

THE EFFECT OF ATHLETIC TRAINING EDUCATION COMPETENCY-BASED
APPROACH ON ASTHMA SPECIFIC EDUCATION DOMAINS

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THE EFFECT OF ATHLETIC TRAINING EDUCATION COMPETENCY-BASED
APPROACH ON ASTHMA SPECIFIC EDUCATION DOMAINS

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DEDICATION

This thesis is dedicated to my parents, Steve and Trinkka Kuehner, who are the greatest advocates for athletes with asthma that I know. Without your determination I would not be who or where I am today. I hope that this thesis can serve as a small symbol of my love and appreciation.

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ABSTRACT

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It is imperative for Athletic Trainers to possess the knowledge and skills necessary to assure their patients the highest quality health care. Evidence suggests that asthma prevalence in the athletic population ranges between 15-20% of all athletes.²⁰ The objective of this investigation was to determine the knowledge of Athletic Trainers who recently graduated (within 1 year) from a Commission on Accreditation of Athletic Training Education (CAATE) accredited undergraduate athletic training education program (CAUATEP), as determined by the most recent educational standards, on asthma specific competencies. This study was qualitative in nature. Subjects of this study included 1,000 randomly selected Athletic Trainers within their first year of graduation from a CAUATEP. Subjects were selected randomly by the NATA research survey

services in accordance with the specific research inclusion and exclusion criteria. Data were collected through SurveyMonkey and analyzed using SPSS (version 16.0; SPSS Inc, Chicago, IL) and Microsoft Excel (Microsoft Inc. Redmond, WA). This study found that no participants passed the asthma competencies survey with a 70% or higher, the average score was a $34\% \pm 10.53$. A majority of Athletic Trainers surveyed (83%) believe that there is a need for more asthma specific education in CAUATEPs. It is the conclusion of this study that graduates of CAATE accredited undergraduate athletic training education programs do not possess the necessary education competency to adequately recognize and treat asthma related medical conditions.

Key Words

Commission on Accreditation of Athletic Training Education (CAATE), Exercise Induced Asthma (EIA), Sports Medicine, Pulmonary disease, General Medical Condition

CHAPTER I

INTRODUCTION TO THE STUDY

The American Academy of Allergy Asthma and Immunology (AAAAI) reports that approximately 8% of American adults and 10% of American children have asthma.¹ The prevalence of asthma is estimated to be higher in the athletic population than in the general population. An investigation was conducted to determine the prevalence of asthma in all varsity sports at a large division NCAA I college, it concluded that 17.0% of all varsity athletes reported to have medically diagnosed asthma.² An investigation of 699 American athletes who competed in the 1996 Olympic Games in Atlanta concluded that 16.7% of athletes reported either use of asthma medications and/or diagnosis of asthma.³ Between 1993 and 2000, 61 sports related deaths were found to be caused by asthma related pathologies.⁴

A study surveyed 304 Certified Athletic Trainers (ATC) investigating their experience and comfort in treating asthma conditions. The study found that of those surveyed; 25.3% reported being “very comfortable” managing asthma, 58% reported that they were unsatisfied with their asthma education, and 95% of survey respondents

believed that there was a need for more asthma education in athletic training education program curriculums.⁵

The Commission on Accreditation of Athletic Training Education (CAATE) is an organization tasked with accrediting athletic training education programs by assuring that each accredited program meets a strict set of standards. Successful completion of a CAATE accredited program is the standard used to assure a candidate's eligibility for the Board of Certification examination (BOC). Educational standards are mapped out for CAATE accredited athletic training education programs through the Athletic Training Education Competencies (Competencies) which consist of specific clinical abilities, knowledge, and skills, intended to provide entry level Athletic Trainers with the minimal requirements to provide athletic training services to their patients. The Professional Education Council (PEC) of the National Athletic Trainers Association (NATA) created the 5th edition of the Competencies.

Previously publicized research has failed to thoroughly address the knowledge of CAATE accredited undergraduate athletic training education program (CAUATEP) graduates based specifically on competencies related to asthma pathology and treatment.

Purpose of the Study

The purpose of this study was to determine the knowledge of Athletic Trainers who recently graduated (within 1 year) from a CAUATEP, as determined by the most recent educational standards, on asthma specific competencies.

Hypothesis

It was hypothesized that a majority of Athletic Trainers, who had graduated from a CAUATEP, within one year of the survey date, would not meet the BOC standard of a 70% passing grade when given a survey based specifically on the most recent asthma related competencies. A 70% or higher is considered by the BOC to be a proficient passing grade.

Data were collected in this investigation to determine if a majority of participants agree that more asthma education is needed in CAUATEPs. Data were collected to determine participant's level of satisfaction with their CAUATEP as it related specifically to asthma education.

Delimitations

When designing this investigation certain delimitations were accepted which could potentially camouflage the outcome.

1. This study was delimited to Athletic Trainers who had graduated from a CAATE accredited undergraduate athletic training education program within one year of the survey date, this was controlled in order to verify that knowledge tested was specific to undergraduate education and not professional experience.
2. This study was delimited to Athletic Trainers who are current members of the NATA; this limitation was placed on this study because the NATA's research survey services can only send survey information to current members.
3. This study is delimited by the Athletic Training Education Competencies (5th edition.) The Competencies are the most recent standard for CAATE accreditation

and were therefore used in this study to examine the most current standards of knowledge. The Competencies were written by PEC, published by the NATA, and are monitored by CAATE.

Limitations

The limitations of this investigation indicated the effect of the delimitations on the collection and interpretation of the data and on the ability to expand the scope of inference beyond the sample population. Generalizations from the investigations results may be confined by the following limitations. This study was limited to individuals who graduated from a CAUATEP within one year of the survey date; it should be acknowledged that the results of this study reflect knowledge that has been retained from an undergraduate education. This study was limited to competencies relating specifically to asthma knowledge; caution should be taken when generalizing the findings of this study to competencies related to other topics.

Assumptions

Basic assumptions were made during the process of this study. It was assumed that participants answered all survey questions honestly. It was assumed that participants followed all instructions and answered survey questions without the help of books, notes, or other outside sources. It was assumed that participants exhibited maximum effort while participating in this survey.

Significance of the Study

Current knowledge and medications relating to asthma have made it more possible now than at any other time in modern sports for asthmatics to participate and thrive in physical activity. It is imperative for Athletic Trainers to possess the knowledge and skills necessary to assure their patients the highest quality health care. Evidence suggests that asthma prevalence in the athletic population ranges between 15-20% of all athletes,²¹ it is evident that asthma affects a large number of the patients that would fall under the care of an Athletic Trainer. This study investigated the knowledge of the most recent asthma specific education competencies retained by Athletic Trainers who recently graduated (within one year) from a CAUATEP.

CHAPTER II

LITURATURE REVIEW

Purpose

The purpose of this study was to determine the knowledge of the most recent asthma specific educational competencies retained by Athletic Trainers who recently graduated (within 1 year) from a CAUATEP.

Introduction

Asthma is a chronic inflammatory disease of the lungs that has been recognized for over 2,000 years.⁶ It is currently estimated that 8% of all adults, 10% of all children, and 15-20% of all athletes have asthma.^{1,7} It is also reported that on average 4,200-5,000 people die from asthma every year in the United States.⁸ Athletic Trainers and other health care providers who work directly with athletes and active individuals

should be well versed in identifying asthma etiology, therapeutic interventions, prevention strategies, emergency care, and referral guidelines for athletes with asthma.

