

AMERICAN ACADEMY OF PEDIATRICS

Committee on Sports Medicine and Fitness

Risk of Injury From Baseball and Softball in Children

ABSTRACT. This statement updates the 1994 American Academy of Pediatrics policy statement on baseball and softball injuries in children. Current studies on acute, overuse, and catastrophic injuries are reviewed with emphasis on the causes and mechanisms of injury. This information serves as a basis for recommending safe training practices and the appropriate use of protective equipment.

ABBREVIATION. NOCSAE, National Operating Committee on Standards for Athletic Equipment.

INTRODUCTION

Baseball is one of the most popular sports in the United States, with an estimated 4.8 million children 5 to 14 years of age participating annually in organized and recreational baseball and softball. Highly publicized catastrophic impact injuries from contact with a ball or a bat frequently raise safety concerns. These injuries, as well as ongoing concerns about shoulder and elbow injuries, provide the impetus for this review of the safety of baseball for 5- to 14-year-old participants. The discussion focuses principally on baseball, but softball is considered in accord with the availability of relevant literature. This statement mainly concerns injuries during practices and games in organized settings. Players and bystanders also can be injured in casual play.

INJURY OVERVIEW

The overall incidence of injury in baseball ranges between 2% and 8% of participants per year. Among children 5 to 14 years of age, an estimated 162 000 baseball, softball, and tee-ball injuries were treated in emergency departments in 1995. The number of injuries generally increased with age, with a peak incidence at 12 years. Of the injuries, 26% were fractures, and 37% were contusions and abrasions. The remainder were strains, sprains, concussions, internal injuries, and dental injuries.¹ The potential for catastrophic injury resulting from direct contact with a bat, baseball, or softball exists. Deaths have occurred from impact to the head resulting in intracranial bleeding and from blunt chest impact, probably causing ventricular fibrillation or asystole (commotio cordis).¹ Children 5 to 15 years of age seem to be uniquely vulnerable to blunt chest impact because

their thoraces may be more elastic and more easily compressed.² Statistics compiled by the US Consumer Product Safety Commission¹ indicate that there were 88 baseball-related deaths to children in this age group between 1973 and 1995, an average of about 4 per year. This average has not changed since 1973. Of these, 43% were from direct-ball impact with the chest (commotio cordis); 24% were from direct-ball contact with the head; 15% were from impacts from bats; 10% were from direct contact with a ball impacting the neck, ears, or throat; and in 8%, the mechanism of injury was unknown.

Direct contact by the ball is the most frequent cause of death and serious injury in baseball. Preventive measures to protect young players from direct ball contact include the use of batting helmets and face protectors while at bat and on base, the use of special equipment for the catcher (helmet, mask, chest, and neck protectors), the elimination of the on-deck circle, and protective screening of dugouts and benches.

OVERUSE INJURIES

The term "Little League elbow" refers to medial elbow pain attributable to throwing by skeletally immature athletes. Pitchers are most likely to be affected by this condition, but it can occur in other positions associated with frequent and forceful throwing. The throwing motion creates traction forces on the medial portion of the elbow and compression forces on the lateral portion of the elbow. The medial traction forces can cause separation or avulsion of the apophysis from the medial epicondyle of the humerus and overuse injury to the common flexor tendon. The compression forces laterally can cause collapse and deformity of the distal humerus, also known as osteochondritis dissecans of the capitulum of the humerus. Early recognition of the symptoms is important to avoid chronic elbow pain, instability, and arthritis.

In response to concerns about Little League elbow and shoulder, many youth leagues have attempted to limit the stress placed on the pitching arms of youth. For example, Little League Baseball Incorporated limits pitchers to a maximum of 6 innings per week and requires mandatory rest periods between pitching appearances.³ The number of pitches thrown per outing should be recorded for all young pitchers. Recommendations include limiting the number of pitches to 200 per week, or 90 pitches per outing.⁴ A preseason conditioning program that includes strengthening the rotator cuff and the shoulder-stabilizing muscles also may help reduce

The recommendations in this statement do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

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throwing injuries. Instruction on proper pitching mechanics is another way to prevent serious overuse throwing injuries.⁵ Finally, allowing time during the early part of the season to gradually increase the amount and intensity of throwing may allow young arms a better opportunity to adapt to the stresses of throwing.

