Medical Conditions Affecting Sports Participation

Committee on Sports Medicine and Fitness

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ABSTRACT. Children and adolescents with medical conditions present special issues with respect to participation in athletic activities. The pediatrician can play an important role in determining whether a child with a health condition should participate in certain sports by assessing the child's health status, suggesting appropriate equipment or modifications of sports to decrease the risk of injury, and educating the athlete and parents on the risks of injury as they relate to the child's condition. This statement updates a previous policy statement and provides information for pediatricians on sports participation for children and adolescents with medical conditions.

INTRODUCTION

In 1994, the American Academy of Pediatrics published an analysis of medical conditions affecting sports participation.[1] This statement replaces the previous version and provides additions and changes to increase the accuracy and completeness of the information.

Sports are categorized by their probability for collision or contact in Table 1. In "collision" sports (eg, boxing, ice hockey, football, and rodeo), athletes purposely hit or collide with each other or inanimate objects, including the ground, with great force. In "contact" sports (eg, basketball and soccer), athletes routinely make contact with each other or inanimate objects but usually with less force than in collision sports. Table 1 does not separate collision and contact sports, because there is no clear dividing line between them. In "limited-contact" sports (eg, softball and squash), contact with other athletes or inanimate objects is infrequent or inadvertent.

Some limited-contact sports (eg, downhill skiing and gymnastics) can be as dangerous as contact or collision sports. Even in noncontact sports, such as power lifting, serious injuries can occur. Overuse injuries are not related to contact or collision. For these reasons, the categorization of sports in Table 1 insufficiently reflects the relative risks of injury.[1] The categorization, however, gives an idea of the comparative likelihood that participation in different sports will result in acute traumatic injuries resulting from blows to the body.

The medical conditions listed in Table 2 have been assessed to determine if participation would create an increased risk of injury or adversely affect the medical condition. Table 2 is valuable when a physician examines an athlete who has 1 of the listed problems. Decisions about sports participation are often complex, and the usefulness of Table 2 is limited by the frequency with which it recommends individual assessment when a "qualified yes" or a "qualified no" appears. For the majority of chronic health conditions, however, current evidence supports the participation of children and adolescents in most athletic activities.

The physician's clinical judgment is essential for applying these recommendations to a specific patient. This judgment involves the available published

TABLE 1. Classification of Sports by Contact

Contact or Collision	Limited Contact	Noncontact
Basketball	Baseball	Archery
Boxing*	Bicycling	Badminton
Diving	Cheerleading	Body building
Field hockey	Canoeing or kayaking (white water)	Bowling
Football	Fencing	Canoeing or kayaking (flat water)
Tackle	Field events	Crew or rowing
Ice hockey†	High jump	Curling
Lacrosse	Pole vault	Dancing§
Martial arts	Floor hockey	Ballet
Rodeo	Football	Modern
Rugby	Flag	Jazz
Ski jumping	Gymnastics	Field events
Soccer	Handball	Discus
Team handball	Horseback riding	Javelin
Water polo	Racquetball	Shot put
Wrestling	Skating	Golf
	Ice	Orienteering‖
	In-line	Power lifting
	Roller	Race walking
	Skiing	Riflery
	Cross-country	Rope jumping
	Downhill	Running
	Water	Sailing
	Skateboarding	Scuba diving
	Snowboarding‡	Swimming
	Softball	Table tennis
	Squash	Tennis
	Ultimate frisbee	Track
	Volleyball	Weight lifting
	Windsurfing or surfing	

* Participation not recommended by the American Academy of Pediatrics.
† The American Academy of Pediatrics recommends limiting the amount of body checking allowed for hockey players 15 years and younger to reduce injuries.[2]
‡ Snowboarding has been added since previous statement was published.[1]
§ Dancing has been further classified into ballet, modern, and jazz since previous statement was published.[1]
‖ A race (contest) in which competitors use a map and compass to find their way through unfamiliar territory.

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.

