Sports Specific Safety

Volleyball

Sports Medicine & Athletic Related Trauma
SMART Institute

Objectives of Presentation

1. Identify the prevalence of injuries.
2. Discuss commonly seen injuries.
3. Provide information regarding the management of injuries seen in volleyball.
4. Provide examples of venue and equipment safety measures.
5. Provide conditioning tips for volleyball to reduce potential injuries.

6 Basic Skill Sets in Volleyball

1 - Serve
2 - Pass
3 - Set
4 - Attack
5 - Block
6 - Defend

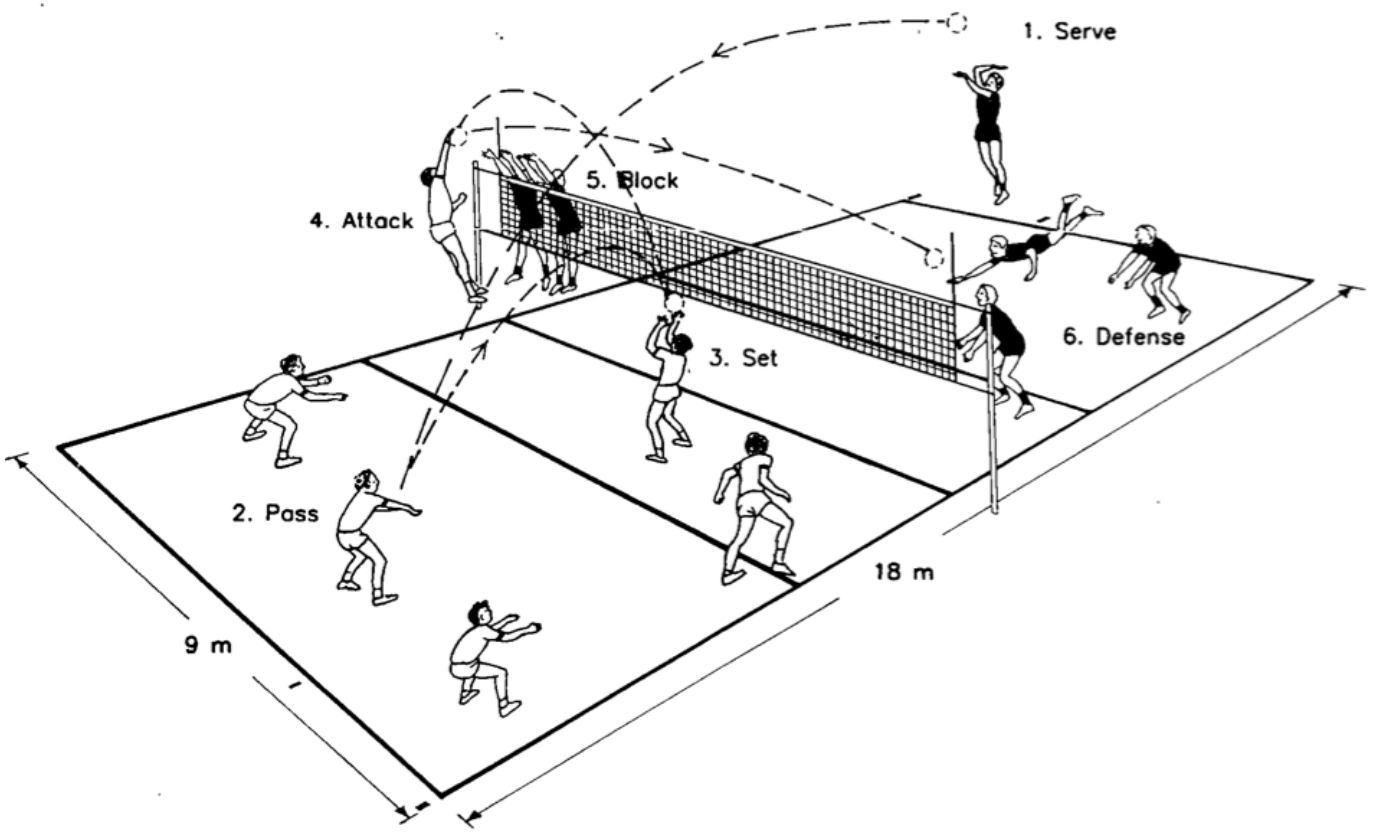
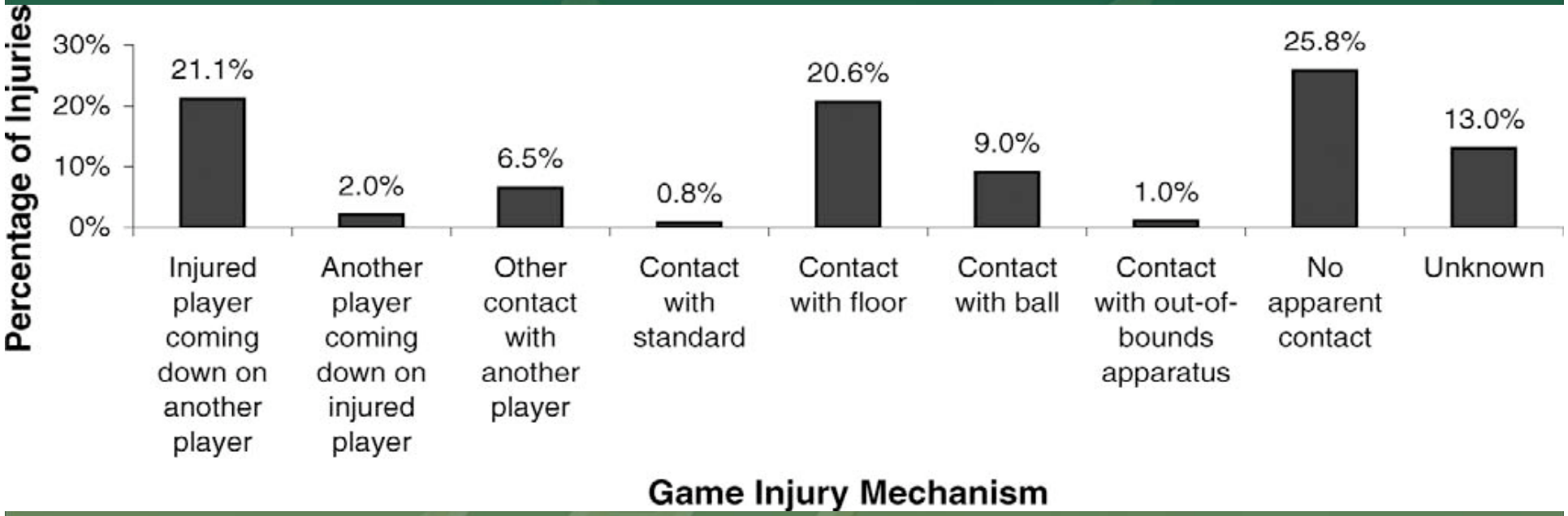


