gender classes of participants. The results are presented in Table 5.

Table 5. *Financial Class Comparison Male and Female*

	Medicaid Medical	Medicaid MCO	Commercial
Male	5	86	10
Female	5	80	7

As indicated in table 5, an equal distribution between males and females for straight Medicaid with 5 males and 5 female participants represented, and a slightly higher level of Medicaid (MCO) for males with 86 and females on Medicaid (MCO) represented 80 participants. Commercial insurance revealed 10 for males and 7 for females representing a slight disparity between males and females for MCO and commercial healthcare coverage. This distribution of Financial Class indicator is a balanced distribution across the two gender classifications.

The data was also examined to determine if the financial class or type of healthcare insurance had an equal distribution across races as well or if certain disparities may exist across classes of participants. The results are illustrated in Table 6.

Table 6. *Financial Class Comparison racial groups*

	Medicaid Medical	Medicaid MCO	Commercial
African American/Black	3	84	3
White	3	49	11
Hispanic/Latino	0	9	1
Other/Unknown	4	24	2

As indicated in Table 6, an equal representation between African Americans and White participants for straight Medicaid healthcare coverage with 3 participants black, 3 participants white, 0 participants within the Hispanic /Latino population and 4 participants listed within the other/unknown category. African American participants represented under Medicaid (HMO) healthcare coverage revealed 84 participants represented, White revealed 49 participants, Hispanic/Latino revealed 9 and 24 participants within the classification of other/unknown. African Americans listed as

commercially insured, represented 3 participants, whites 11 participants, Hispanic/Latino 1 participants and 2 commercially insured listed as Other/Unknown. A higher level of Medicaid (MCO) was noted with 84 for African American participants vs. White participants that included 49 of the participants and females on Medicaid MCO represented 80 participants was revealed. This compared to 11 whites with commercial insurance vs. 3 African Americans and 1 Hispanic/ Latino revealing disparities of those receiving HMO insurance healthcare insurance coverage and those groups that were commercially insured. These results are consistent with expectations due to the higher number of African Americans within the study and a higher number of males than females on MCO.

Disease and age specific asthma education that included: A brief pathophysiology of the disease process, self-recognition and awareness of symptoms, self-management strategies, prophylactic management of exercise induced symptoms, proper inhaler and spacer technique and medication recognition was provided along with a physician directed asthma action treatment plan that was reviewed with and given to the patient on completion of the educational encounter during a follow up asthma management appointment.

A learning needs assessment was also performed to evaluate and aid in recognition of any specific learning barriers and needs of the participants. Specific barriers such as hearing impairment, language barriers or a diagnoses of an impaired cognitive function were evaluated for any special need and documented within the Electronic Health Record, as well as any co learners or caregivers that may have been present during the visit.

The participants receiving education and those that did not receive education are illustrated in table 7.

Table 7. *Educational Encounter Distribution*

	Frequency	Percent
No	24	12.4
Yes	169	87.6

Those participants that received age and disease specific education comprised 87.6% of the participant population with 12.4% of the participant population that chose to not participate or did not receive the educational encounter for other reasons. The data was then further disseminated to assess those participants, male versus female, that had received age and disease specific education with the results provided in Table 8.

Table 8. *Educational Comparison by Gender*

	No	Yes
Male	14	87
Female	10	82

This reveals that both male and female participants received the same level of educational support and further revealed a nearly equal distribution of those participants that were offered and received asthma education.

Further analysis of received education by race is provided in Table 9.

Table. 9. *Educational comparison by Race*

	No	Yes
African American/Black	12	78
White	4	59
Hispanic/Latino	2	8
Other/Unknown	6	24

As indicated in Table 9, the greatest number, specific to race, that did not participate in education is represented by twelve African American participants foregoing education and 78 African Americans agreeing to the educational process. This finding is consistent with the fact that African Americans are the largest represented group in the randomly produced data set.

Descriptive analytics were used to examine the following variables including, appointments that were KEPT and the number of NO SHOW appointments, this was represented as the total number of appointments for the individual. Data was also analyzed for individual appointments that were canceled and those appointments that were rescheduled to a later date before the original appointment date. This data was analyzed this way because these variables are ratio level (continuous) measured variables. One participant, Participant # 70 was excluded from this analysis due to being an influential outlier (with 38 missed appointments). The statistical analysis is provided in Table 10.

Table 10. Descriptive statistics for variables of continuous measurement

	Mean	Std. Deviation	Skewness	Kurtosis	Minimum	Maximum
Kept	12.81	11.128	1.233	1.06	1	51
No Show	3.89	3.847	1.435	2.008	0	18
Total	16.88	13.994	1.351	2.187	1	82
Cancelled	2.33	2.45	1.607	2.767	0	12
Rescheduled	4.89	4.824	1.52	2.648	0	27

As indicated in Table 10, all values of skewness and kurtosis are within the acceptable ranges of $[-2.0]$ and $[5.0]$, respectively (Field, 2009).

Research Question Specific Analysis

The next section will examine each research question specifically. This includes preliminary analysis as well as questions specific data analysis

Research Question #1

Research question #1 asks:

1. What impact does age and disease specific education have on no show rates for follow up pediatric asthma management? More specifically
 - a. What is the impact on appointment slot utilization: measurable by a decrease in individual no show rates for follow up asthma care.

In order to answer this question, an independent samples t test was conducted on the frequency of NO SHOWS by education group. The Levene's Test for Equality of Variance revealed that homogeneity of variance was not tenable, $F(1, 190) = 5.32, p = .022$. The lack of homogeneity of variance across the two groups is likely due to sample size differences across the groups. In order to confidently analyze this data, the degrees of freedom were adjusted downward prior to conducting the t analysis (Field, 2009). Results indicate that there are no significant differences across the two groups, regarding NO SHOWS, $t(44.78) = -1.78, p = .082$.

