



Exercise Induced Bronchospasm in Adolescents

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Purpose

- Provide a mechanism to objectively evaluate the status of adolescent athletes with asthma which would promote physical activity with decreased asthma exacerbations.
- To determine the impact of a school-based asthma program on safe participation in college sports for athletes with exercise-induced bronchospasm.



Goal

Promote the safe participation in college sports for asthmatic adolescents who have exercise induced bronchospasm during physical activity by utilizing an asthma sports action plan in college sports for adolescents with symptoms of exercise induced bronchospasm.



Significance

- Asthma is the leading cause of chronic disease in children (ALA, 2005).
- Nine million children under the age of eighteen have asthma (CDC, 2005).
- Asthma attacks occurred in four million children under the age of eighteen in 2003 (ALA).
- Asthma is one of the leading causes of missed school days (CDC, 2002).

Significance

- Ninety percent of asthmatics experience some degree of exercise induced bronchospasm.
 - Also occurs in:
 - 40% allergic rhinitis.
 - 10% of general population
- (Cardona, D'Alonzo & Becker, 2003, Milgrom & Taussig, 1999).

Review of Literature

- Asthma is a **chronic** inflammatory disease of the airways (NHBLI, 1997).
- Triggers such as pollen, allergens and exercise can cause rapid exacerbation of symptoms.

Review of Literature

- Exercise induced bronchospasm is the temporary narrowing of the airways related to exercise.
- Onset 6-8 minutes after start of exercise and may last 30-90 minutes.
- Symptoms may require medication or stop spontaneously.

(Gotshall, 2002, Sheth, 2003).



Mechanism

Exercise Induced Bronchospasm

- ☛ Airway rewarming theory
 - Airways cool during exercise and lose water.
 - As the airways rewarm the bronchiolar vessels that wrap around the bronchial tree dilate
 - Fluid moves into the submucosa of the airway and trigger a mediator response and bronchoconstriction

(Storm, 2005)



Mechanism

Exercise Induced Bronchospasm

Hyperosmolarity Theory

- Water loss during exercise due to increased respirations dehydrates the bronchial mucosa
- This increases the osmolarity of the mucosal fluid and activates mast cells.
- The release of inflammatory mediators lead to bronchial constriction

(Langdeau & Boulet, 2001)

Mechanism

Exercise Induced Bronchospasm

● Eosinophilic Inflammation

- Correlation found between the level of eosinophils in the sputum and the severity of bronchospasm.
- Findings have not indicated that exercise increases the eosinophil count.
- It appears that the eosinophil count could be elevated from uncontrolled asthma which could lead to more severe Exercise Induced Bronchospasm

(Otani et al, 2004, Yoshikawaset al, 1998)

Exercise

- Some exercise is more asthmagenic
 - Running, Walking, leisure biking, hiking and sports that have short bursts of energy such as baseball, football, wrestling, golfing, gymnastics, surfing, and short term field and track events.
 - Sports requiring continuous activity such as soccer, basketball, field hockey or long-distance running. Are more likely to cause bronchospasm. Cold weather activities such as cross-country skiing and ice hockey are also more likely to aggravate airways.

Mortality

Exercise Induced Bronchospasm

- Asthma deaths related to Exercise – are not high but preventable.
 - Between 1990-2003, Forty four school related deaths were found. Sixteen correlated with physical activity.
 - Most fatal attacks occur within one hour of onset of symptoms
 - » (Greiling, Boss, and Wheeler, 2005)

Mortality

Exercise Induced Bronchospasm

Becker, Rogers, Rossini, Mirchandani, and D'Alonzo, (2004) Performed study found 61 deaths related to sports or physical activity

Exercise-Induced Bronchospasm

- Routine screening not done on high school level.
- Some college athletic departments survey the student athletes regarding asthma and exercise-induced bronchospasm and perform free running tests to evaluate symptoms.

Free Running Test

- Performed outside at a running track.
- Peak flow measured prior to exercise.
- Peak flows repeated during the run at 3 and 6 minutes and 8 minutes after running stopped.
- Found to be an accurate method for screening students who need further evaluation

(Hammerman et al, 2002)

Current Management

National Athletic Trainers Association position paper on management of asthma in athletes in 2005.

Recommends monitoring of student athletes with asthma.

- Currently no specific protocol for evaluation of athletes prior to play or return to play after stopping due to symptoms


- (Allen, 2005).



Current Management

Program developed by the National Heart Lung Blood Institute (1995) "Asthma and Physical Activity in School".

Educational booklet for teachers and coaches to help education children with asthma about physical activity.