The Institution of Sports Medicine Children's Memorial Hospital in Chicago, Illinois conducted the study, "Athletic Trainers' Experience and Comfort with Evaluation and Management of Asthma: A Pilot Study."⁵ This study surveyed 304 ATCs and found that of those surveyed 25.3% reported being "very comfortable" managing asthma, 58% reported that they were unsatisfied with their asthma education, and 95% of survey respondents believed that there was a need for more asthma education within athletic training education curriculums.⁵

How Common is Asthma?

How Common is Asthma in the General Population?

The AAAAI estimates that roughly 300 million people worldwide suffer from asthma, and 250,000 people worldwide die from asthma every year. Of those 300 million it is estimated that 34.1 million Americans have been diagnosed with asthma by a medical care professional. In the last 25 years the prevalence of asthma worldwide has more than doubled, and it is estimated that the number of people with asthma will increase by 100 million by 2025. In addition asthma accounts for 217,000 emergency room visits, 10.5 million physician office visits, and 500,000 hospitalizations every year. Everyday roughly 11 Americans die from asthma that is more than 4,000 asthma related deaths per year.¹

How Common is Asthma in the Athletic Population?

Asthma is more common in the athletic population than it is in the general

population. Zoz et al.² concluded in an asthma study in one major NCAA division one university, 17% of the total athletic population suffered from diagnosed exercise-induced asthma (EIA), as compared to the AAAAI's estimation of 7% in the general population.¹

Bonini et al.⁹ found that of 98 Italian pre-Olympic athletes studied, asthma was diagnosed in 20.4% of test subjects. The researchers concluded that swimmers, cold weather athletes, and endurance athletes had the highest prevalence of asthma.

Passali et al.¹⁰ found 27.4% of 106 professional athletes tested suffered from EIA. The researchers also suggest that athletes need the earliest therapeutic aid to avoid a more serious clinical situation involving the inferior airways. Turcotte et al.¹¹ conducted a study of 698 athletes from the province of Quebec and found that 22.8% reported having EIA. However the investigators found a minority of asthmatic athletes reported an increase in respiratory symptoms with exercise compared to activities of daily living.

Weiler, Layton, and Hunt³ supported the findings of Bonini et al.⁹ by concluding that 16.7% of 699 American athletes, who competed in the 1996 Olympic Games in Atlanta, reported either use of asthma medications, and/or medical diagnosis of asthma. Only 10.4% of subjects reported using asthma medication on a permanent or semi-permanent basis, and were considered to have active asthma.³ While the diagnosis of asthma is more prevalent within an elite athletic population than the general population, the incidence of active asthma may only be slightly higher in elite athletes than within the general population. A portion of athletes studied may have been using asthma medication as an intended ergogenic aid. Additional research is needed in this field to clarify the statistical difference between athletes with active asthma and those with latent asthma

symptoms.

Prevention and Health Promotion

The Prevention and Health Promotion section of the Competencies states that Athletic Trainers should incorporate nutrition and physical activity in the maintenance of a healthy lifestyle and prevention of chronic disease for their athletes.¹² Asthma is a chronic inflammatory disease of the lungs, recurrent inflammation of the airway causes increased airway hyperresponsiveness, indicated by acute episodes of wheezing, coughing, and chest tightness. Most commonly asthma affects small bronchi measuring 2-5cm in diameter.¹³ Asthma causes bronchial smooth muscle contraction, the release of histamine and leukotrienes by mast cells, and goblet cells release thick, viscous mucus; this cascading effect causes a decrease in maximum expiratory flow rate (MEFR) and residual lung volumes increase as CO₂ rich air is trapped behind inflamed airways.¹⁴

A peak flow meter (PFM) measures lung variability, and can be used to follow the course of asthma, identify asthma triggers, and monitor medication changes. The National Asthma Education and Prevention Program (NAEPP) recommend the use of a PFM twice per day, in the morning and evening.¹⁵ The NATA recommends that two to three trials be conducted and at each specific time the highest value be recorded.¹² The NAEPP and NATA recommend that an athlete whose peak expiratory flow rate (PEFR) value falls below 50% of their personal best should seek immediate medical attention.^{12,15}

Clinical Examination

The Clinical Examination section of the Competencies dictates that an Athletic Trainer should possess strong clinical evaluation skills in order to effectively treat their patients. These skills require a thorough understanding of anatomy, physiology, biomechanics, and clinical reasoning skills.¹²

The NATA recommends that all athletes receive screening during pre-participation physical examinations that would be sufficient to identify the presence of asthma.⁷ In most cases, a thorough history is sufficient to determine indicators of asthma.¹⁶ The NATA recommends that Athletic Trainers be aware of the major signs and symptoms that suggest that an athlete may have asthma, should an athlete fit such criteria the athlete should be referred to a physician for a medical evaluation and to obtain a classification for their asthma severity.⁷

A normal medical history evaluation will not cover all signs and symptoms of asthma, additional screening tools maybe necessary to determine the risk factor of asthma in an athlete.^{17,18,19} Rupp, Guill, and Brudno¹⁸ conducted a study of 166 middle school and high school athletes to determine if a thorough medical history evaluation was sufficient to determine an individual's asthma risk factor. Participants first completed an interview and questionnaire to identify their risk factor for asthma, followed by administration of an exercise challenge test. It was concluded that 64% of students who were diagnosed with asthma as a result of the exercise challenge test were not identified as at risk individuals by the history evaluation.

Spirometry testing is a helpful tool in the diagnosis of asthma. From a common spirometry reading three measures of airway function can be determined, forced

expiratory volume (FEV_1), forced vital capacity (FVC), and PEF. The measurement of the total volume of air that can be forcefully exhaled in one second following inspiration is FEV_1 . The FVC measures the total volume of air that can be forcefully exhaled out of the airways. The PEF measures the maximum flow rate out of the lungs during the spirometry testing.²⁰ McCormack and Enright²¹ recommend the use of spirometry testing, bronchodilator response testing, and inhalation challenge testing, to confirm the diagnosis of asthma. McCormack and Enright²¹ recommend a reduced FEV_1 to FVC ratio in the diagnosis of asthma. An improvement of greater than 12% in baseline FEV_1 or FVC following the use of an albuterol inhaler indicates a positive bronchodilator response test.²¹

Metacholine challenge testing (MCT) can indicate airway hyperresponsiveness or hyperactivity and is a useful diagnostic tool for the testing of patients with a history of asthma-like symptoms, but normal spirometry readings.²² Metacholine chloride is a synthetic analog of acetylcholine that stimulates postganglionic parasympathetic receptors leading to smooth muscle contraction.²³ During MCT gradually increasing concentrations of methacholine is inhaled, spirometry testing is performed before and after every inhalation. A positive test result is defined as either a decrease in specific airway conductance of 35-45% of baseline or a decrease in FEV_1 of 20%.²³

Acute Care of Injuries and Illnesses

The Acute Care of injuries and illnesses section of the Competencies states that Athletic Trainers are often the first responders in the case of an injury or emergency situation, because of this it is important for Athletic Trainers to be knowledgeable about

evaluation and immediate management of acute injuries and illnesses.¹²

Meter dosed inhalers (MDI) are the most common type of inhaler devices, utilizing a pressurized canister to release a specific dose of aerosolized medication that can then be inhaled directly into the lungs. When using a MDI a patient should first exhale, the MDI should be placed at the patient's lips, patient should purse lips around mouth piece, patient should be instructed to slowly inhale at the same time that they activate the MDI. Patients should then then hold their breath for approximately 10 seconds before exhaling.⁷