Figure 1. Illustration of a volleyball court and the six basic skills of volleyball in the most common playing order: serve, pass (serve reception), set, attack, block, and defense. Note that there are six players on each team, three in the front court positions and three in the back court positions. The players may move freely around their half-court, but only the three front court players are allowed to attack or block.

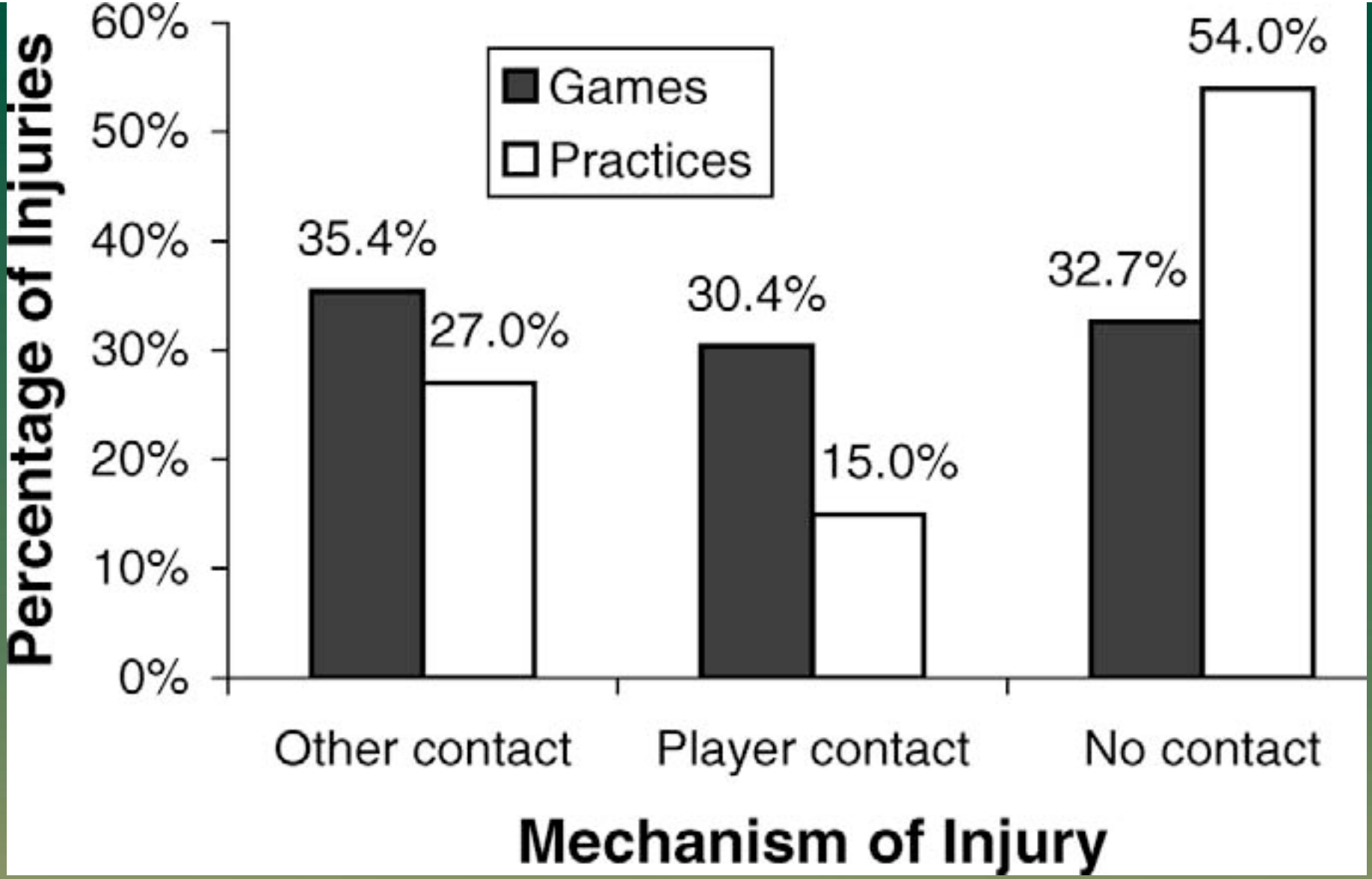
Bahr, et.al.