Current Management

“First Aid for Exercise Induced Asthma” for coaches, physical education teachers and trainers.

Two page worksheet with recommendations for emergency care developed by National Asthma Education and Prevention Program, NHLBI and NIH.



Current Management

☛ American Lung Association

- Wisconsin
- Minnesota
- Utah

Have all developed Exercise and Asthma programs directed at Coaches and PE teachers.

Current Management

- ☞ All of these programs are reactive
 - They all provide recommendations for treatment of acute exacerbation.
 - Based on symptoms observed by coaches or parents or stated by students.

Objectives

- Certified athletic trainers adhere to the Asthma Sports Action Plan when evaluating and managing students with Exercise-Induced Bronchospasm during physical activities.
- Certified athletic trainers and student athletes increase their knowledge of exercise-induced bronchospasm.

Project Design

- This evaluation study involved two separate samples with pre-test and post-test data collection from each sample.
- Participants were certified athletic trainers and student athletes.
- Midwestern Division I University enrollment 13,000 students.

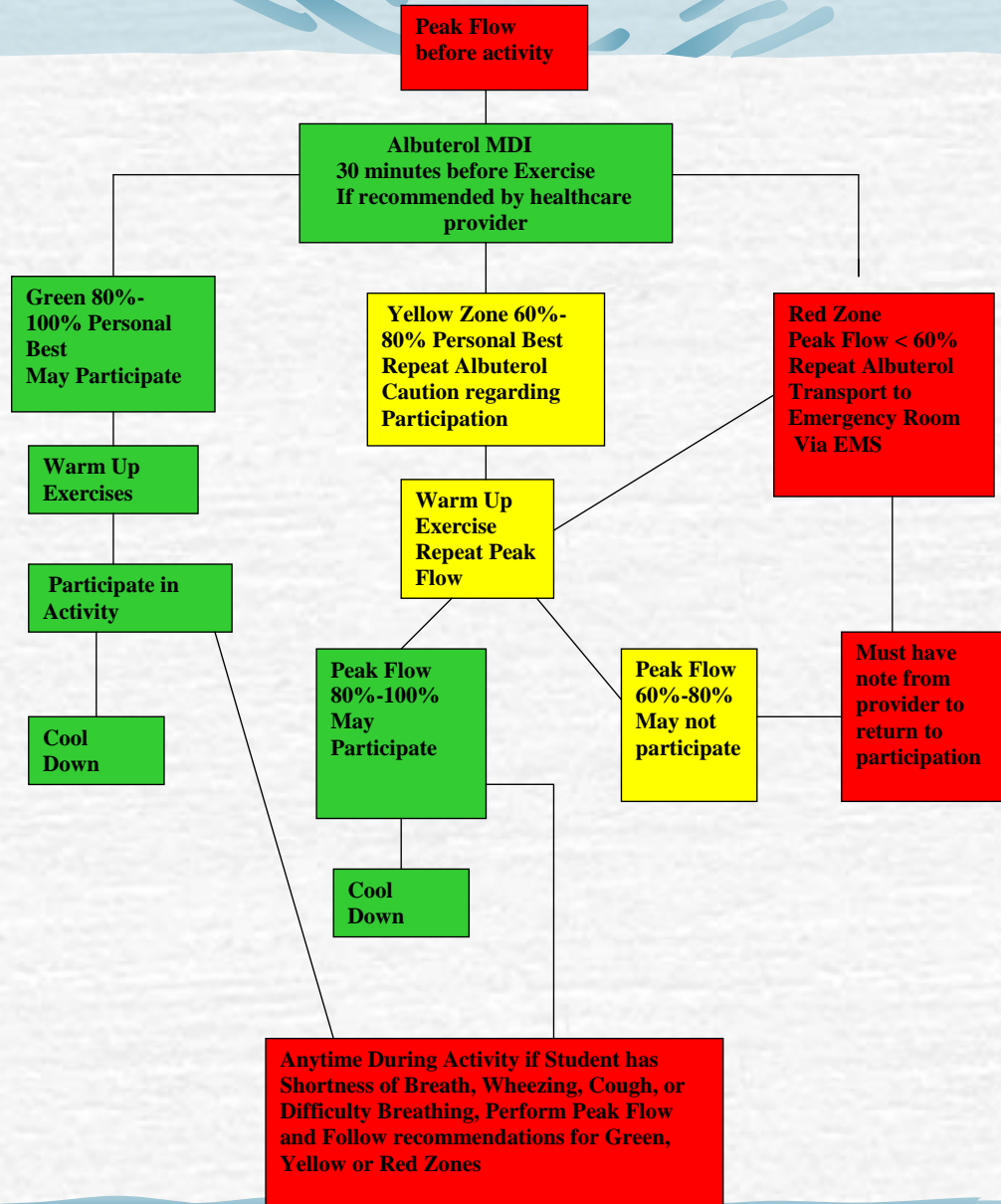
Project Design

An Asthma Sports Action Plan developed by the principal investigator was used in this study it was

based on the Asthma Action Plan developed and recommended by the National Asthma Education and Prevention Panel (NIH, 1997).