Therapeutic Intervention

The Therapeutic Interventions section of the Competencies states that Athletic Trainers should be able to assess a patient's status using outcomes measures to assess the stage of healing and goals. These interventions are designed to identify, and prevent impairments and activity restrictions to maximize participation of the athlete, and may include the use of prescription and non-prescription medication.¹²

Environmental factors such as cold weather, allergens, air pollution, and indoor irritants such as chlorine can exacerbate the symptoms of asthma. Bougault et al.²⁴ conducted a study on the prevalence of airway hyperresponsiveness within an athletic population; the researchers found that 69% of swimmers, and 28% of cold air athletes had airway hyperresponsiveness. Leuppi, Kuhn, Comminot, and Reinhart²⁵ studied the difference in asthma prevalence between ice hockey and floor ball players in the Swiss population. The investigators found that asthma was diagnosed in 19.2% of ice hockey players as compared to 4.2% in floor ball players. The researchers concluded that

bronchial hyperresponsiveness was more common in ice hockey players than in floor ball players due to the difference in air temperature between the two sports.

Rapid acting β_2 agonists (RABA), also known as rescue medications, cause bronchodilation by inhibiting mast cell release, relaxing the smooth muscles of the airways, and decreasing vascular permeability.²⁶ Long acting β_2 agonists (LABA), also known as controller medications, have a similar physiological mechanism as RABA, but are taken orally in the morning, and, are not recommended for use as an emergency asthma relief medication.²⁶ Commonly LABAs have a duration of action of 12 hours and RABA have a faster onset of symptom relief, but a short duration of 4-6 hours.⁷ The use of systemic corticosteroids should be discussed with a patient's primary care physician if the patient's asthma remains poorly controlled with the use of inhaler therapy.

A physician should evaluate an athlete who has the need to use short acting β_2 agonist 3-4 times during physical activity before the athlete is permitted to return to participation.⁷ RABA and LABA are the most commonly prescribed forms of asthma medication.⁷ RABA and LABA are restricted by both the NCAA and Olympic committees; theories suggest that β_2 agonists may increase endurance performance when taken by athletes without asthma.⁷ Currently β_2 agonists are restricted to only medically prescribe inhaled corticosteroids. Carlsen et al.²⁷ conducted a study and found that β_2 agonists showed no enhanced endurance ergogenic parameters. Interestingly the research statistically showed an improvement in VO_2 max in the placebo group, as compared to the experimental group who received β_2 agonists.

Asthmatics have an increased risk of symptom onset with the use of non-steroidal anti-inflammatory drugs (NSAIDs) and aspirin,⁷ this puts athletes with asthma at a greater

risk as many athletes use NSAIDs or aspirin to treat both chronic and acute injuries. Athletic Trainers should be especially vigilant about the signs of triad syndrome in which athletes with nasal polyps, aspirin sensitivity, and asthma have a potential risk of a severe asthma attack with the use of NSAIDs.²⁸

Healthcare Administration

The Healthcare Administration portion of the Competencies states that Athletic Trainers must have a thorough understanding of risk management, healthcare delivery mechanisms, insurance, documentation, and facility management.¹² The NATA recommends that an asthma specific action plan be incorporated into existing emergency action plans. Asthma emergency action plans should include goals of the patient, contact numbers for all health care professionals, environmental triggers for individual athletes, instructions for proper use and frequency of PEFr monitoring, and guidelines for altering individuals medications based on PEFr readings and asthma symptoms. Additionally all athletes with asthma should have a rescue inhaler with them during all athletic activities, and, the Athletic Trainer should have an inhaler present for each individual athlete for emergency use.⁷

A study of 541 Athletic Trainers determined how EIA is managed by NCAA sports medicine programs; the researchers found that 21% of Athletic Trainers surveyed indicated that an asthma management protocol existed at their NCAA institution. Additionally the study found that 39% responded that SABA was not required to be available during practices, and 41% responded that SABA was not required to be available for games. From their findings, the researchers concluded that many NCAA

sports medicine programs do not manage athletes with EIA in accordance with current NATA guidelines.²⁹

Conclusion

Asthma is a medical condition characterized by an inflammatory hyper-response of the body to stimuli. Evidence has shown that asthma is more common in the athletic population as compared to the general population,^{2,3,9,10,11} with a high prevalence in swimmers and cold air athletes.²⁴ β_2 agonists, though regulated by both the NCAA and Olympic committees, show no long lasting extension of endurance parameters.²⁷

The evidence has shown that a majority of ATCs do not feel comfortable recognizing and treating asthma symptoms.⁵ Studies have shown that 95% of Athletic Trainers feel that there should be more asthma education placed into athletic training curriculums.⁵ Increased asthma medication guidelines should be enforced by the NATA and asthma education should become an increased concern for CAATE.

Further research is needed to determine if asthma is in fact more prevalent within the athletic population, or if asthma is more often identified in the athletic population due to better screening processes, and easier access to medical professionals. In addition future research should concentrate on the period of the athlete's life which the initial onset of asthma occurred. Further investigation should examine if the prevalence of asthma is caused by physiological damage to the respiratory system that is sports related and a possible plan for prevention.

CHAPTER III

METHODS

The purpose of this study was to determine the knowledge of first year CAUATEP's graduates, as it pertains to asthma specific competencies. This was accomplished through an online survey created from the Competencies. In addition, this investigation surveyed the graduate's level of satisfaction with their CAUATEP's asthma education, and investigated participants' opinion on the necessity for an increase in asthma specific education in CAATE accredited athletic training education programs.

This chapter discusses the methods used for collecting and analyzing survey data on the knowledge of Athletic Trainers within their first year of graduation from a CAUATEP, as related to asthma specific competencies.

Participants

Subjects included Athletic Trainers who had graduated from a CAUATEP within one year of the study. Subjects were randomly selected through the NATA database.

Inclusion and exclusion criteria was sent to the NATA's research survey service, the NATA distributed the study instructions, and, a survey link on behalf of the investigator to 1,000 NATA members who fit the study criteria. Subject qualifying criteria included graduation from a CAUATEP during one of the following semesters; Fall 2010, Spring 2011, or Summer 2011. Subject exclusion criteria included graduation from an entry level master's degree program.

Tests and Instruments

Foundation Survey

This study was a descriptive design and followed standard protocol. A 10 question survey was developed for this investigation to obtain specific information about each subject. Foundation information including the term of the individual's undergraduate graduation was obtained to confirm that the subject had graduated within one year of the survey date. Survey participants were asked to indicate if they held a current national BOC certification (ATC), a current state license (LAT), or if they held neither. The individual's certification and licenser status was obtained to analyze if a higher level of knowledge of the asthma competencies was reflected by those who had passed the BOC exam. Diagnosis of self or a close friend and/or family member with asthma was obtained to determine if individuals with personal asthma experience have a greater knowledge of asthma specific competencies. Each subject was asked to rate their level of satisfaction with their CAUATEP as it pertained specifically to asthma education. The survey respondents were asked if they believe that more asthma education is necessary in CAUATEPs. Survey respondents were asked if they had read the NATA's position

statement regarding the management of asthma in athletes. All survey questions were validated through an expert panel consisting of nine athletic training education faculties with five years or more of experience with athletic training education, average 16 years ± 8.63 , and one physician specializing in respiratory care. Panel members were given three options for each question not valid, somewhat valid, and valid. Panel ratings and suggestions were considered and questions were developed into the pilot study.

