Risk of Injury From Baseball and Softball in Children 5 to 14 Years of Age

Committee on Sports Medicine and Fitness

Baseball is one of the most popular sports in the United States, with estimates of 4.8 million children 5 to 14 years of age participating annually in organized and recreational baseball and softball. Interest in and fascination with the sport have grown since the beginning of the 20th century, but it was not until 1965 that the issue of "Little League elbow" raised concern about the safety of the game. Recently, highly publicized catastrophic impact injuries from contact with a ball or bat have raised new safety concerns. These injuries provided 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.

The term Little League elbow was used in 1965 to denote radiologic evidence of fragmentation of the medial epicondylar apophysis and osteochondrosis of the head of the radius and capitellum.\(^1,2\) Subsequent studies of children 12 years old and younger\(^3,4\) have found a substantially lower incidence of abnormalities than originally described.\(^1,2\) Early detection and intervention seem to permit the complete resolution of symptoms and underlying structural abnormalities.\(^5\) More serious abnormalities become more common after the age of 13 years.\(^6-8\) The role that repetitive throwing in 5- to 14-year-old children may play in the evolution of elbow overuse injuries at an older age remains to be determined. In response to concern about Little League elbow, many youth leagues have attempted to limit the stress placed on young pitching arms. For example, Little League Baseball, Inc limits pitchers to a maximum of six innings of pitching per week and requires mandatory rest periods between pitching appearances.\(^9\) Instruction in proper pitching mechanics is another way to prevent serious overuse throwing injuries.\(^5,10\)

The overall incidence of injury in baseball ranges between 2% and 8% of participants per year. Most injuries are minor soft tissue trauma, usually to the face and upper extremity.\(^11,12\) Sliding is the cause of one third of the injuries to the lower extremity. In softball and baseball, the Velcro-stabilized breakaway base significantly reduces this risk.\(^13,14\)

Recently, concern has been raised about injuries to the eye.\(^15-17\) Baseball seems to be the leading cause of sports-related eye injuries in children, and the highest incidence occurs in those 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, in this age group, the Sports Eye Safety Committee of the National Society to Prevent Blindness has recommended the use of batting helmets with polycarbonate faceguards that meet Standard F910 of the American Society for Testing and Materials.\(^18\) 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 (those with best corrected vision in the\(^\text{worst}\) eye of \(<20/50) must use these faceguards; they also must protect their eyes when fielding by using polycarbonate sports goggles. Eye protection also may be particularly important for young athletes who have had previous surgery or serious eye injury.

Recently the potential of catastrophic injury resulting from direct contact with a bat, baseball, or softball has received publicity. Deaths have occurred from impact to the head resulting in intracranial bleeding and from nonpenetrating blunt chest impact probably causing ventricular fibrillation or asystole.\(^19-21\) Statistics compiled by the US Consumer Product Safety Commission\(^11,22,23\) indicate that in the 8-year period from 1973 to 1980, 40 baseball- or softball-related deaths were reported in children 5 to 14 years of age. Of these deaths, 21 resulted from head and neck injuries, 17 from nonpenetrating impact to the chest, and 2 from other causes, an average of 5 deaths per year. In the 5-year period of 1986 through 1990, 16 baseball- or softball-related deaths were recorded, an average of 3.3 per year. Eight deaths were due to head and neck injuries, seven were caused by chest impact, and one was due to other causes. It would seem that there has been no significant recent change in impact-related deaths in baseball and softball, but conclusions must be tempered by differences in the sources for data surveillance for the two periods studied.\(^11,22,23\)

Direct contact by the ball is the most frequent cause of death and serious injury in baseball. Children 5 to 14 years of age seem to be uniquely vulnerable to blunt chest impact, because their thoraces may be more elastic and more easily compressed.\(^24,25\) Preventive measures to protect young players from direct ball contact include utilization of batting helmets and face protectors while at bat and on base; utilization of

This statement has been approved by the Council on Child and Adolescent Health.

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.
the catcher’s helmet, mask, and chest and neck protectors; the elimination of the on-deck circle; and the protective screening of dugouts and benches. Future equipment may include chest protectors for batters and pitchers if this equipment can be developed in an efficacious and acceptable manner. 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. Studies evaluating their playing characteristics and capacity to reduce injury are in progress; but, at the time this review was completed, it was not yet clear whether these balls offer an advantage in injury prevention.

Compared with older players, children less than 10 years of age 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 are therefore 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 perhaps the use of softer balls, if they are proven to be safer than standard ones.

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 in football. If further injury surveillance confirms the need, such sliding may need to be banned in players older than 10 years.

Much of the injury research has concerned baseball, or has not differentiated between baseball and softball. Injury risks seem to be similar in softball, except that softball players are less likely to incur overuse injuries of the pitching arm. Therefore, the same recommendations for injury prevention in baseball apply to softball, except for limitation on pitching.

RECOMMENDATIONS

The American Academy of Pediatrics recommends:

1. Pediatricians may be supportive of the desire of 5- to 14-year-old children to participate in baseball and softball. Catastrophic and chronically disabling injuries are rare and do not seem to have been increasing in frequency in the past decade. Surveillance of baseball and softball injuries should be continued.

2. All preventive measures should be employed to protect young baseball pitchers from disabling throwing injuries. These measures include a restriction on the amount of pitching, in both organized and informal settings; instruction in proper biomechanics; and education of parents, coaches, and children to permit early diagnosis and treatment of overuse pitching injuries.

3. All preventive measures that can reduce serious and catastrophic injuries should be employed in both baseball and softball. These include the use of approved batting helmets; the catcher’s helmet, mask, and chest and neck protectors; and rubber spikes. The elimination of the on-deck circle, the protective fencing of dugouts and benches, and the use of breakaway bases are also recommended. Protective equipment should always be sized properly and well maintained. These preventive measures should be employed in both games and practices and in organized and informal participation. Developmentally appropriate rule modifications such as alternative pitching techniques and the avoidance of head-first sliding should be implemented for children less than 10 years of age.

4. Baseball and softball players should be encouraged to reduce the risk of eye injury by wearing polycarbonate eye protectors on their batting helmets. These should be required for the functionally one-eyed athlete (best corrected vision in the worst eye of <20/50) or for athletes with previous eye surgery or severe eye injuries, if their ophthalmologists judge them to be at increased risk of eye injury. The latter two groups should also protect their eyes when fielding by using polycarbonate sports goggles.

5. Consideration should be given to utilizing low-impact NOCSAE-approved baseballs and softballs for children 5 to 14 years of age, if these balls demonstrate satisfactory playing characteristics and reduce injury risk. Children younger than 10 years of age should be particularly encouraged to use the lowest impact NOCSAE-approved balls because these children tend to be less skilled and coordinated. A variety of studies should be undertaken to determine the efficacy of low-impact balls in reducing serious impact injuries. Research should be continued to develop other new, improved, and efficacious safety equipment.
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