EQUIPMENT

Modifications in the hardness and compressibility of softballs and baseballs have been developed for use by children of different ages with the intent of reducing the force of impact while maintaining performance characteristics. The National Operating Committee on Standards for Athletic Equipment (NOCSAE) has developed standards for these softer baseballs.⁶ An expert review indicated that softer balls that meet the NOCSAE standard are less likely to result in serious head injury or commotio cordis attributable to ball impact.¹

Chest protectors for batters are a relatively new product. They are produced in 2 styles: a small 6 × 6-in polyethylene square intended to protect the heart from ball impact; and a high-density plastic and foam vest intended to protect the rib cage and the heart and other vital organs. Expert review of the available scientific literature indicated that the way in which baseball impact causes death is unknown at the present. Therefore, the effect of any equipment on the risk of chest impact death remains undetermined.²

Concern has been raised about injuries to the eye.⁷⁻⁹ Baseball is the leading cause of sports-related eye injuries in children, and the highest incidence occurs in children 5 to 14 years of age. Approximately one third of baseball-related eye injuries result from being struck by a pitched ball. As a result, for this age group, Prevent Blindness America has recommended the use of batting helmets with polycarbonate face guards that meet standard F910 of the American Society for Testing and Materials.¹⁰ These cover the lower part of the face from the tip of the nose to below the chin. They also protect against injuries to the teeth and facial bones. Functionally one-eyed athletes (best corrected vision in the worst eye of less than 20/50) must use these face guards. They also must protect their eye when fielding by using polycarbonate sports goggles. Eye protection also may be particularly important for young athletes who have undergone eye surgery or experienced a serious eye injury.

DEVELOPMENTAL CONSIDERATIONS

Compared with older players, children younger than 10 years often have less coordination, slower reaction times, a reduced ability to pitch accurately, and a greater fear of being struck by the ball. Some developmentally appropriate rule modifications therefore are advisable for this age group, including the use of an adult pitcher, a pitching machine, or a batting tee. The avoidance of head-first sliding and the use of softer balls should be considered. For children younger than 10 years, there have been

anecdotal reports of rare but serious cervical spine injuries occurring when a player slides head-first, hitting an opponent with the top of the helmet. This injury is similar to that caused by spearing (using the head as the lead object) in football. Such sliding should be banned for players younger than 10 years.

Much of the injury research has concerned baseball and is not differentiated between baseball and softball. Injury risks seem to be similar in softball. Therefore, the same recommendations for injury prevention in baseball apply to softball except for limitations on pitching.

RECOMMENDATIONS

The American Academy of Pediatrics recommends the following:

1. Baseball and softball for children 5 through 14 years of age should be acknowledged by pediatricians as relatively safe sports. Catastrophic and chronically disabling injuries are rare; the frequency of injuries does not seem to have increased during the past 2 decades.
2. Preventive measures should be used to protect young baseball pitchers from throwing injuries. These measures include a restriction on the number of pitches thrown in organized and informal settings and instruction in proper training, conditioning, and throwing mechanics. Parents, coaches, and players should be educated about the early warning signs of an overuse injury and encouraged to seek timely and appropriate treatment if evidence of an injury develops.
3. Serious and potentially catastrophic baseball injuries can be minimized by the proper use of available safety equipment. This includes the use of approved batting helmets; helmets, masks, and chest and neck protectors for all catchers; and rubber spikes. Protective fencing of dugouts and benches and the use of break-away bases also are recommended, as is the elimination of the on-deck circle. Protective equipment should always be properly fitted and well maintained. These preventive measures should be used in games and practices and in organized and informal participation.
4. Baseball and softball players should be encouraged to wear polycarbonate eye protectors on their batting helmets to reduce the risk of eye injury. These eye protectors should be required for functionally one-eyed athletes (best corrected vision in the worst eye of less than 20/50) and for athletes who have undergone eye surgery or experienced severe eye injuries if their ophthalmologists judge them to be at an increased risk for eye injuries. These athletes also should protect their eyes when fielding by using polycarbonate sports goggles.
5. Consideration should be given to using low-impact NOCSAE-approved baseballs and softballs for children 5 to 14 years of age. Particularly, children younger than 10 years should be encouraged to use the lowest impact NOCSAE-approved balls.

6. Developmentally appropriate rule modifications, such as the avoidance of head-first sliding, should be implemented for children younger than 10 years.
7. Because current data are limited, the routine use of chest protectors is not recommended for baseball players other than catchers.
8. Surveillance of baseball and softball injuries should be continued. Studies should continue to determine the effectiveness of low-impact balls for reducing serious impact injuries. Research should be continued to develop other new, improved, and efficacious safety equipment.

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Pediatrics 2001;107;782
DOI: 10.1542/peds.107.4.782

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PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

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Pediatrics 2001;107:782

DOI: 10.1542/peds.107.4.782

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