Foundation questions can be seen in Attachment A.

Asthma Competencies Survey

The 15 item survey was developed to assess the subject's knowledge of information related to asthma specific Competencies. Questions were created to reflect knowledge listed in the Competencies all questions were based on procedures from the "National Athletic Trainers' Association Position Statement: Management of Asthma in Athletes."⁷ Questions were validated through an expert panel consisting of nine athletic training education faculties with five years or more of experience with athletic training education, and one physician specializing in respiratory care. Panel members were given three options for responses for each question not valid, somewhat valid, and valid. Each question was then rated based on the assessment of the total expert panel and the top 15 questions were developed into the pilot study. The pilot survey was tested on 38 senior level athletic training students in CAUATEPs to determine quality of the design and flow of study administration; however two subjects failed to complete the survey, therefore their answers were dismissed. The survey was administered through the online survey application survey monkey (<http://www.surveymonkey.com/>, Palo Alto, CA). Asthma

specific competency questions can be seen in Attachment A.

Procedures

Subjects were randomly selected by the NATA's research survey service based on specific study inclusion and exclusion criteria. The NATA broadcasted the survey link and email invitation to 1,000 subjects. Respondents were encouraged to respond within the first two weeks after the survey email was sent. A reminder email was transmitted by the NATA to those who had not responded to the survey following the first two weeks.

Design and Analysis

The dependent variable in this investigation was the survey respondents pass or fail rate of the survey, a pass was defined as a percentage score of 70% or above, a fail was defined as a score below 70%. The independent variables included athletic training certifications and licensers currently held, and a personal diagnosis of asthma, or diagnosis of a close friend or family member with asthma.

Component analysis was used to produce component matrixes based on Competencies sections, to distinguish factorial associations among survey questions. All questions in both the validation survey and data collection survey had a strong correlation to one or more of the established factors. The dependent variable was the pass or fail grade on the asthma competencies assessment. Continuous independent variables included indication of asthma diagnosis for self, indication of asthma diagnosis for a close friend or family member, and certification category; these categorical independent

variables were tested using a 3x5 one way ANOVA to determine significant differences between groups. Level of significance was defined as $p < 0.05$.

CHAPTER IV

MANUSCRIPT

Asthma is a chronic inflammatory disease of the lungs that has been recognized for over 2,000 years.⁶ It is currently estimated that 8% of all adults, 10% of all children, and 15-20% of all athletes have asthma.^{1,7} It is reported that on average 4,200-5,000 people die from asthma every year in the United States.⁸ Between 1993 and 2000, 61 sports related deaths were found to be caused by asthma related pathologies.⁴ Athletic Trainers and other health care providers who work directly with athletes and active individuals should be well versed in identifying asthma etiology, therapeutic interventions, prevention strategies, emergency care, and referral guidelines for athletes with asthma.

In September of 2005, the National Athletic Trainers Association (NATA) released the “National Athletic Trainers’ Association Position Statement: Management of Asthma in Athletics.”⁷ The purpose of the asthma position statement was to provide Athletic Trainers and other allied health care professionals with information to:

1. Identify characteristics and diagnosis criteria for asthma, including exercise induced asthma (EIA) and exercise induced bronchospasm (EIB).

2. Provide guidelines for referral of patients with asthma, and those suspected of having asthma.
3. Provide guidelines for asthma managements plans to prevent asthma attacks and to control asthma exacerbation.
4. Educate Athletic Trainers, and athletes about pharmacological therapies and non-pharmacological techniques to control asthma.

In 2011, the NATA released the 5th edition of the Athletic Training Education Competencies (Competencies).¹² The Competencies were created to serve as a guideline of the knowledge, skills, and clinical abilities to be mastered by students enrolled in CAATE accredited athletic training education programs. CAATE requires that the Competencies be instructed and evaluated in all CAATE accredited athletic training education programs. The Competencies represent the standard for the minimum requirements for an athletic training education, and a candidate's acceptance to sit for the Board of Certification exam (BOC). The Competencies were created by the Professional Education Council (PEC) of the NATA.

LaBelle, Sanders, and Sullivan⁵ surveyed 304 Certified Athletic Trainers (ATC) investigating their experience and comfort in treating asthma conditions. The study found that 25.3% reported being "very comfortable" managing asthma, 58% reported that they were unsatisfied with their asthma education, and 95% of survey respondents believed that more asthma education was necessary in athletic training education program curriculums. Previously publicized research has failed to thoroughly address the knowledge of CAATE accredited undergraduate athletic training education program

(CAUATEP) graduates based specifically on competencies related to asthma pathology and treatment.

Methods

Research Design and Participants

Subjects included randomly selected Athletic Trainers who had graduated from a CAUATEP within one year of the study. Subjects were randomly selected by the NATA research survey services through the NATA database. Inclusion and exclusion criteria were sent to the NATA's research survey service, the NATA distributed the study instructions, and, a survey link on behalf of the researcher to 1,000 NATA members who fit the research criteria. Subject qualifying criteria included graduation from a CAUATEP during one of the following semesters; Fall 2010, Spring 2011, or Summer 2011. Subject exclusion criteria included graduation from an entry level master's degree program.

Survey Instrumentation

Question Formation

Questions designed to examine knowledge regarding asthma specific competencies were created using information exclusively from the "National Athletic Trainers' Association Position Statement: Management of Asthma in Athletics."⁷ Questions were created to correspond to specific 5th edition Competencies.¹² The Competencies are the most recent standard for CAATE accreditation and were therefore used in this study to examine the most current standards of knowledge. It is acknowledged that the 5th editions of the Competencies were published in 2011 and that

the subjects of the study were therefore educated under the 4th edition of the Competencies. Attachment B provides a guideline for the association between the “National Athletic Trainers’ Association Position Statement: Management of Asthma in Athletics,”⁷ the 5th edition Competencies,¹² and, the 4th edition Competencies.³⁰

Expert Panel

The expert panel consisted of nine Athletic Trainers with five or more years of experience as educators, average 16 ± 8.63 years and one physician specializing in respiratory care were sent a validation survey consisting of 30 questions (Attachment A). The first 10 questions of the survey were designed to collect specific foundation information, and 20 questions were designed to collect data regarding knowledge of asthma specific competencies. Each panel member was asked to choose one of three options for each of the 30 questions on the survey, “not valid,” “somewhat valid,” or “valid.” Each answer chosen had a coinciding points value “not valid” indicated a points value of 0, “somewhat valid” indicated a points value of 1, and “valid” indicated a points value of 2.

Foundation questions were excused if a majority of the panel members indicated that they believed that the questions was “not valid,” however no questions met the criteria to be removed from the survey. Asthma specific competency questions were scored, and the 15 questions with the highest point’s value were developed into the validation survey. A final score of ≥ 15 was necessary for inclusion into the survey. The average score was 16 ± 0.96 .