Am. J. Sports Medicine
1994; 22; 595

NCAA Sport Specific Game Injury Mechanism Women's Volleyball 1988-2004 (N=2216)



61% 'Contact' Injury

Agel,J et.al.; J. of Athletic Training 2007; 42(2): 295-302



Agel,J et.al.; J. of Athletic Training 2007; 42(2): 295-302

NCAA – Women's Volleyball % Body Part and Injury Type

Game Injury

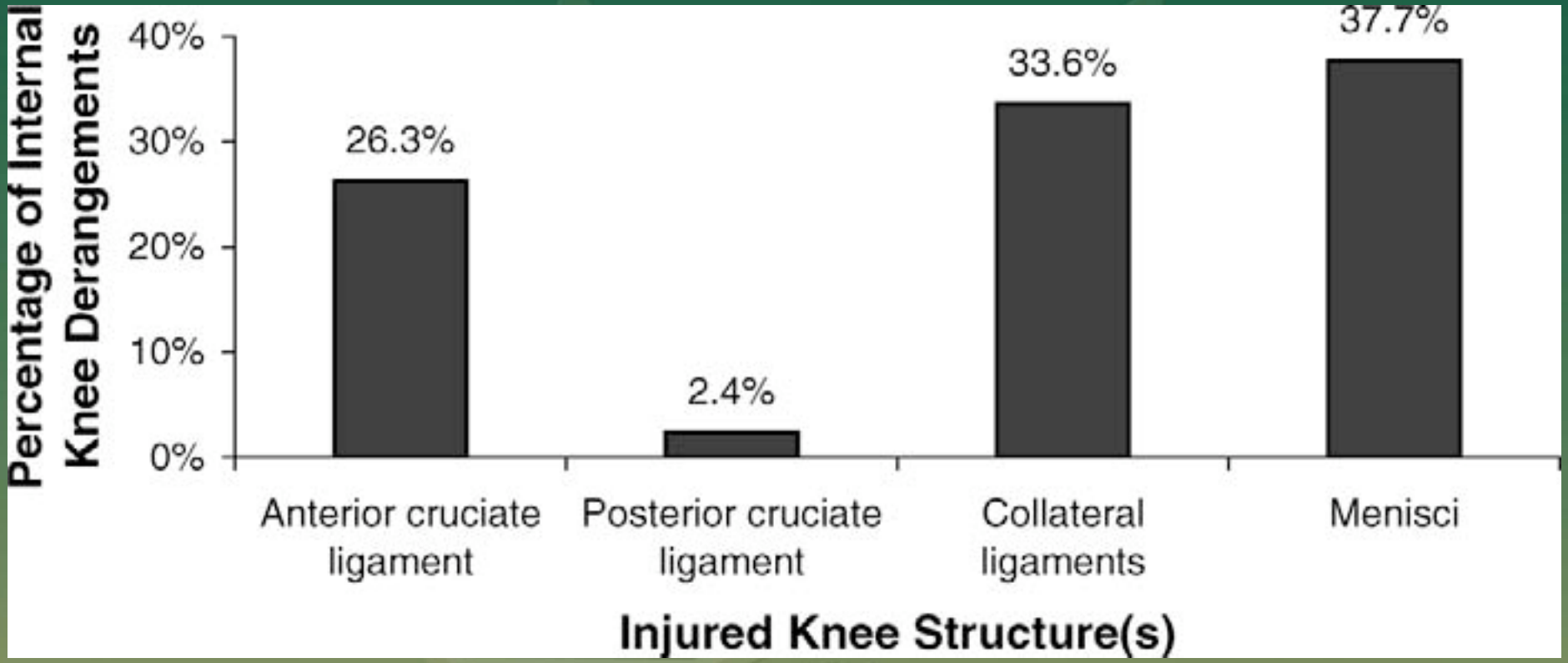
- Ankle sprains – 44.1
- Knee internal derangement – 14.1
- Shoulder strains – 5.2
- Lower back muscular strains – 4.8