Research Question #2 asks:

1. If there is a measurable impact, are there specific moderators evident for the impact of education on NO SHOW?
 - a. If no effect is found, is there an association of education to KEPT appointments?

No effect was discovered based on the analysis conducted for research question #1. A Pearson’s Zero-Order Correlation was conducted in order to assess the relationship between the education variable and the Slot Utilization Variables. These results are presented in Table 11.

Table 11. *Pearson’s Zero – Order Correlation Between Slot Utilization Data*

	Education	Kept	No Show	Cancelled	Rescheduled
Education	-	.172*	0.089	0.134	0.118
Kept	-	-	.505**	.717**	.726**
No Show	-	-	-	.407**	.593**
Cancelled	-	-	-	-	.691**
Rescheduled	-	-	-	-	-

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

As indicated above, KEPT appointments was the only variable that was correlated to the education variable. Since Education and KEPT appointments is significantly correlated, it was determined that a Binary Logistic Regression would be used to assess whether the number of KEPT appointments was an indicator of the person receiving education about their condition and treatment (Field, 2009). Gender and race were added to the binary logistic regression in an effort to examine if they added the model.

Binary logistical regression determines the impact of multiple independent variables simultaneously to predict or indicate membership of one of two dependent variable levels (Cook, Dixon, Duckworth, Kaiser, Koehler, Meeker, & Stephenson, 2000; Dowell & Larwin, 2013). Specifically, this analysis was used to assess if a patient

received education could be estimated based on their KEPT appointments, gender, and race. The variables in the Equation Table (Table 12) have several important elements.

Table 12. Variables in the equation table

	B	S.E.	Wald	df	Sig.	Exp(B)
Constant	0.869	0.592	2.153	1	0.142	2.38
KEPT	0.074	0.031	5.824	1	0.016	1.077
Gender	-0.209	0.46	0.206	1	0.650	0.812
RACE			4.989	3	0.173	

As indicated in Table 13, KEPT appointments is the only significant indicator of the patient receiving education. Table 13. presents the Model Summary.

Table 13. *Model Summary*

2 Log likelihood	Nagelkerke R Square
132.056	.122

As seen in Table 13, the Model Summary indicates a Nagelkerke R Square $R^2 = .122$.

This indicates that a weak but significant relationship of 12.2% exists between the predictors and the dependent dichotomous variable, education.

The Hosmer and Lemeshow test (H-L) is a test of sampling adequacy (Field, 2009). The results of the H-L analysis are presented in Table 14

Table 14. *Hosmer and Lemeshow Test*

Hosmer and Lemeshow Test			
Model	Chi-Square	df	Sig
2	10.236	8	0.249

The H-L Statistic has a *p value* =.249, which is not statistically significant. Therefore, this indicates that the model has a good fit. As indicated above, this weak yet significant model is able to demonstrate the likelihood of a patient receiving education, by the frequency of their KEPT appointments, above what would be predicted by chance. Illustrated in table 14.

Research Question #3 asks:

3. Do demographic moderator variables such as age, gender, race, financial status/healthcare coverage or geographic zone have an association to no show rates? A Pearson’s Zero-order Correlation was conducted to asses if any association existed between NO SHOW rates and age, gender, ethnicity, and type of healthcare coverage (financial status).

The results are presented in Table 15.

Table 15. *Pearson’s Zero-Order Correlation Between No-Show and Potential Moderators*

	No Show	Age	Gender	Race	Financial Class
No Show	-	-0.013	0.114	-0.066	-0.103
Age	-	-	.151*	0.038	0.133
Gender	-	-	-	-0.073	-0.038
Race	-	-	-	-	-0.03
Financial Class	-	-	-	-	-

* Correlation is significant at the 0.05 level (2-tailed).

As indicated in Table 15., there is no correlation found between the NO SHOW rates and the potential moderators of age, gender, ethnicity, and type of health care coverage. An additional analysis was conducted to examine if residential location was an indicator of NO SHOW rates and KEPT appointments. This was conducted using a geographic information analysis. The mapping images are presented for the entire sample in Figure 16 and Figure 17. The results are for the entire samples KEPT appointments are presented in Figure 16.



Figure 16. Average KEPT Appointments Across Entire Sample

As seen in Figure 16, the size of the circle indicates the average KEPT appointments in that zip code area. The one participant who lives in the 43081 zip code KEPT $n = 18$ appointments.

Figure 17. presents the same map with the average NO SHOW rates.