Based on the scores from the expert panel six questions from the Clinical Examination (CE) section of the Competencies, four questions from the Prevention and

Health Promotion section of the Competencies, two questions from the Acute Care (AC) section of the Competencies, two questions from the Therapeutic Intervention (TI) section of the Competencies, and one question from the Health Administration (HA) section of the Competencies were included in the validation survey.

Validation Study

The 10 foundation questions and the top 15 scoring asthma specific competency questions were developed into an online validation survey using SurveyMonkey (<http://www.surveymonkey.com/>, Palo Alto, CA). The validation survey was distributed to educators at CAUATEPs who were asked to distribute the survey link and instructions to their senior level athletic training students. A total of 38 senior level athletic training students began the validation survey, 36 students completed the survey. The data collected from those who did not complete the survey was disregarded. Component matrixes were calculated through SPSS (version 16.0; SPSS Inc., Chicago, IL). Data were compiled and analyzed by forming component matrixes for each individual section of the Competencies assessed by the survey.

The CE section of the Competencies made up six questions on the survey, questions 11, 12, 13, 22, 23, and, 24. When calculated into a component matrix 3 factors were established. All questions had a strong correlation to one or more of the established factors. The PHP section of the Competencies made up four questions on the survey, questions 14, 15, 16, and, 17. When calculated into a component matrix two factors were established. All questions had a strong correlation to one or more of the established factors. The AC section of the Competencies made up two questions on the survey, questions 18 and 21. When calculated into a component matrix one factor was established

with high correlation of both questions. The TI section of the competencies made up two questions on the survey, questions 19 and 25. When calculated into a component matrix one factor was established. This factor had a high correlation with one question and a negative correlation with the other question. This factor indicated knowledge of when to use pharmacological and non pharmacological strategies as one question measured knowledge of pharmacological drug usage and the other question measured knowledge of non-pharmacological interventions. The Health Administration (HA) portion of the competencies made up one question on the survey, question 20, therefore formulation of a component matrix was not possible.

Data Collection

The NATA research survey services randomly selected 1,000 Athletic Trainers within their first year of graduation from a CAUATEP. Survey instructions and link were sent on behalf of the researcher to survey participants (Attachment A). Foundation and background information were collected in the first 10 questions of the survey, and information regarding survey participants' knowledge of asthma specific competencies was measured by questions 11-25. Questions were created to reflect knowledge listed in the 5th edition Competencies, all questions were based on procedures from the "National Athletic Trainers' Association Position Statement: Management of Asthma in Athletes."⁷

Questions were validated through an expert panel consisting of nine athletic training education faculties with five years or more of experience with athletic training education, and one physician specializing in respiratory care. Questions were validated through 36 senior level athletic training students currently enrolled in CAUATEPs.

The study was completed by 185 participants who met the specific inclusion criteria of this study. The data collected by those who did not complete the survey or who did not meet the specific inclusion criteria was disregarded. Competency section averages, category averages, and overall score averages were calculated using Microsoft Excel 2007 (Microsoft Inc. Redmond, WA). Component matrixes were calculated through SPSS. Data were compiled and analyzed by forming component matrixes for each individual section of the Competencies assessed by the survey. When calculated into a component matrix questions from the CE section of the Competencies formed seven factors, all questions had a strong correlation to one or more of the established factors. When calculated into a component matrix questions from the PHP section of the Competencies formed two factors, all questions had a strong correlation to one or more of the established factors. When calculated into a component matrix questions from the AC section of the Competencies formed three factors, all questions had a strong correlation to one or more of the established factors. When calculated into a component matrix questions from the TI formed two factors, all questions had a strong correlation to one or more of the established factors.

Statistical Analysis

Survey data were collected through SurveyMonkey, an online survey questionnaire. Numerical data were downloaded from SurveyMonkey via Microsoft Excel 2007. Competency section averages, categorical averages, and overall score averages were calculated using Microsoft Excel. Component matrixes were calculated using SPSS by grouping questions from common competencies for both the validation

survey, and the data collection. A 3x5 one way ANOVA was calculated to determine significant differences between groups. Level of significance was defined as $p < 0.05$.

Results

A total of 248 participants began the survey. The survey was not completed by 51 participants, and their data were disregarded. Not all participants who completed the survey were included, 12 participants indicated that they either had not graduated from a CAUATEP or had graduated outside of the one year inclusion criteria, their data were therefore disregarded. The survey was completed by 185 participants who also met the specific inclusion and exclusion criteria to be included in the study. No participants passed the survey with a 70% or higher. Table 1 give the average percentages for the subjects based on category, there were no significant differences found between overall percentages between groups. Figure 1 graphically demonstrates the average overall percentages based on category.

Table 1- Categorical Outcomes

Category	n	Percentage
Certified Athletic Trainer	48	34%
Certified and Licensed Athletic Trainer	132	35%
Neither Certified nor Licensed Athletic Trainer	5	32%
Self asthma diagnosis	58	35%
No Self asthma diagnosis	127	34%
Close Family member with asthma	50	37%
Close Friend with asthma	22	34%
Both Close friend and family member with asthma diagnosis	26	33%
Neither Close friend nor close family member with asthma diagnosis	90	33%
Had read NATA position statement on asthma in athletics	111	34%
Had not read the NATA position statement on asthma in athletics	74	35%