Practice Injury

- Ankle sprains – 29.4
- Leg muscle/tendon strains – 12.3
- Lower back muscular strains – 7.9
- Knee internal derangement – 7.8

Agel,J et.al.; J. of Athletic Training 2007; 42(2): 295-302

Acute Volleyball Knee Injuries



Agel,J et.al.; J. of Athletic Training 2007; 42(2): 295-302

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Commonly Seen Injuries

- Most acute injuries occur with play at the net:
  - Blocking
  - Spiking/attacking
  - Player contact
- Most overuse injuries are secondary to repetitive jumping and landing and overhead arm swinging

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6 Most Common Injuries

Acute

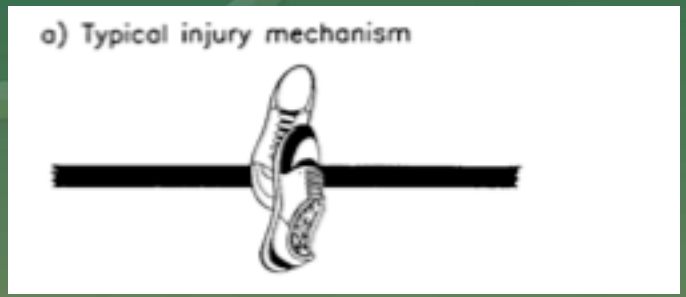
- Ankle sprain
- Jammed fingers
- Knee internal derangement

Overuse

- Jumper's knee
- Rotator cuff strain
- Lumbosacral strain

Ankle Sprains

- Most common acute injury in volleyball.
- 15%-60% of all injuries.
- Front court (net) players landing on opponents or teammates foot after blocking or spiking.
- Contact under the net.



Contact across center line

Recognition and Management of Injuries to the Ankle

- Inversion Sprains
  - Most common and results in injury to the lateral ligaments
  - Anterior talofibular ligament is injured with inversion, plantar flexion and internal rotation
  - Occasionally the force is great enough for an avulsion fracture to occur off the lateral malleolus

Clinical Grading of Ankle Sprains

- **Grade 1**
  - Mild pain and disability; weight bearing is minimally impaired; point tenderness over ligaments and no laxity
- **Grade 2**
  - Feel or hear pop or snap; moderate pain with difficulty bearing weight; tenderness and edema
  - Positive talar tilt and anterior drawer tests
  - Possible tearing of the anterior talofibular and calcaneofibular ligaments
- **Grade 3**
  - Severe pain, swelling, hemarthrosis, discoloration
  - Unable to bear weight
  - Positive talar tilt and anterior drawer
  - Instability due to complete ligamentous rupture

Ankle Sprain Care

- Must manage pain and swelling
- Apply horseshoe-shaped foam pad for focal compression
- Apply wet compression wrap to facilitate passage of cold from ice packs surrounding ankle
- Apply ice for 20 minutes and repeat every hour for 24 hours
- Continue to apply ice over the course of the next 3 days
- Keep foot elevated as much as possible
- Avoid weight bearing for at least 24 hours
- Begin weight bearing as soon as tolerated
- Return to participation should be gradual and dictated by healing process

Ankle Sprain Rehabilitation

- Athletes with a sprained ankle should complete supervised rehabilitation prior to returning to practice and competition.
- Rehabilitation should include appropriate strengthening and proprioceptive (balance board) components.
  - Athletes returning from moderate to severe sprains should wear a protective orthosis for at least 6 months.