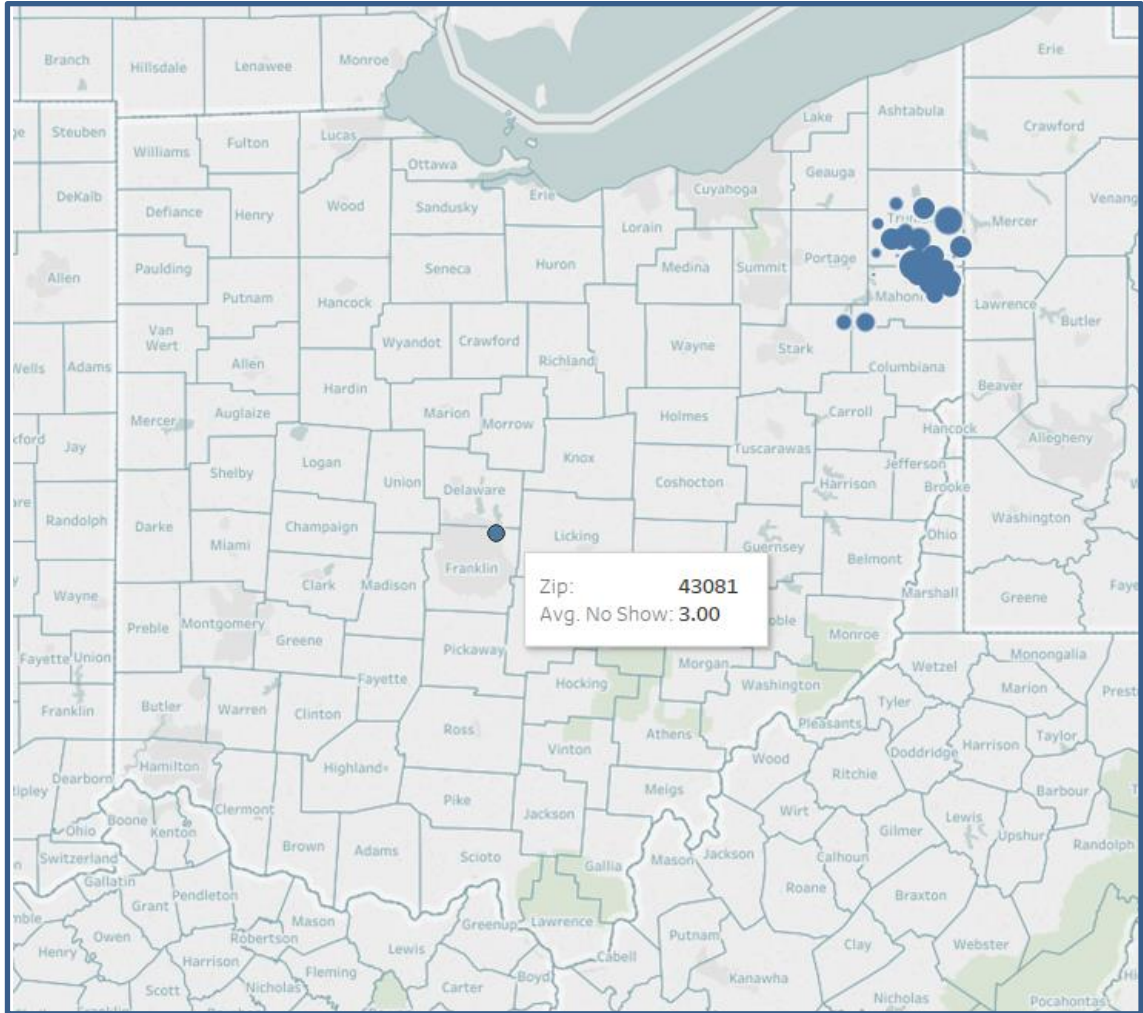


Figure 17. Average NO SHOW Across Entire Sample

Similar to Figure 16, one participant residing in 43081 was a NO SHOW for $n = 3$ appointments. The results are also presented for the sample, after eliminating the one participant in the 43081 zip code. This was conducted so that the data could be analyzed more specifically in the area where the most of the data was generated. The results for the average KEPT appointments are presented in Figure 18.