TABLE 2. Medical Conditions and Sports Participation*

Condition	May Participate
Atlantoaxial instability (instability of the joint between cervical vertebrae 1 and 2)	Qualified yes
Explanation: Athlete needs evaluation to assess risk of spinal cord injury during sports participation.	
Bleeding disorder	Qualified yes
Explanation: Athlete needs evaluation.	
Cardiovascular disease	
Carditis (inflammation of the heart)	No
Explanation: Carditis may result in sudden death with exertion.	
Hypertension (high blood pressure)	Qualified yes
Explanation: Those with significant essential (unexplained) hypertension should avoid weight and power lifting, body building, and strength training. Those with secondary hypertension (hypertension caused by a previously identified disease) or severe essential hypertension need evaluation. The National High Blood Pressure Education Working group[3] defined significant and severe hypertension.	
Congenital heart disease (structural heart defects present at birth)	Qualified yes
Explanation: Those with mild forms may participate fully; those with moderate or severe forms or who have undergone surgery need evaluation. The 26th Bethesda Conference[4] defined mild, moderate, and severe disease for common cardiac lesions.	
Dysrhythmia (irregular heart rhythm)	Qualified yes
Explanation: Those with symptoms (chest pain, syncope, dizziness, shortness of breath, or other symptoms of possible dysrhythmia) or evidence of mitral regurgitation (leaking) on physical examination need evaluation. All others may participate fully.[5]	
Heart murmur	Qualified yes
Explanation: If the murmur is innocent (does not indicate heart disease), full participation is permitted. Otherwise, the athlete needs evaluation (see congenital heart disease and mitral valve prolapse[5]).	
Cerebral palsy	Qualified yes
Explanation: Athlete needs evaluation.	
Diabetes mellitus	Yes
Explanation: All sports can be played with proper attention to diet, blood glucose concentration, hydration, and insulin therapy. Blood glucose concentration should be monitored every 30 minutes during continuous exercise and 15 minutes after completion of exercise.	
Diarrhea	Qualified no
Explanation: Unless disease is mild, no participation is permitted, because diarrhea may increase the risk of dehydration and heat illness. See fever.	
Eating disorders	Qualified yes
Anorexia nervosa	
Bulimia nervosa	
Explanation: Patients with these disorders need medical and psychiatric assessment before participation.	
Eyes	Qualified yes
Functionally one-eyed athlete	
Loss of an eye	
Detached retina	
Previous eye surgery or serious eye injury	
Explanation: A functionally one-eyed athlete has a best-corrected visual acuity of less than 20/40 in the eye with worse acuity. These athletes would suffer significant disability if the better eye were seriously injured, as would those with loss of an eye. Some athletes who previously have undergone eye surgery or had a serious eye injury may have an increased risk of injury because of weakened eye tissue. Availability of eye guards approved by the American Society for Testing and Materials and other protective equipment may allow participation in most sports, but this must be judged on an individual basis.[6,7]	
Fever	No
Explanation: Fever can increase cardiopulmonary effort, reduce maximum exercise capacity, make heat illness more likely, and increase orthostatic hypertension during exercise. Fever may rarely accompany myocarditis or other infections that may make exercise dangerous.	
Heat illness, history of	Qualified yes
Explanation: Because of the increased likelihood of recurrence, the athlete needs individual assessment to determine the presence of predisposing conditions and to arrange a prevention strategy.	
Hepatitis	Yes
Explanation: Because of the apparent minimal risk to others, all sports may be played that the athlete's state of health allows. In all athletes, skin lesions should be covered properly, and athletic personnel should use universal precautions when handling blood or body fluids with visible blood.[8]	
Human immunodeficiency virus infection	Yes
Explanation: Because of the apparent minimal risk to others, all sports may be played that the athlete's state of health allows. In all athletes, skin lesions should be covered properly, and athletic personnel should use universal precautions when handling blood or body fluids with visible blood.[8]	
Kidney, absence of one	Qualified yes
Explanation: Athlete needs individual assessment for contact, collision, and limited-contact sports.	

TABLE 2. Continued

Condition	May Participate
Liver, enlarged	Qualified yes
Explanation: If the liver is acutely enlarged, participation should be avoided because of risk of rupture. If the liver is chronically enlarged, individual assessment is needed before collision, contact, or limited-contact sports are played.	
Malignant neoplasm	Qualified yes
Explanation: Athlete needs individual assessment.	
Musculoskeletal disorders	Qualified yes
Explanation: Athlete needs individual assessment.	
Neurologic disorders	
History of serious head or spine trauma, severe or repeated concussions, or crainotomy.[9,10]	Qualified yes
Explanation: Athlete needs individual assessment for collision, contact, or limited-contact sports and also for noncontact sports if deficits in judgment or cognition are present. Research supports a conservative approach to management of concussion.[9,10]	
Seizure disorder, well-controlled	Yes
Explanation: Risk of seizure during participation is minimal	
Seizure disorder, poorly controlled	Qualified yes
Explanation: Athlete needs individual assessment for collision, contact, or limited-contact sports. The following noncontact sports should be avoided: archery, riflery, swimming, weight or power lifting, strength training, or sports involving heights. In these sports, occurrence of a seizure may pose a risk to self or others.	
Obesity	Qualified yes
Explanation: Because of the risk of heat illness, obese persons need careful acclimatization and hydration.	
Organ transplant recipient	Qualified yes
Explanation: Athlete needs individual assessment.	
Ovary, absence of one	Yes
Explanation: Risk of severe injury to the remaining ovary is minimal.	
Respiratory conditions	
Pulmonary compromise, including cystic fibrosis	Qualified yes
Explanation: Athlete needs individual assessment, but generally, all sports may be played if oxygenation remains satisfactory during a graded exercise test. Patients with cystic fibrosis need acclimatization and good hydration to reduce the risk of heat illness.	
Asthma	Yes
Explanation: With proper medication and education, only athletes with the most severe asthma will need to modify their participation.	
Acute upper respiratory infection	Qualified yes
Explanation: Upper respiratory obstruction may affect pulmonary function. Athlete needs individual assessment for all but mild disease. See fever.	
Sickle cell disease	Qualified yes
Explanation: Athlete needs individual assessment. In general, if status of the illness permits, all but high exertion, collision, and contact sports may be played. Overheating, dehydration, and chilling must be avoided.	
Sickle cell trait	Yes
Explanation: It is unlikely that persons with sickle cell trait have an increased risk of sudden death or other medical problems during athletic participation, except under the most extreme conditions of heat, humidity, and possibly increased altitude.[11] These persons, like all athletes, should be carefully conditioned, acclimatized, and hydrated to reduce any possible risk.	
Skin disorders (boils, herpes simplex, impetigo, scabies, molluscum contagiosum)	Qualified yes
Explanation: While the patient is contagious, participation in gymnastics with mats; martial arts; wrestling; or other collision, contact, or limited-contact sports is not allowed.	
Spleen, enlarged	Qualified yes
Explanation: A patient with an acutely enlarged spleen should avoid all sports because of risk of rupture. A patient with a chronically enlarged spleen needs individual assessment before playing collision, contact, or limited-contact sports.	
Testicle, undescended or absence of one	Yes
Explanation: Certain sports may require a protective cup.	

