AMERICAN ACADEMY OF NEUROLOGY®

Summary of Evidence-based Guideline for **PATIENTS** and their **FAMILIES**

CONCUSSION DURING SPORTS ACTIVITIES

This information sheet is provided to help you recognize and understand sports concussion.

Neurologists from the American Academy of Neurology (AAN) are doctors who identify and treat diseases of the brain and nervous system. The following evidence-based information* is provided by experts who carefully reviewed all available scientific studies on evaluating and managing sports concussion in athletes. This information updates the findings of the 1997 AAN guideline on this topic.

Concussion is a serious health issue. It can affect athletes of any age, gender, or type or level of sport played. If you (or a family member) have a head injury, you should be evaluated by a licensed health care professional to make sure that you are not at risk for health problems. This person should be trained in diagnosing and managing concussions.

WHAT IS A CONCUSSION?

A concussion is a type of brain injury. It can happen when the head hits an object or a moving object strikes the head. It also can happen when the head experiences a sudden force without being hit directly. Each year, 1.6 to 3.8 million concussions result from sports/recreation injuries in the United States. Almost nine percent of all US high school sports injuries involve concussions. Most concussions result in full recovery. However, some can lead to more-severe injuries if not identified early and treated properly.

WHAT ARE THE SIGNS AND SYMPTOMS OF CONCUSSION?

When you have a head injury, it can be hard to tell if the injury caused a concussion. The source of the head injury is not always clear. In some cases, you may not be aware of having a concussion. Signs of concussion are things people can observe about someone with a concussion. These may include:

- Behavior or personality changes
- Blank stare, dazed look
- Changes to balance, coordination, reaction time
- Delayed or slowed spoken or physical responses
- Disorientation (confused about time, date, location, game)
- Loss of consciousness/blackout (occurs in less than 10 percent of people with concussion)
- Memory loss of event before, during, or after injury occurred
- Slurred/unclear speech
- Trouble controlling emotions
- Vomiting

Symptoms of concussion are things you can sense or feel are happening. These may include:

- Blurry vision/double vision
- Confusion
- Dizziness
- Feeling hazy, foggy, or groggy
- Feeling very drowsy, having sleep problems
- Headache
- Inability to focus, concentrate
- Nausea (stomach upset)
- Not feeling right
- Sensitivity to light or sound

The signs and symptoms of concussion often begin right after the injury. These may worsen over minutes or hours. Sometimes symptoms do not appear until you have exercised hard.

WHAT ARE THE RISKS OF CONCUSSION? HOW CAN I KNOW IF I AM AT RISK?

Concussions can occur in many sports. Concussions are common in high-speed contact sports. The studies examined here looked at concussion risk in several sports. Strong evidence shows:

- Football, rugby, hockey, and soccer pose the greatest risk
- Baseball, softball, volleyball, and gymnastics involve the least risk

The studies also examined concussion risk by:

- Gender
- Equipment used
- Previous concussion(s)

In terms of gender, the studies suggest that risk varies from sport to sport. Some studies compared concussion risks for males and females by sport. There is strong evidence that concussion risk in soccer and basketball is greater in females than in males. For other sports, there is not enough evidence to show any clear differences in risk by gender.

For headgear, there is moderate evidence that its use in rugby can lower concussion risk. Headgear should be well fitted, well designed, and well maintained. Use of football helmets to protect against concussion has not been studied. But given the evidence for headgear use in other sports, one can assume well-maintained football helmets also are helpful. Mouth guards often are used to prevent dental injuries. However, there is not enough evidence to show if mouth guards help prevent concussions.

In addition, there is not enough evidence to show:

- That one type of football helmet gives more protection than another
- That headgear use in soccer or basketball protects against concussion

If you have had a concussion before, be aware that:

- Strong evidence shows you are at greater risk for another concussion
- If you are within ten days of having had a concussion, there is moderate evidence of a greater risk for another one

There is not enough evidence to show if risk varies by age, level of sport played, or position played.

WHAT SHOULD I DO IF I HAVE A HEAD INJURY DURING A GAME?

If you think you might have a concussion, stop playing the game right away. This will help reduce your risk of worse injury.

Moderate evidence shows that checklists and screening tests can help with diagnosing concussions. If available, your coach or athletic trainer should be trained to administer these tests properly. He or she then should share your test results with your health care professional to confirm a diagnosis. Some of these tests are not intended for use in preteen children or younger.

If a concussion may have occurred, you should be evaluated thoroughly by a licensed health care professional. This person should be trained to diagnose and manage concussion. He or she also should be able to recognize brain injuries that are more severe. Concussion diagnosis must be based on a clinical exam and health history. Moderate evidence shows that tests can help to diagnose and manage concussion. However, no single test score can be the basis of a concussion diagnosis.

I HAVE BEEN DIAGNOSED WITH A CONCUSSION. WHEN CAN I RETURN TO PLAY/PRACTICE?

If you have been diagnosed with a concussion, do not return to play until:

- All symptoms have cleared up—these include symptoms you have while taking medication or, especially, after stopping it
- You have been cleared for play by a licensed health care professional trained in diagnosing and managing concussion

Be careful when returning to play. This should be a slow process. Weak evidence suggests a step-by-step plan of return to activity might be helpful. A licensed professional should design this to fit your needs. The plan should exclude any activities that make symptoms worse or put you at risk of another concussion. Be sure to discuss this plan with your health care professional.

There is no set timeline for recovery or return to play. There also is no evidence for absolute rest after a concussion. However, high school athletes or younger should be managed more conservatively than older athletes. Moderate evidence shows that these athletes have symptoms and thinking problems that last longer than in older athletes

For injured athletes who continue to have symptoms:

- Moderate to strong evidence shows that they will have ongoing thinking and behavior problems and slowed reaction times
- Weak evidence shows that such athletes may be risking further injury—and even longer recovery—if they try returning to play too soon

If you have concerns about long-term risk, discuss counseling options with your health care professional.

This AAN guideline is endorsed by the National Football League Players Association, the American Football Coaches Association, the Child Neurology Society, the National Academy of Neuropsychology, the National Association of Emergency Medical Service Physicians, the National Association of School Psychologists, the National Athletic Trainers Association, and the Neurocritical Care Society.

*After the experts review all of the published research studies, they describe the strength of the evidence supporting each recommendation:

Strong evidence = more than one high-quality scientific study

Moderate evidence = at least one high-quality scientific study or two or more studies of a lesser quality

Weak evidence = means the studies, while supportive, are weak in design or strength of the findings

Not enough evidence = means either different studies have come to conflicting results or there are no studies of reasonable quality

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