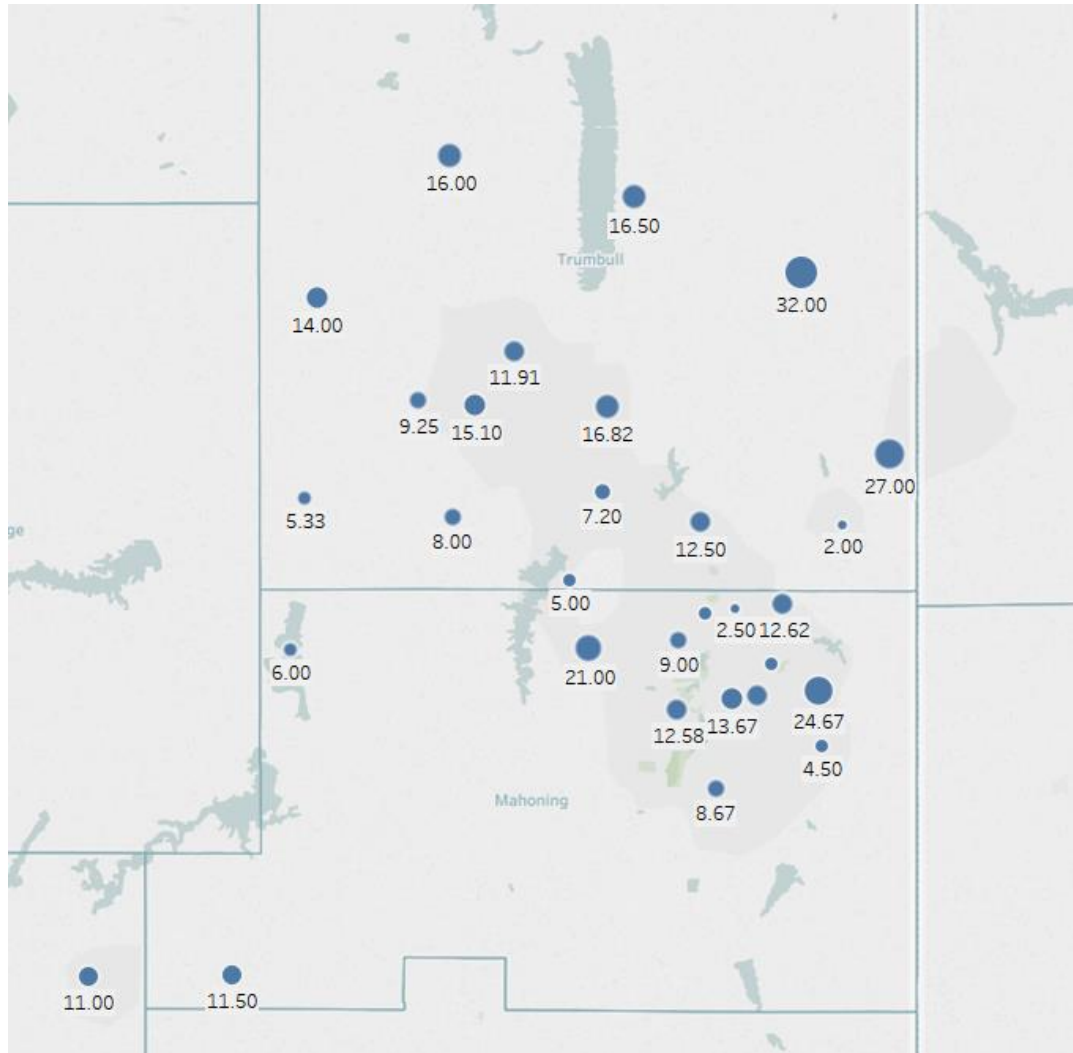


Figure 18. Average KEPT Appointments Minus 43081 Participant

As seen in Figure 18, the highest average KEPT appointments are found in the Trumbull county, with an average of $n = 32$. The greatest number of NO SHOW was found to be on the boarder of Mahoning and Trumbull County with $n = 11$ NO SHOW appointments (as seen in Figure 19).

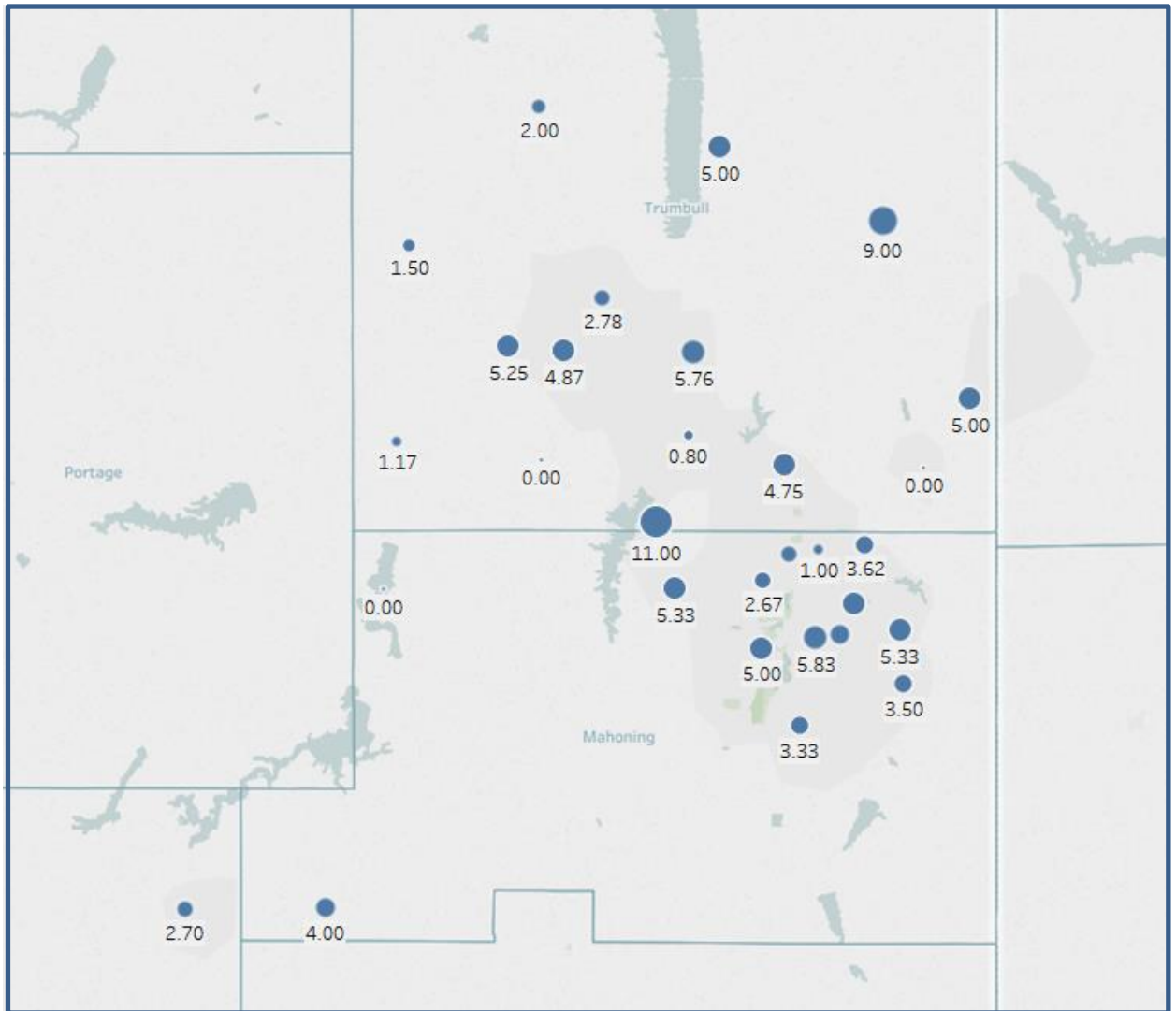


Figure 19. Average NO SHOW Minus 43081 Participant

Based on the information provided in the figure above, a zero-order correlation was conducted in order to assess if there was a pattern to the county of the participants, the education variable, and the NO SHOW as well as KEPT appointment rates. The results are presented in Table 20.

Table. 20 *County by Education, NO SHOW and KEPT Appointments*

	Education	County	Kept	# No Show
Education	-	.173*	.172*	0.089
County	-	-	0.082	0.037
Kept	-	-	-	.505**
No Show	-	-	-	-

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

+

As indicated in Table 20., County is significant correlated to the Education Variable. A Pearson’s Chi-Square indicates that there is a significant association between County and Education, $\chi^2_3 = 13.00, p = .005$. The breakdown of the frequency of those receiving (or not receiving) education by County is provided in Table 21.