* This table is designed for use by medical and nonmedical personnel. "Needs evaluation" means that a physician with appropriate knowledge and experience should assess the safety of a given sport for an athlete with the listed medical condition. Unless otherwise noted, this is because of variability of the severity of the disease, the risk of injury for the specific sports listed in Table 1, or both.

information on the risks of participation, the advice of knowledgeable experts, the current health status of the athlete, the level of competition, the position played, the sport in which the athlete participates, the maturity of the competitor, the availability of effective protective equipment that is acceptable to the athlete, the availability and efficacy of treatment, whether treatment (eg, rehabilitation of an injury) has been completed, whether the sport can be modified to allow safer participation, and the ability of the athlete and parents to understand and accept risks involved in participation. Potential dangers of associated training activities should also be considered. For example, strength training is now a part of conditioning for many sports.

Unfortunately, adequate data on the risks of a particular sport for an athlete with a medical problem often are limited or lacking, and an estimate of risk becomes a necessary part of decision-making. If restriction from a sport is believed necessary, the

TABLE 3. Classification of Sports by Strenuousness[4]

High to Moderate Intensity		
High to Moderate Dynamic and Static Demands	High to Moderate Dynamic and Low Static Demands	High to Moderate Static and Low Dynamic Demands
Boxing*	Badminton	Archery
Crew or rowing	Baseball	Auto racing
Cross-country skiing	Basketball	Diving
Cycling	Field hockey	Horseback riding (jumping)
Downhill skiing	Lacrosse	Field events (throwing)
Fencing	Orienteering	Gymnastics
Football	Race walking	Karate or judo
Ice hockey	Racquetball	Motorcycling
Rugby	Soccer	Rodeo
Running (sprint)	Squash	Sailing
Speed skating	Swimming	Ski jumping
Water polo	Table tennis	Water skiing
Wrestling	Tennis	Weight lifting
	Volleyball	
Low Intensity (Low Dynamic and Low Static Demands)		
	Bowling	
	Cricket	
	Curling	
	Golf	
	Riflery	

* Participation not recommended by the American Academy of Pediatrics.

physician should counsel the athlete and family about safe alternative activities.

The strenuousness of a sport is an additional characteristic relevant to athletes with cardiovascular or pulmonary disease. A strenuous sport can place dynamic (volume) and static (pressure) demands on the cardiovascular system. These demands vary not only with activities of the sport but also with such factors as the associated training activities and the level of emotional arousal and fitness of the competitors. Table 3 lists sports by their strenuousness as classified by experts. The authors of Table 3 state that the classification "may be of theoretical interest, but its practical value is unknown because our current knowledge regarding the relative risks of these 2 types of exercise (dynamic and static) for various cardiovascular abnormalities is limited."[4]

Physicians making decisions about sports participation for patients who have more than mild congenital heart disease or who have cardiac dysrhythmias are encouraged to consider consulting a cardiologist and to review recommendations from the 26th Bethesda Conference.[4] Information on sports participation for patients with hypertension also is available, indicating that primary hypertension must be severe before exclusion from sports is indicated.[3,12]

In recent legal decisions, athletes have been permitted to participate in sports despite known medical risks.[1] When an athlete's family disregards medical advice against participation, the physician should ask all parents or guardians to sign a written informed consent statement indicating that they have been advised of the potential dangers of participation and that they understand them. The physician should also document, with the child's signature, that the child athlete also understands the risks of participation.

Information on the impact of medical problems on the risk of injury during sports participation is available in *Care of the Young Athlete* by the American Academy of Orthopaedic Surgeons and the American Academy of Pediatrics.[13] Other policy statements include relevant material.[14–22]

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