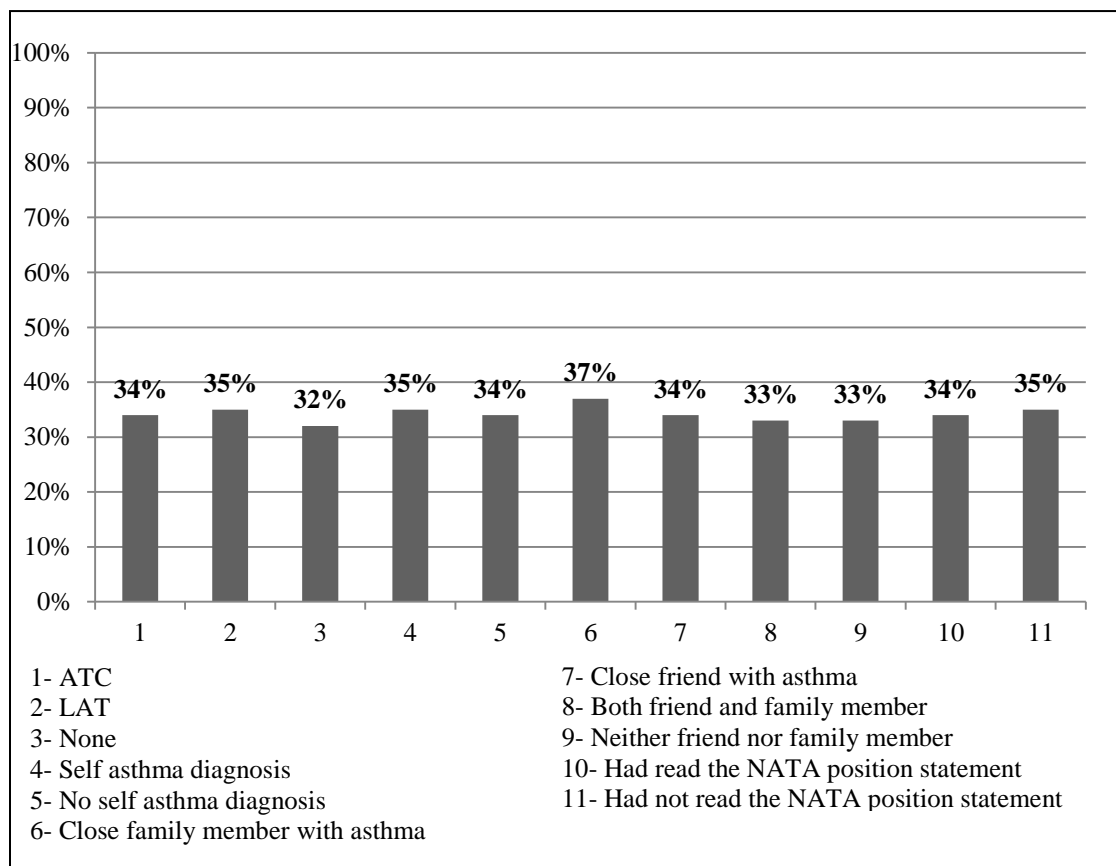


Figure 1- Categorical Outcomes

Survey participants were asked to rate their level of satisfaction with their CAUATEP specifically related to asthma education (Figure 2, Satisfaction) using a Likert scale ranging from 1-4; one indicated the respondent was, “very unsatisfied,” and four indicating the respondent was, “very satisfied.” A majority of Athletic Trainers surveyed responded that they were satisfied with their CAUATEP; results may be seen in Figure 2. Survey participants were asked to rate their level of agreement with the following statement: “I received asthma specific education in my CAATE accredited undergraduate athletic training education program” (Figure 2, Received Ed) using a Likert scale ranging from 1-4; one indicated, “strongly disagree,” and four indicating, “strongly agree.” A majority of Athletic Trainers surveyed agreed that they believed that they had received

asthma specific education in their CAUATEP; results may be seen in Figure 2. Survey participants were asked to rate their level of agreement with the following statement: “There should be more asthma specific education in CAATE accredited undergraduate athletic training education programs” (Figure 2, Education) using a Likert scale ranging from 1-4; one indicated, “strongly disagree,” and four indicating, “strongly agree.” A majority of Athletic Trainers believed that there should be more asthma specific education in CAUATEPs results may be seen in Figure 2.

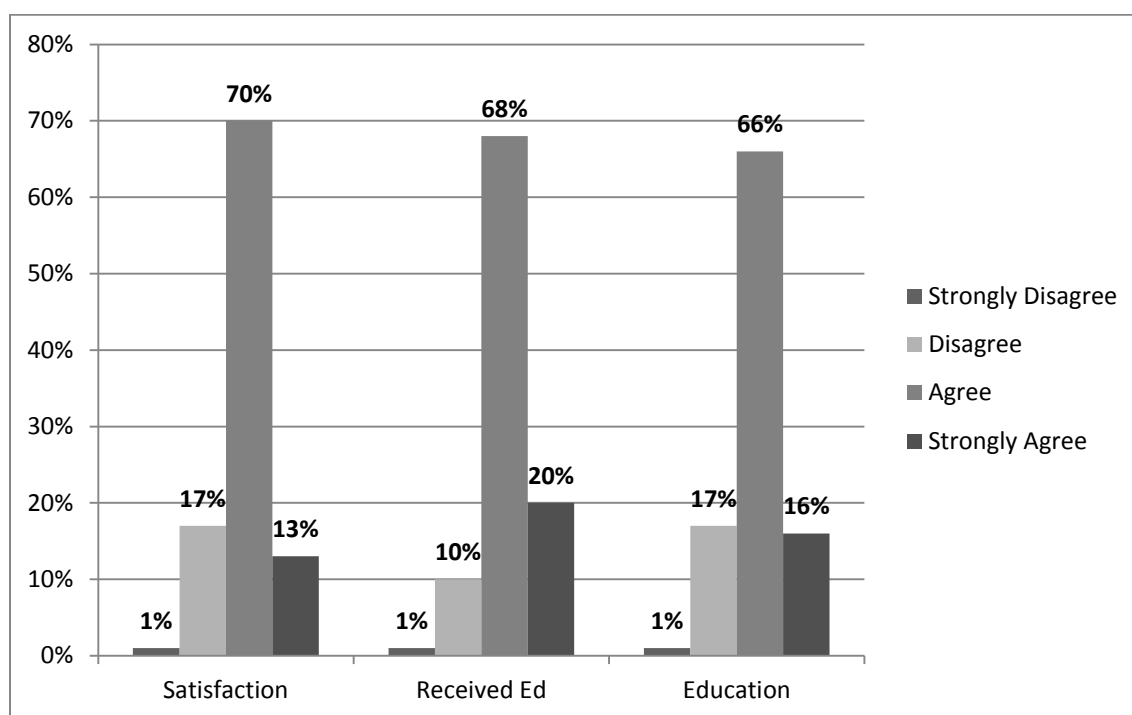


Figure 2- Opinion Outcomes

Discussion

This study was the first study to measure asthma specific Competency knowledge in the athletic training profession. The purpose of this study was to determine the knowledge of CAUATEPs graduates, as it pertains to asthma specific competencies. This

was accomplished through an online survey created from the Competencies.¹² In addition, this investigation surveyed the graduate's level of satisfaction with their CAUATEP's asthma education, and investigated participants' opinion on the necessity for an increase in asthma specific education in CAATE accredited athletic training education programs.

It was hypothesized that a majority of Athletic Trainers, who had graduated from a CAUATEP, within one year of the survey date, would not meet the BOC standard of a 70% passing grade when given a survey based specifically on the most recent asthma related competencies. A 70% or higher is considered by the BOC to be a proficient passing grade. This study found that zero out of 185 surveyed Athletic Trainers passed the survey based on asthma specific competencies with a 70% or higher, the average score was $34\% \pm 10.53$. This study also found that 82% of survey participants believed that there was a need for more asthma education in CAUATEPs.

The findings of this study support the finding of LaBella, Sanders, and Sullivan¹⁵ who found that 95% of survey respondents believed that there was a need for more asthma education in athletic training curriculums. No additional studies could be found by the researcher that measured the level of knowledge of athletic trainers on asthma specific competencies.

Current knowledge and medications relating to asthma have made it more possible now than at any other time in modern sports for asthmatics to participate and thrive in physical activity. It is imperative for Athletic Trainers to possess the knowledge and skills necessary to assure their patients the highest quality health care. Evidence suggests that asthma prevalence in the athletic population ranges between 15-20% of all athletes,⁷ it is evident that asthma affects a large number of the patients that would fall

under the care of an Athletic Trainer. This study investigated the knowledge of the most recent asthma specific education competencies retained by Athletic Trainers who recently graduated (within one year) from a CAUATEP. This study found that Athletic Trainer's knowledge of asthma specific competencies is inferior to that which would be considered proficient based on BOC standard.

Conclusion

Based on the results of this investigation graduates of CAATE accredited undergraduate athletic training education programs do not possess the necessary education competency to adequately recognize and treat asthma related medical conditions. The results of this investigation found that no participating Athletic Trainers passed the investigative survey, with a 70% or higher, based on asthma specific CAATE competencies; the average score was a 34% \pm 10.53, supporting the hypothesis of this study. There was no significant difference in overall score found between different groups of professional credentials. No significant difference was found in overall score between participants that indicated that they had asthma, and participants who indicated that they did not have asthma. There was not a significant difference in overall score found between groups indicating that they had close friends and/or family members who had been diagnosed with asthma. No significant difference was found in overall scores between groups who indicated that they had or had not read the NATA's position statement regarding the management of asthma in athlete. (Table 1).