Table. 21 *County by Education Received*

	Franklin	Stark	Mahoning	Trumbull
No	1	1	14	8
Yes	0	10	58	101

Summary

A retrospective chart review was completed to ascertain if age and disease specific education would have an effect at reducing the number of NO SHOW rates a for the pediatric asthma patient population. The study includes $n=192$ randomly selected participants with 52.3% being male and 47.7% female. Racial makeup of the participants included 46.6% African American, 32.6% white, 5.2% Hispanic/Latino and 15.5% listed as Other/unknown. The data was collected from a random sample of electronic medical record data base with a specific diagnosis code (ICD-9/10) of multiple types of asthma. The population was selected from adolescent subjects 8-18 years of age and from a time span of 1-1-2012 to 2-28-2017. The population was from Mahoning, Trumbull,

Stark and Franklin counties within the State of Ohio. Moderator demographic variables such as age, gender, race, level of insurance and geographic zone and receiving or not receiving age and disease specific education during the time of the physician encounter, were also collected and analyzed for correlation with NO SHOW rates. Data was collected for both, participants that had a problematic NO SHOW rate and for those participants that did not have a NO SHOW issue as well for comparison. Descriptive statistics for the following variables was analyzed as well for KEPT appointments, NO SHOW appointments, CANCELLED appointments and RESCHEDULED appointments. Results indicated that there was no effect of participating in education on NO SHOW rates. However, KEPT appointments was found to be associated with the education variable, and a significant indicator of receiving education. Moderator analysis also demonstrated that none of the potential moderators were associated with the NO SHOW rates. However, county of residence was found to be related to KEPT appointments. A discussion of these results is presented in Chapter 5.

Chapter 5

Discussion and Conclusion

The intent of this investigation was to ascertain if age and disease-specific education had an effect in decreasing the phenomena of the “empty chair” or “no-show” rates, and improving access to follow-up healthcare management in the adolescent, asthma patient populations. (Molfenter, 2013, p. 634). In reducing no-show rates and improving access to follow-up care, it is conceivable that an improvement in disease management will improve overall societal health, improve quality of life, decrease suffering and the societal healthcare costs of asthma management (DuMontier et al., 2013; Kheirkhah et al., 2015) Moreover, by decreasing no-show rates, appointment slot utilization will be improved for those waiting for diagnosis, treatment, and follow-up management as well. This research will support the need to improve the time to treat for those newly diagnosed individuals with chronic health conditions. (Goldman & Mayer, 2011; Molfenter, 2013).

As many issues, societal, social, and cultural, with perceived and real barriers may influence the problematic issue of no-show rates, this initial investigation is intended as a catalyst for further studies to be performed, and seeks to focus on the issue of health literacy and the improvement of, or compliance with, follow-up chronic disease management. An extensive review of the literature revealed that, although many studies have been performed to understand missed appointments, or the empty chair phenomena, for follow-up disease management, a dearth of research studies have specifically focused on the pediatric asthma patient populations. This is the first known study that employs

random sampling to investigate specifically the empty chair phenomena with pediatric asthma patients (Parikh et al., 2010; Dumontier et al., 2013; Phillip et al., 2010; Samuels et al., 2015; van Baar et al., 2006).

The purpose of this study is a first step into understanding if education, or any moderator variables that had a direct association to missed asthma follow-up appointments with pediatric patients, may have an influence in predicting no-show behavior. Secondly, if there is any measurable association within the financial status, or the type of insurance a family has, and if geographic zone plays a role in influencing no-show rates for follow-up adolescent asthma management (DeVoe, 2008; Glover et al., 2010).

The following three research questions were instrumental in guiding the analysis of the collected data:

1. What impact does age and disease-specific education have on no-show rates for follow-up pediatric asthma management? More specifically:

a. What is the impact on appointment slot utilization: measurable by a decrease in individual no-show rates for follow-up asthma care?

2. If there is a measurable impact, are there specific moderators evident for the impact of education on no-shows?

a. If no effect is found, is there an association with education on “kept” appointments?

3. Do demographic moderator variables such as age, gender, ethnicity, financial status, type of healthcare coverage, or geographic zone have an association to no-show rates?

Summary of the results

This investigation began with a retrospective chart review (RCR) investigation by means of an electronic medical record database (Vassar & Holzmann, 2013).

Data was collected for ICD-9 and ICD-10 specific asthma diagnosis codes, including all types of asthma conditions, along with codes for exercise induced and mild, moderate and severe classifications of asthma (CMS.gov). Asthma, within the United States, afflicts more than 25 million individuals including seven million children under the age of 18, making asthma the most common chronic healthcare disease in children for which there is no known cure. This makes follow-up disease management appointments with one's primary care physician paramount for control and survivability of this chronic healthcare condition (nhlbi.gov). Participants with a diagnosis of hyperactive airway disease were also included in this investigation, as this is an alternate diagnosis of asthma in some healthcare disciplines (Salame, Tyan, Salameh, & Waked, 2014). Male and female participants, between the ages of 8-18, were included in this study as 18 years of age is considered an emancipation from pediatric status to adulthood by The National Heart Lung and Blood Institute guidelines (nhlbi.gov). Eight years of age was chosen for an age start point for this investigation as this is considered a level of learning cognition, just above the age of six, that may be considered a cognitive level for understanding the asthma and medication inhaler educational process (Belanger, Atance, Varghese, Nguyen, & Vendetti, 2014).

Those participants with severe comorbidities due to a loss of cognitive function were excluded from participation as they may be unable to understand the educational encounter (cerebralpalsy.org). A random sample of participants' data revealing two or

more missed appointments in a rolling year, and a stratified random sample of those with no missed appointments were included (Field, 2009). This design provided the ability to make a comparison between pediatric patients with and without the problematic issue of no-show rates,

Potential demographic moderator variables of age, gender, ethnicity, financial status, or healthcare coverage type were included. Data for the slot utilization variables included (a) no-show appointments, (b) kept appointments, (c) cancelled, and (d) rescheduled appointments. All data analysis was conducted in SPSS.

