

Chapter 4: SPORTS-INJURY PREVENTION

I. Causative Factors in Injury. Causative factors of sports injuries must be identified before developing a well-planned injury prevention program.

A. Two general categories of causative factors have been proposed.

1. Extrinsic factors include _____ (Slide 2).

2. Intrinsic factors include _____

(Slide 2).

3. Specific intrinsic risk factors by body area: upper extremity—ligamentous laxity, tight shoulder muscles, and shoulder girdle weakness; lower extremity—tight/weak hamstrings, weak lower extremity muscles, joint malalignments, and poor stretching and muscular conditioning.

II. Intervention Strategies

A. It is the responsibility of all members of the sports medicine team to identify causative factors before an injury occurs. Extrinsic factors such as faulty equipment or dangerous facilities are easily recognized. Athletes engaged in high-risk sports must be educated about hazards and prevention strategies.

B. Both the NCAA and the NFHS have developed and implemented guidelines for medical evaluations of student athletes.

1. NCAA guideline 1B requires a pre-participation physical evaluation (PPE) upon entrance into the institution's athletic program. Thereafter, only an updated medical history is required, unless an additional medical examination is warranted based on the updated history.

2. NFHS policy states that "prior to the first year of participation in interscholastic athletics, a student shall undergo a medical examination and be approved for interscholastic athletic competition by the examining medical authority."

C. The need to develop these guidelines resulted _____

(Slide 3).

1. The primary purpose of a PPE should be _____ (Slide 4)
as well as to ascertain any injuries or diseases that represent potential problems for the student athlete.

D. Typically the PPE is _____ (Slide 4), although not all states require that a physician conduct the exam.

1. Commonly identified problems include spina bifida occulta, the absence of one of a paired set of organs, as well as postural problems, obesity, high blood pressure, cardiac defects/disorders, allergies, and skin infections.

2. The two PPE formats are office-based and station-based screening.

a. _____ (Slide 4)

b. _____

(Slide 4)

c. All information obtained during a physical exam should be handled to protect the athlete's confidentiality.

E. Although many school districts require a PPE annually, increasing health care costs may require an updated physical exam whenever the child begins a new level of competition. A physician should make a complete physical evaluation when a child has recovered from a serious injury.

1. The American Academy of Pediatrics (AAP) and five other consensus groups recommend athletes receive a PPE biannually or when an athlete enters Middle/High School or transfers to another school. All athletes should receive annual updates that include a comprehensive history,

height, weight, and blood pressure.

III. Injury Prevention and Preseason Conditioning. _____ (Slide 5)

A. The two primary components of a conditioning program are general conditioning and sports-specific conditioning.

1. General conditioning: _____ (Slide 6)

2. Sports-specific conditioning: _____ (Slide 6)

B. Aerobic Fitness. **Aerobic fitness**, or power, is _____ (Slide 7)

1. Aerobic fitness can help athletes avoid injuries that result from general fatigue.

2. Aerobic fitness can be increased by regular participation in running, bicycling, swimming, cross-country skiing, in-line skating, etc. _____ (Slide 7)

C. Muscle Strength, Power, and Endurance.

a. **Muscle strength** can be defined as _____ (Slide 8).

b. **Muscle power** can be defined as _____ (Slide 8). In most cases, muscle power is more important to performance than strength because performance is often time dependent.

c. **Muscle endurance** is defined as _____ (Slide 8).

Weight training improves muscle strength, power, and endurance.

1. Different types of weight training involve manipulating training volume, intensity, and frequency. Moderate- to high-intensity training requires 24 to 48 hours for full recovery and to avoid overuse injury.

2. **Periodization** is the _____ (Slide 9).

Periodization tailors the training program to meet the athlete's specific needs and maximize performance.

3. Strength training improves muscle strength, reducing the risk of injury. _____ (Slide 9) Additionally,

strength ratios between opposing muscle groups improves and increased muscular endurance can occur.

4. **Flexibility** is defined as _____ (Slide 10)

a. Tissue temperature, bone structure, tissue mass, age, and gender all help determine flexibility.

b. Two types of flexibility are static and dynamic flexibility.

1. Static flexibility involves _____ (Slide 10).

2. Dynamic flexibility _____ (Slide 10).

c. Stretching exercises improve extensibility of muscle tissue and can prevent muscle strains.

d. The four types of stretching exercises are ballistic, static, proprioceptive neuromuscular facilitation (PNF), and passive stretching.

1. **Ballistic stretching** involves _____ (Slide 11)

2. **Static stretching** involves _____ (Slide 11)

3. **Proprioceptive neuromuscular facilitation** uses _____ (Slide 11)

4. **Passive stretching** involves _____ (Slide 11)

A. Ballistic stretching is the least effective method and not recommended because it may result in injury. Static stretching is probably the most effective stretching method.

5. Nutrition and Body Composition. The body will respond better to any conditioning program when adequate amounts of nutrients are consumed. Coaches, parents, and athletes must take care to avoid an over-emphasis on leanness.

6. Periodization is the “organization of training into a cyclic structure, to attain the optimal development of an athlete’s performance capacities.” Periodization is achieved by manipulating the frequency, intensity, and duration of exercise and helps prevent training-induced injury. **Hypertrophy** of leg muscles is an example a specific training goal that can be achieved by periodization.

- a. Most programs developed around a one-year training cycle, the **macrocycle**. A **microcycle**, the smallest component of the training cycle, consists of 2 to 4 weeks of specific training. The **mesocycle** consists of several successive microcycles leading to a specific goal. The **transition phase** is a 2 to 4 week period between training seasons or between successive mesocycles.

D. Modification of Extrinsic Factors. Coaching personnel and administrators must monitor these factors to identify and eliminate any potential risks.

1. Practice/ Competition Environment. _____ (Slide 13)

2. Facilities. All sports facilities _____ (Slide 13). For example, integrity of safety fences, batting cages, location of dugouts in baseball/softball, types of bases used, soccer goal construction, location of water and sanitation facilities, and EMS access routes.

a. With respect to indoor facilities, the primary safety concerns involve lighting, playing surfaces, room dimensions, and locker rooms. Medical equipment such as whirlpool baths and other therapeutic modalities should not be available for use in locker rooms.

3. Protective Equipment. _____ (Slide 13)