Ankle Sprain Prevention

- Bracing may be effective in reducing the incidence of ankle sprains, particularly in those athletes with a history of sprains or those recovering from injury.
- Strength, agility, and flexibility should be emphasized throughout the season.
- Players should be taught to jump ‘up’ the net, not ‘to’ the net, and to have court awareness of the center (net) line, avoiding penetration under the net.

Jumper's Knee

- Also known as patellar tendonitis.
- An overuse injury from cyclic loading from repetitive jumps and landings.
- Hamstring and quadriceps tightness is a significant predisposing factor.
- Incidence increases with harder playing surfaces; uncommon in beach volleyball.

Jumper's Knee-Symptoms

- Focal anterior knee pain below kneecap
- Grade symptoms based on interference with athletic performance:

Grade 1 - Pain after practice or game
Grade 2 - Pain at beginning of activity, disappearing after warm-up and reappearing after activity.
Grade 3 - Pain during and after activity but not affecting athletic performance.
Grade 4 - Pain during and after activity, affecting athletic performance

Jumper's Knee-Treatment

- Activity modification
- Ice; NSAID
- Stretching/strengthening
- Bracing (open-patellar sleeve, Chopat strap)
- Extracorporeal shock wave therapy has demonstrated efficacy similar to surgical debridement in recalcitrant cases
- Surgical debridement 70-90% good results in chronic cases

Jumper's Knee-Prevention

- Modifications in frequency of jump training, plyometrics, and strength training.
- Coaching proper approach (shorter steps) and vertical jump.
- Maintenance of hamstring and quadriceps flexibility.
- Avoid hard playing surfaces (concrete, linoleum)

Knee Internal Derangement

- Meniscus tears
- ACL tears
- MCL tears

History & Likely Pathology

- Acute swelling > ACL tear, peripheral meniscal tear, intraarticular fracture, patellar dislocation, extensor mechanism disruption
- Non-contact injury with "pop" > ACL tear, patellar dislocation
- Contact injury with "pop" > ACL, collateral ligament, or meniscal tear; fracture
- Twisting injury > ACL or meniscal tear
- Locked knee > Displaced meniscal tear
- Dashboard injury > PCL tear, patellar injury

Meniscal Tears

- History
  - Trauma, swelling, locking, giving way, etc.
- Physical Exam
  - Effusion in 50%.
  - Joint line pain in 80%.
  - Pain with provocative testing (McMurray, Apley, duck-walk)
  - Associated instability.

Ligament Injuries - ACL

- > 200,000 new ACL injuries per year
- History
  - –Non-contact injury with knee in extension (70%)
  - –Hemarthrosis within a few hours
  - –Audible pop in 50%
  - –More common in females

ACL Injury : Nonsurgical Management

- Activity modification
- Rehabilitation emphasizing:
  -proprioceptive training
  -quadriceps/hamstring strengthening
  -co-contractions for deceleration and cutting
- Bracing: may aid in restraint of anterior shear forces in light recreational activities.

ACL Risk-Anatomic

- When cutting and landing, women tend to be more upright (less hip and knee flexion) than men.
- Either excess rotation of the femur on the tibia or excess anterior tibial translation must occur to cause an ACL tear.

PEP

- What is the PEP Program?

  The PEP (Prevent injury, Enhance Performance) Program is a highly specific 15-minute training session that replaces the traditional warm-up. It was developed by a team of physicians, physical therapists, athletic trainers and coaches, and has funding support from the Amateur Athletic Foundation of Los Angeles (AAF).

PEP Program

- **The Goals of the Program are to:**

1) Avoid vulnerable positions
2) Increase flexibility
3) Increase strength
4) Include plyometric exercises into the training program
5) Increase proprioception through agilities

ACL Treatment

- Ability to cope with an ACL tear based on age, activity level, and knee laxity
- A desire to return to pivoting sports of moderate to high demand warrants ACL reconstruction.