Research Question 1.

What impact does age and disease-specific education have on no-show rates for follow-up pediatric asthma management? More specifically:

- a. What is the impact on appointment slot utilization: measurable by a decrease in individual no-show rates for asthma follow-up asthma care?

Although commonalities existed between those receiving age and disease-specific education and those that did not receive the educational encounter, the results of the analysis revealed that there were no significant differences across the two groups regarding no-show rates for follow-up asthma care and disease management. This is in direct contrast with the extant literature, as there are disparities within all aspects of asthma and chronic disease management between races of individuals, that include the incidence of disease, and the focus on patient education (Boise, 2014). African American populations and those living at the poverty level, most notably Hispanic /Latino populations, are two- times more likely than non-Whites to have asthma (nhlbi.gov). This may lead one to assume that as the incidence of asthma and chronic disease within a race

increases, the level of no-show rates would increase for that race as well; this does not seem to be the case for those individuals suffering from chronic asthma within this current investigation.

Research Question 2.

If there is a measurable impact, are there specific moderators evident for the impact of education on no-shows?

a. If no effect is found, is there an association with education on kept appointments?

The results for research question 1 revealed no effect of education on no-show rates for this random sample of participant data. These data were further analyzed using a Pearson's Zero-order correlation to assess the relationship between education and slot utilization variables such as kept, no-show, cancelled and rescheduled appointment types respectively. This analysis revealed that the kept appointment variable was the only slot utilization variable that correlated to the education variable. While this result was surprising, as the focus of the investigation is on no-show rates, it is intuitive that receiving age appropriate education should impact whether or not the patients follow their treatment plan and attend scheduled appointments. A Binary Logistical regression was conducted with the kept variable and revealed that the kept appointments variable is a significant indicator of the patient receiving education (Field, 2009).

This analysis shows promise, as seemingly, an improvement in health literacy may have helped improve self-awareness of the patient's (and the patient's family) chronic condition. This may be a result of the age and disease-specific educational process as discussed within the existing literature (Boise, 2014; Tieu et al., 2015).

Health literacy, or the level at which one can process and understand basic health information, is paramount in making sound medical or life and death decisions (Tieu et al.). As Tieu et al. posited, minorities may not have the technological wherewithal, or they may have technological disparities, such as access to a computer, the Internet or a level of technical education and financial wherewithal to afford the higher degree of technology, putting them at a disadvantage. The results seem to show, with a proper level of education, there is an improvement in kept appointments that may allow a level of improved care for those minorities that could be technologically disadvantaged (Grineski, 2008; Tieu et al.).

Research Question 3.

Do demographic moderator variables such as age, gender, ethnicity, financial status, type of healthcare coverage, or geographic zone have an association to no-show rates?

As previously discussed, this research investigation was an attempt to ascertain if age and disease-specific education had an effect on improving no-show rates, and if demographic variables such as age, gender, race, type of healthcare coverage, and geographic zone had a correlation to missed appointments. A Pearson's Zero-order correlation was conducted to assess the association of potential moderators and the slot utilization variables. This analysis revealed that no correlation existed between no-show rates and the previous demographic variables of age, gender, race, and financial status. The findings of this analysis of data are in stark contrast with extant literature.

According to DuMontier (2013), a cohort study revealed that individuals living within underserved and deprived areas were three-times more likely to be a no-show

individual for follow-up healthcare management than those that did not live in impoverished areas. Individuals who were receiving governmental assistance for healthcare such as straight Medicaid and Medicaid HMO were also found to be three-times more likely to be a no-show individual than those individuals that were not receiving government healthcare assistance (DuMontier, 2013).

For further investigation of the association between no-show rates and geographic zone, the use of Geographical Information Systems (GIS) analysis was utilized to further map the residential areas of the participant data by county. This mapping technique revealed that a significant correlation was found to exist between the variable of education and county of residence. The greatest number of no-show rates were found within the border between Trumbull and Mahoning Counties, Ohio.

These neighborhoods may need to be an area of investigation in further studies to ascertain reasons for the higher level of no-show rates in these two areas. It has been found that environmental concerns such as poor quality housing, asbestos, smog, and ambient air pollutions all play a role in a higher incidence, and lack of, asthma control, in urban neighborhoods. This is posited to occur from the inflammatory, contributing factors associated with air pollutants and poor air quality in the urban areas of many cities (Delfino et al., 2013). It is unclear if these areas are considered to be impoverished or low socio-economic communities, but these areas are considered to have adequate access to healthcare and are not underserved areas (M. Walton, personal communication, November 11, 2016).

Future investigation may allow an analysis of health literacy, or barriers, real and perceived, that may be causation for the higher no-show rates. By addressing the above-

mentioned areas of concern, it may reveal an overall improvement in healthcare delivery within these areas.

If physician ordered therapy is to be effective, an uninterrupted management of one's chronic condition must be maintained for an improvement in overall healthcare to be realized (Schatz et al., 2009; Schauman et al., 2013).

The current investigation between age and disease-specific education delivery and a comparison to no-show rates was developed as an initial study into one of the many myriads of social and economic factors, including those of perceived and real barriers, that have an effect on patient follow-up care. The analysis of data was an attempt to ascertain any causal influence for the problematic issue of missed healthcare follow-up appointments, with a random sample of pre-existing chart data. And, while the current investigation did not reveal a significant impact of education, the prevalence of no-show rates effectively creates health concerns for others, as not showing up for an appointment blocks an appointment slot for those waiting to be scheduled to be seen. This extended wait time prolongs pain and suffering, extends diagnosis and time to treatment, and invariably decreases the quality of life for those waiting to be seen (Kheirkhah et al., 2015).