Future research should study the most effective way to educate Athletic Trainers about asthma. Research should investigate whether asthma specific competencies are

failing to be taught in CAUATEPs, or if asthma knowledge fails to be retained by CAUATEP graduates. Future studies should use different questions based on the CAATE Competencies and the, “National Athletic Trainers’ Association Position Statement: Management of Asthma in Athletics”⁷ to support the findings of this study. Research should be conducted regarding asthma education in entry level masters degree in athletic training education programs.

The findings of this study indicate that currently a majority of practicing Athletic Trainers do not possess the minimum standard of knowledge, specified by CAATE, to recognize and treat asthma related pathologies. Currently Athletic Trainers are not prepared to treat a chronic medical condition found in 15-20% of athletes.

CHAPTER V

CONCLUSIONS, APPLICATIONS, AND, RECOMMENDATIONS

Conclusions and Applications

The purpose of this study was to determine the knowledge of CAUATEPs graduates, as it pertains to asthma specific competencies. It was hypothesized that a majority of Athletic Trainers, who had graduated from a CAUATEP, within one year of the survey date, would not meet the BOC standard of a 70% passing grade when given a survey based specifically on the most recent asthma related competencies. This investigation found that no Athletic Trainers passed a survey measuring knowledge of asthma specific competencies. It is the conclusion of this study that graduates of CAATE accredited undergraduate athletic training education programs do not possess the necessary education competency to adequately recognize and treat asthma related medical conditions.

Recommendations

Future research should study the most effective way to educate Athletic Trainers about asthma. Future research should investigate whether asthma specific competencies are failing to be taught in CAUATEPs, or if asthma knowledge fails to be retained by

CAUATEP graduates. Future research using different questions based on the Competencies and the, “National Athletic Trainers’ Association Position Statement: Management of Asthma in Athletics”⁷ should be conducted to support the findings of this study. Future research should be conducted regarding asthma education in entry level masters degree in athletic training programs. This survey used questions to measure Competencies based specifically on scores indicating that validity of a question given by members of an expert panel. A more extensive survey that measures all competencies of athletic training education equally maybe beneficial to ensure that knowledge level of all competencies is studied.

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ATTACHMENT A- Asthma Competencies Survey and Instructions

Dear fellow Athletic Trainer,

I am a master's degree candidate at Texas State University, requesting your help to complete my thesis, entitled **The Effect of Athletic Training Education Competency-Based Approach on Asthma Specific Education Domains**.

The questionnaire consists of 10 demographic questions, and 15 questions designed to test your knowledge of asthma. I ask that you answer the questions honestly and please refrain from using any outside sources (text books, notes, internet, or other people) to assist you to answer these questions as this study is designed to collect data based on your knowledge of asthma specific competencies. This questionnaire should take you 10-15 minutes to complete.

This study will benefit you and the athletic training profession as a whole. It is estimated that 15-20% of athletes, and 8-10% of the American population has been diagnosed with asthma. Understanding the knowledge of athletic trainers about asthma, and determining athletic trainer's level of satisfaction with their asthma education, will help our profession to better educate athletic trainers, and better prepare athletic trainers to provide the best possible care for their patients.

One thousand randomly selected NATA members with a listed email address are being asked to submit this questionnaire, but you have the right to choose not to participate. The Texas State University Institutional Review Board has approved this study for the Protection of Human Subjects.

This is a completely anonymous questionnaire and upon submission, neither your name nor your email address will be attached to your answers. Your information will be kept strictly confidential.

As a fellow athletic trainer, your knowledge and opinions regarding this topic makes your input invaluable. Please take a few minutes to fill out the anonymous questionnaire you will find by clicking on this link below and submit it by 03/09/12.

<http://www.surveymonkey.com/s/3MGNRJN>

Upon completion of the study a summary of data will be available to you upon request. To request a study summary please contact Chelsea Kuehner at ck1284@txstate.edu. For any pertinent questions regarding research participants rights, and/or research related injury please feel free to contact Texas State University IRB chair, Dr. Jon Lasser at lasser@txstate.edu, or Ms. Becky Northcut, Compliance Specialist at (512)-245-2102.

I sincerely thank you for your time and consideration,

Chelsea Kuehner ATC, LAT, CES
Texas State University

Participants for this survey were selected at random from the NATA membership database according to the selection criteria provided by the student doing the survey. This student survey is not approved or endorsed by the NATA. It is being sent to you because of the NATA's commitment to athletic training education and research.

1. Did you graduate from a CAATE accredited undergraduate (Bachelor's) athletic training education program?
 - Yes
 - No
2. Which semester did you graduate from your CAATE accredited undergraduate (Bachelor's) athletic training education program?
 - Fall of 2010
 - Spring of 2011
 - Summer of 2011
 - None of the above
3. I hold the following credentials, please choose all that apply
 - ATC
 - LAT
 - CES
4. Do you currently or have you ever been diagnosed with asthma?
 - Yes
 - No
5. Do you have a close friend or family member who has been diagnosed with asthma?
 - Yes
 - No
6. If you answered yes to the previous question, please check all that apply
 - Parent
 - Child
 - Sibling
 - Other family member
 - Close friend
7. I received asthma specific education in my CAATE accredited undergraduate athletic training education program
 - Strongly disagree
 - Disagree
 - Agree
 - Strongly agree
8. Please rate your level of satisfaction with your CAATE undergraduate athletic training education specifically related to asthma.
 - Very unsatisfied
 - Unsatisfied
 - Satisfied
 - Very satisfied

9. Please indicate our level of agreement with the following statement: There should be more asthma specific education in CAATE accredited undergraduate athletic training education programs?
- Strongly disagree
 - Disagree
 - Agree
 - Strongly agree
10. Have you read the National Athletic Trainers' Association Position Statement: Management of Asthma in Athletics?
- Yes
 - No
11. Patients who exhibit which of the following signs and/or symptoms warrant referral to their personal physician for further evaluation? Please choose all that apply from the list below.
- Respiratory rate greater than 25 breaths per minute
 - Significantly prolonged expiratory phase of breathing
 - Self report of shortness of breath
 - Nasal flaring
12. From the list below, please match the measure of airway function to its correct respiratory measurement
- The volume of air forcefully exhaled out of the airway in 1 second
- Forced vital capacity
 - Forced expiratory flow rate
 - Peak expiratory flow rate
- The total volume of air forcefully exhaled out of the airway when the breath continues to residual volume
- Forced vital capacity
 - Forced expiratory flow rate
 - Peak expiratory flow rate
- The maximal flow rate of the air out of the airways
- Forced vital capacity
 - Forced expiratory flow rate
 - Peak expiratory flow rate
13. In asthma the _____ measure will decrease and the ____ measure will stay the same. Please select the most correct answer from the list below.
- Forced expiratory volume, Forced vital capacity
 - Forced vital capacity, Peak expiratory flow rate
 - Forced expiratory volume, Peak expiratory flow rate
 - Peak expiratory flow rate, Forced expiratory volume