- The Asthma Sports Action Plan used the green, yellow and red zone recommendations for daily asthma control based on peak flow measurements.

Asthma Action Sports Plan



Project Design

- Educational program that was given to the athletes, and certified athletic trainers, was based on Winning with Asthma. (used with permission from the Minnesota Department of Public Health
- Information on asthma, symptoms of exercise-induced bronchospasm, asthma medications, actions for students and athletic trainers during an asthma attacks and methods to avoid asthma attacks.
- Instruction on the use of the Asthma Sports Action Plan, the tracking tools, and use of peak flow meters, spacers and metered-dose inhalers.

Outcomes

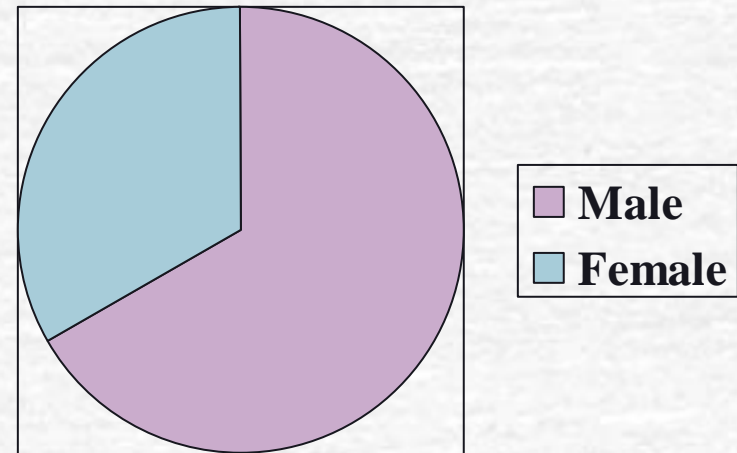
- Anticipated outcomes of the educational programs were that the certified athletic trainers and student athletes would show improved scores on the post-test.

Outcomes

- The anticipated outcome for the student-tracking tool was adherence of the certified athletic trainer to perform the monitoring actions and document the data on the Student-Tracking Tool.