The problematic no-shows also create an issue of poor slot utilization for healthcare providers by creating underutilization of appointment slots, lost revenue opportunities, and a waste of invaluable healthcare resources. (Goldman & Aronson, 2011; Molfenter, 2013). No-show rates can be best described as a societal healthcare issue that is creating burdens to the already unhealthy, unaffordable, unsustainable United

States healthcare system (cdc.gov; DeVoe, 2008; Glover et al., 2010; Social Security Advisory Board, 2009).

Limitations

Several limitations became evident at the conclusion of this research study. The limitations of the data will be discussed first, followed by the limitation of the study design

The population of the data was a small representation, $n=193$, of pediatric asthma patients in Mahoning, Trumbull, Stark, and Franklin Counties in the State of Ohio. Although significant results were found, further investigations are warranted to include a larger geographic patient population base to add power to any further investigations. However, while the sample size is limited, the sample was produced through random selection, which increases the external validity (i.e., the generalizability) of the results of the investigation's findings.

The second limitation was related to the racial makeup of the participant populations. African Americans represented 46.6% of the participants, while White participants represented 32.6% of the patient populations revealing a close distribution of participants within those two groups. Representation for males and females revealed an equal distribution within this investigation as well. However, the percentage of Hispanic/Latino pediatric asthma participants at 5.2% did not represent this race well within this study. This was problematic as incidence of asthma within this racial group has been shown to be higher than normal (U.S. Department of Health and Human Services, 2012).

Every attempt was exhausted to relegate bias within this study however; bias is difficult to prevent and some bias is inevitable. It is conceivable that the educational processes listed within the EMR may lead to educator bias as a result of patient interviews and the patient educational encounter process. Without an interview of the individuals completing the patient learning assessment and an observational study of the educational process, it is conceivable that individuals not specifically trained in the pathophysiology and specific needs of the pediatric asthma patient may have created interviewer and educator bias. Transcription errors in the documentation process may also lead to incorrect data entered within the participants EHR and being unnoticed within the RCR data collection process, further lending to bias within this investigation. However, the researcher was provided the data after all the data were recorded, therefore, minimizing any influence of researcher bias in the records.

Recommendations for Future Research

This study sought to ascertain if age and disease-specific education had an effect at decreasing no-show rates. After specific data analysis and results previously discussed within this investigation, it is recommended that further studies may need to be performed to ascertain causation for individual no-show rates for follow-up asthma management. And, based on the findings of the current investigation, it would be beneficial to examine all data related to slot-utilization, rather than just the no-show rates. The following are recommendations and suggestions to further investigate, develop and confirm the findings of this research and to the disseminated problematic issue of slot-utilization within the pediatric asthma patient populations.

1. This study sought the effect between age and disease-specific education to improve no-show rates in the pediatric patient populations. This study could be augmented by an improvement in the educational interview process to compare teaching methods and specific content delivered within the educational encounter for the patient.
2. An observational study of those individual healthcare professionals educating patients may conclude that educational material and delivery of education may vary between educators, or that individuals may not have an asthma background, helpful in the patient education process.
3. An investigation into cultural sensitivity and cultural competency, along with cultural sensitive learning materials, may facilitate a more patient-responsive educational encounter if the patient felt they could trust the healthcare educator, and felt the educator could relate to and respect their heritage.
4. An investigation into the delivery of evidence-based practices and clinical practice guidelines for the educational process may improve health literacy and appointment compliance by using practices already found to be effective for specific educational purposes.
5. An investigation into possible barriers to care, perceived and real, to follow-up asthma management may reveal barriers that an individual may need to overcome in planning and returning for care.
6. Face to face patient / caregiver interviews to ascertain why they were unable to maintain their appointment, or why a caregiver was unable to bring the patient for their appointment may be helpful in resolving perceived and real barriers as well.

This could be something as simple as transportation or more complex as an illness of the caregiver.

7. An evaluation of a facility's patient reminder system may reveal flaws within that system, and a longitudinal study of the participants may also be necessary in an attempt to track the performance of any implemented changes to the facilities reminder system

Implications of this study

It is feasible that if causation for no-show rates were to be founded, an improvement in patient slot utilization and an improvement in access to asthma management care could be realized. An improvement in patient satisfaction, outcomes, and quality of life, have roots in an improvement in timely follow-up asthma care as well. It is also conceivable, that due to longer wait times to see an asthma specialist, a patient's conditions may deteriorate or otherwise remain undiagnosed for longer periods of time, leading to an extended time to begin treatment and ultimately leading to an increase in pain and suffering, an increase in overall healthcare costs, and lowered patient satisfaction.

Healthcare facilities that treat pediatric asthma patients will also benefit from a decrease in no-show rates, as there is a financial deficit that increases with the progression of continued daily no-show rates. Facilities that schedule appointment slots rely on revenues generated by the patient provider encounter to expand services and provide care for a larger patient population. With a high no-show rate, a facility may have to limit services or available appointments, restricting care to those in need.

Conclusions

A surprising result revealed within this study was that there was no correlation found between the no-show rates and the moderator demographic variables of age, gender, race, and type of healthcare coverage, along with no difference between groups and that the kept appointment variable and county of residence were the only variables to correlate to education. The highest kept appointments were found in Trumbull County, with the greatest number of no-shows found on the border of Mahoning and Trumbull Counties, Ohio.

This study was developed to ascertain causation for no-show rates and, although no correlation was found between no-show rates and education, it was confirmed that kept appointments were directly related to receiving the educational encounter. While education and kept appointments were correlated, this is not a true inverse relationship to no show rates and education as well.