14. Patients with asthma should have follow-up examinations at regular intervals with their primary care physician; in general, for an asthmatic athlete whose symptoms are well controlled, these appointments should be scheduled every _____. Please choose the correct answer from the list below.
- 1-2 months
 - 6-12 months
 - 2 years
 - 3 years
15. Please choose the correct definition for dynamic hyperinflation, from the list below.
- Increase in respiratory rate due to blockage of the primary bronchi
 - The inability of the usually elastic lung to recoil. The body compensates for this by increasing the respiratory rate
 - Rapid, short bursts of breathing due to diaphragmatic fatigue
 - Intercostal fatigue leading to decreased respiratory rate
16. From the list below please choose the physiological effect of asthma that most commonly leads to death.
- Constriction of the bronchi results in spasm of the diaphragm
 - Physical blockage of the tertiary bronchi leads to inability to exhale carbon dioxide
 - Muscle efficiency is eventually lost, and the increased breathing rate leads to respiratory muscle fatigue and physical distress
 - Respiratory stress leads to lactic acid build up of cardiac musculature.
17. Asthma is an example of a/an ____ lung disorder? Please choose the correct answer from the list below.
- Restrictive cardiopulmonary
 - Hyper-respiratory
 - Hypo-respiratory
 - Obstructive lung disease

18. Please select the most correct set of steps for administering a meter dosed inhaler.
- Patient sitting or standing with back straight, patient exhale, place inhaler at or slightly in front of lips, Instruct patient to slowly inhale at the same time as activating inhaler, patient hold breath for approximately 10 seconds.
 - Patient laying on ground with feet slightly elevated, patient inhale, place inhaler approximately 1 inch in front of lips, instruct patient to rapidly inhale after activating inhaler, patient rapidly exhales following inhalation of medication.
 - Patient sitting or standing with back straight, patient inhale, place inhaler approximately 1 inch in front of lips, instruct patient to rapidly inhale after activating inhaler, patient rapidly exhales following inhalation of medication.
 - Patient in position of comfort, patient exhales, place inhaler at or slightly in front of lips, instruct patient to slowly inhale at the same time as activating inhaler, patient holds breath for approximately 30 seconds.
19. From the list below, which drug(s) should an athlete avoid? Please choose all that apply.
- Stimulants
 - Non-steroidal anti-inflammatory drugs (NSAIDS)
 - Beta blockers
 - Aspirin
 - Tetracycline
 - Diuretics
20. What should be included in an effective asthma management plan? Please choose all that apply.
- Goals of the patient
 - Proper use and frequency of peak expiratory flow rate monitoring
 - Guidelines for altering medications based upon readings from peak meter or asthma symptoms
 - Contact numbers for all health care professionals, inclusion emergency numbers
 - Environmental factors to avoid or monitor

21. Which signs and symptoms for an asthmatic athlete would warrant the use of emergency medical services? Please choose all that apply.
- Weak respiratory effort
 - Weak breathing sounds
 - Peak flow rate of less than 25% of normal
 - Unconsciousness
 - Hypoxic seizures
 - Productive cough
22. If an asthmatic's peak expiratory flow rate (PEFR) is less than ___ they should seek immediate medical attention. Please choose that correct answer from the list below.
- 40%
 - 50%
 - 60%
 - 70%
23. A 20 year old female soccer athlete comes into your athletic training room complaining of an abnormal shortness of breath related to exercise. Which additional signs and symptoms listed below would lead you to believe that your patient may have asthma? Please choose all that apply from the list below.
- Bradycardia
 - Use of accessory muscles to breath
 - Breathing difficulty upon waking in the morning
 - Personal history of atopy
 - Chest tightness
 - Wheezing
24. What is the recommended return to play criteria for an athlete who needs to use a short acting beta₂ agonist 3-4 times during a single sporting event? Please choose the correct answer from the list below.
- A physician should evaluate the patient before return to participation
 - Peak flow meter reading of greater than 50% of normal
 - The use of an emergency inhaler
 - Forced expiratory rate of 60% of normal

25. Non-pharmacological strategies for controlling asthma include _____. Please choose all that apply from the list below.

- Nose breathing
- Placing athlete in recovery position
- Limiting exposure to allergens and pollutants
- Placing patient's head between knees
- Proper warm up
- Increasing athlete's dietary sodium intake/

ATTACHMENT B- Association of Position Statement, 5th edition, and 4th edition
Competencies

Position Statement	5th Edition Competencies	4 th Edition Competencies
<p>1) Identify characteristics of asthma and diagnostic criteria of asthma</p> <ul style="list-style-type: none"> a. Athletes must receive preparticipation screening for asthma b. Be aware of major s/s suggesting asthma and associated conditions c. Types of screening questions to seek evidence of asthma d. Id and refer patients with atypical symptoms, symptoms despite proper therapy, and/or other complications that can exacerbate asthma. 	<ul style="list-style-type: none"> a. PHP-8 b. CE-17 PHP-17 c. CE-20g d. CE-19 CE-22 	<ul style="list-style-type: none"> a. RI-4 b. RI-2 c. MC-3 d. MC-1 MC-7 AC-16
<p>2) Provide Guidelines for referral of patients with asthma and patients with suspected asthma</p> <ul style="list-style-type: none"> a. Pulmonary function testing 	<ul style="list-style-type: none"> a. CE-21j CE-22 	<ul style="list-style-type: none"> a. RI-11 MC-8
<p>3) Describe managements plan to prevent attacks and control asthma exacerbation</p> <ul style="list-style-type: none"> a. Incorporate asthma action plan into existing emergency action plan b. Pts experiencing respiratory distress should be referred c. All asthma patients should have a rescue inhaler available during practice and games, and athletic trainer should have an extra inhaler for each individual athlete d. Alternative practice sites should be considered for pts with asthma e. Pts should have regular follow up visits with personal physician. 	<ul style="list-style-type: none"> a. HA-21 b. AC-41 c. HA-22 d. CIP-3 e. PD-9 	<ul style="list-style-type: none"> a. AD-16 b. MC-1 MC-7 MC-16 c. AC-3 d. MC-9 e. MC-9
<p>4) Educate certified athletic trainers and athletes about pharmacologic and non-pharmacologic therapies and techniques to help control asthma</p> <ul style="list-style-type: none"> a. Pharmacology- b. Non-Pharmacology- c. Asthma Education- 	<ul style="list-style-type: none"> a. TI-28 TI-30 b. TI-30 c. PD-10 	<ul style="list-style-type: none"> a. PH-3 b. MC-9 c. PD-11 PD-12

VITA

Chelsea Kuehner was born August 4, 1987 in Walnut Creek, California, the daughter of Stave and Trinkka Kuehner. After completing her work at Yuba City High School, Yuba City, California Chelsea began her college studies at College of the Siskiyou in Weed, California. In June 2007, Chelsea earned her Associates of Science degrees in Kinesiology and Physical Education. In the fall of 2007 Chelsea attended Alderson Broaddus College in Philippi, West Virginia. In 2010 she graduated Cum Laude as a member of the Silver Key Honors Society, and the Presidents List with her Bachelors of Science degree in Athletic Training with a minor in Strength Training and Conditioning. Chelsea sought to further her education as a graduate student at Texas State University- San Marcos. While at Texas State University- San Marcos Chelsea was a Graduate Teaching Assistant in the Athletic Training Education Program and a Graduate Assistant Athletic Trainer for the Texas State University- San Marcos Men's and Women's Cross Country and Track and Field Teams.

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This thesis was typed by Chelsea Anne Marie Kuehne