Demographics

- 66% of athletes were male
- 33% were female
- Mean age was 19 years

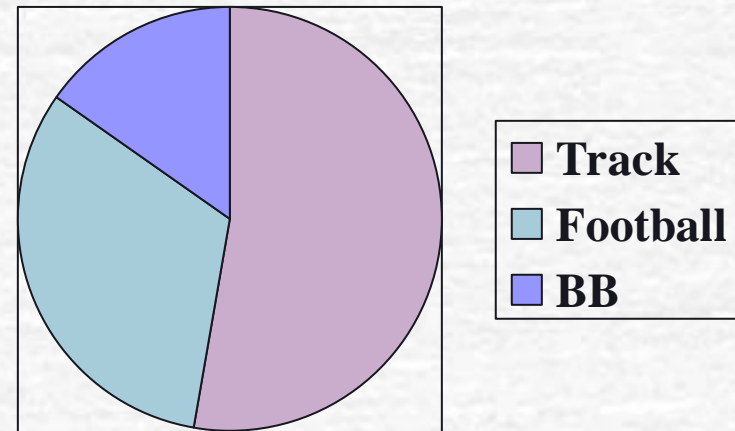


N=6

Sports Activities

- 50% Track
- 33% Football
- 16% Basketball

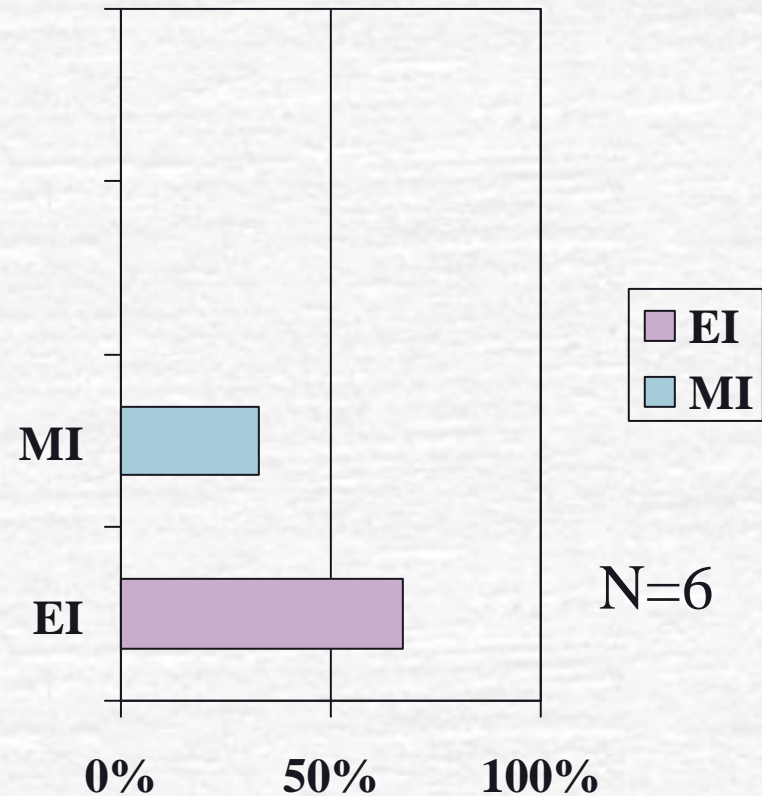
50% were first time participants in college sports.



N=6

Asthma Status

- 67% students classified their asthma as exercise induced.
- 33% were mild intermittent.
- 100% reported they had seen their physicians in the past year.
- 50% reported albuterol use prior to exercise.



Asthma Education

- Six student athletes
 - Pre-test and Post-test
 - 8 questions
 - Pre-test mean score 6.1 with standard deviation of 0.98
 - Post-test mean score 6.5 with standard deviation of 1.51
- Three certified athletic trainers
 - Pretest mean score 6.0 with standard deviation 0.0
 - Post test mean score 7.0 with standard deviation of 1.0

Student Tracking Tool

- Tracking tool indicates that certified athletic trainers monitored initial peak flow prior to play or practice, 100% during the testing period.
- This was the only component of the tracking tool that was consistently completed.

Student Tracking Tool

- Questions regarding allergy, illness or symptoms during exercise the day of data collection were answered 60% of the time.
- Questions regarding students stopping play, and compliance with physician visits before return to play, were answered 40% or less.

Student Tracking Tool

Student Tracking Tool

Fill out immediately after game or practice and

Place in the lock box

Name: _____ Team _____

Personal Best Peak Flow

Green Zone _____

Yellow Zone _____

Red Zone _____

Y means Yes N means No

Date	
Peak Flow measurement	
Allergy Symptoms	Y - N
Illness: Cold or Bronchitis	Y - N
Did you have asthma symptoms during exercise?	
Cough	Y - N
Wheeze	Y - N
Difficulty breathing	Y - N
Shortness of Breath	Y - N
Did you stop play due to asthma symptoms? What was your peak flow?	
Did you use your albuterol inhaler?	Y - N
Did you repeat your peak flow?	
Did you return to sports?	Y - N
Did you not participate today due to asthma symptoms and decreased peak flow?	Y - N

Post Study Data Collection

- Survey student athletes after the study.
- 50% students indicated stopping play during the study period / trainer documentation reported 40%.
- 16% students indicated stopping play on a daily basis.
- 50% students indicated they used rescue inhalers when stopping play / trainer documentation reported 63%.

Conclusions

- Minimal improvement in asthma knowledge was found after the education process in both the athletes and trainers.
- Certified trainers did not adhere to the use of the tracking tool.
- Student athlete reports were inconsistent compared with data reported on the tracking tool by the athletic trainers.

Conclusions

- Small numbers involved in the study did not contribute enough data to make conclusive statements about the use of the Asthma Sports Action Plan.
- The study was started mid-semester and may have had improved adherence if started at the beginning of the season.

Conclusions

- More time with the athletic trainers, students and involvement of the coaches may have improved outcomes.
- The tracking tool may have been too tedious for the athletic trainers; a more simplified data collection tool should be considered.

Recommendations

- ☞ Try other avenues to trial and evaluate use of the Asthma Sports Action Plan
 - Nebraska Chapter of the American Lung Association to trial at summer asthma camp.
 - Certified Athletic Trainers at the beginning of the school and work with coaches as well.
- Evaluate which age group may be the best to target for the next study.



Questions

Thank you