To fully understand causation for the problematic no-show issues for follow-up asthma management will indeed require further investigation, although within this investigation education was revealed to have an integral relationship with the slot utilization variable of kept appointments. Ultimately the goal of this research is to understand causation for problematic no-show rates, and decreasing their overall influence on healthcare delivery, thus, improving access to care for those waiting to be seen, diagnosed, and treated for their chronic asthma condition. Age and disease-specific education clearly invokes responsiveness to an improvement in health literacy through specific educational encounters that will foster an improvement in kept appointments, therefore, improving appointment slot utilization and protecting vulnerable needed

healthcare resources. This improvement in slot utilization will have far reaching implications as it will not only improve the quality and access of healthcare delivery in the pediatric asthma patient populations, show an improvement in patient outcomes, and protect the integrity of the healthcare delivery process, but will ultimately make a difference in the quality of the life of a child.

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Appendices

Appendix A. Body Mass Index

BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Height (inches)	Body Weight (pounds)																
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265

BMI 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35

Height

Body Weight (pounds)

(inches)

74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287

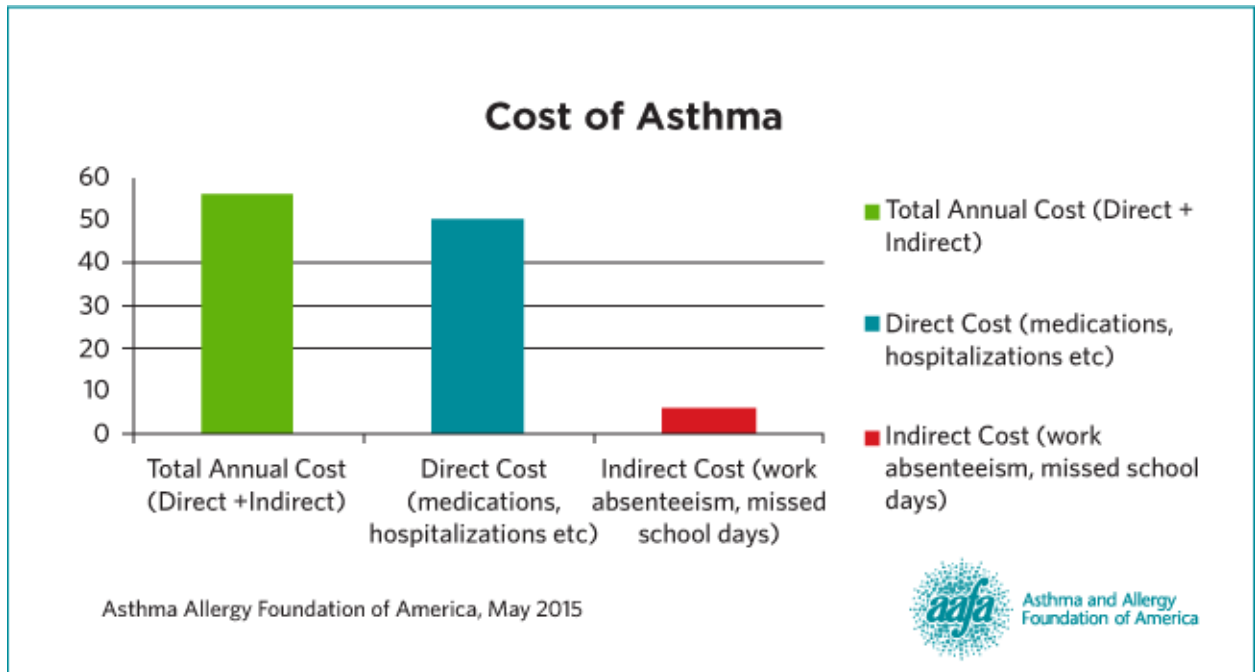
(nih.gov)

Appendices B. Body mass index ranges

	BMI
Underweight	Below 18.5
Normal	18.5–24.9
Overweight	25.0–29.9
Obesity	30.0 and Above

(nih.gov)

Appendix C. Cost of chronic asthma on society



(aafa.org)

Appendix D: Demographic Profile of No-shows Cohort Versus Clinic Population

Demographics	NS Cohort n=141	Wingra Patient Panel n=8,974	<i>P</i> Value
Gender			<.001
Female	114 (80.85%)	5,079 (56.60%)	
Male	27 (19.15%)	3,894 (43.39%)	
Ethnicity			<.001
African American/Black	98 (69.50%)	1,856 (20.68%)	
Caucasian/White	22 (15.60%)	4,275 (47.64%)	
Hispanic/Latino	17 (12.06%)	1,792 (19.97%)	
Other	4 (2.84%)	1,051 (11.71%)	
Age			.005
1–17	16 (11.35%)	1,948 (21.71%)	
18–25	27 (19.15%)	1,146 (12.77%)	
26–44	57 (40.43%)	3,006 (33.50%)	
45–64	34 (24.11%)	2,226 (24.80%)	
65+	5 (3.55%)	561 (6.25%)	
Payer			<.001
Medicaid	108 (76.60%)	2,132 (23.76%)	
Medicare	22 (15.60%)	803 (8.95%)	
Self-pay/none	3 (2.13%)	1,541 (17.17%)	
Private	6 (4.26%)	4,449 (49.58%)	
Other	2 (1.42%)	49 (5.45%)	

(Dumontier, et al., 2013)

Appendix E. Summary of chart review study designs

Summary of considerations for designing retrospective chart reviews studies

1. Create well-defined, clearly articulated research questions
2. Consider sampling questions *a priori*
3. Operationalize variables included in retrospective chart review
4. Train and monitor data abstractors
5. Develop and use standardized data abstraction forms
6. Create a data abstraction procedure manual
7. Develop explicit inclusion and exclusion criteria
8. Address inter-rater and intra-rater reliability
9. Conduct a pilot test
10. Address confidentiality and ethical considerations

(Vassar & Holtzmann, 2013) (ncbi.nlm.nih.gov)

Appendix F. Institutional Review Board