Ligament Injuries - MCL

*Most common isolated ligament injury

*Commonly associated with ACL injury

History:

-Valgus force

-Medial sided knee pain

Ligament Injuries - MCL

- Treatment
  - Non-surgical for all grades is well established
  - Early quadriceps and hamstring strengthening
  - Functional brace for early return to sports
  - Time Line

Grade	Crutches	Hinged brace
I	1 -2 weeks	None
II	2 - 3 weeks	2 - 3 weeks
III	3 - 4 weeks	3 - 4 weeks

Hand and Finger Injuries

- Sprains and strains most common
- Fractures less common
- The thumb and small finger most at risk
- MCP joint of thumb most commonly injured

Hand and Finger Injuries – Treatment and Prevention

- Most can be treated with RICE
- Taping and splinting may be useful
- Deformity or mal-alignment warrant referral
- Prevention = proper blocking technique; proper ball inflation pressure

The Rotator Cuff

- The rotator cuff muscles help stabilize the shoulder joint and are involved in the rotational movements of the shoulder.
- They are put under a significant strain when the arm goes through an overhead motion such as throwing or serving, making them susceptible to injury.

Rotator Cuff Strain - Symptoms

- Pain with overhead activity
  - Serving
  - Spiking/attacking
  - Blocking
- Typically lateral and posterior in location
- Usually non-radiating nor associated with numbness
- Stiffness
- Possibly worse at night

Rotator Cuff Strain Treatment

- Ice
- Activity modification
- NSAID
- Restore pain free range of motion
- Rehabilitation
  - Rotator cuff
  - Scapular stabilizers

Suprascapular Nerve Palsy

- Often asymptomatic
- Traction on the nerve from overhead swing; ‘floater’ serve
- Infraspinatus atrophy

Lumbar Spine Injuries in Athletes

- 7-27% incidence
- Sport dependent
  - Gymnastics
  - Ballet
  - Water Sports
  - Diving
  - Weight lifting
  - Wrestling
  - Volleyball
  - Running
  - Golf
  - Baseball/Softball
  - Football

Lumbosacral Strain - Volleyball

- From repetitive jumping and landing (axial loading)
- From repetitive torsion and hyperextension during spiking and serving
- Typically muscular in origin (strains)

History and Physical

- Quantitate morbidity
- Identify psychosocial factors
  - Effect of pain
  - Secondary gain
  - Parental issues
- Eliminate possibility of tumors, infection, and neurological crisis
- Determine clinical syndrome
  - Non mechanical LBP
  - Mechanical LBP
  - Sciatica
  - Neurogenic claudication

Management and Rehab Principles

- Non operative care:
  - "In most conditions, when and whether an athlete can return to a sport is based on their ability to perform the rehabilitation program and to apply the program to the sport."
    - Watkins RG, Spine in Sports

Non-operative Care

- Goals
  - Stop inflammation/pain
  - Restore strength
  - Restore flexibility
  - Restore aerobic conditioning
  - Restore balance and coordination
  - Adapt program to sports-specific training
  - Return to Sport Slowly
  - Return to full function

Non-operative Care

- Anti-inflammatory agents:
  - ICE
  - NSAIDS
  - Medrol dose pack, Prednisone
  - TENS
  - ESI
  - Bracing
  - Bed Rest- minimal if any

Non-operative Care

- Rehabilitation
  - Trunk Stabilization (8 categories, 5 levels)
    - The First Category: "dead bug"
    - The Second Category: “partial sit-ups”
    - The Third Category: “bridging”
    - The Fourth Category: “prone”
    - The Fifth Category: “quadruped”
    - The Sixth Category: “wall slide”
    - The Seventh Category: “ball”
    - The Eighth Category: “aerobic”

    - 2-7 days/week advance as able to level 5

Return to Play

- When Rest and Rehab finished
- Full, pain free range of motion
- Normal strength
- Appropriate aerobic fitness
- Adequate spinal awareness and mechanics
- Sports related skills without pain

Playing Area Safety

- Padded posts and stanchions
- Proper side and end-wall padding
- Safe distance from crowd
- Good playing surface free of debris and sweat
- Good lighting

Equipment Safety

- Ankle braces
- Knee pads
- Proper ball inflation

Conditioning Tips to Avoid Injury

- Proper sport specific conditioning
  - Strength
  - Flexibility
  - Proprioception
- Jump training (PEP)
- Warm-up and cool down
- Promote teamwork and communication

Heat Illness

Prevention of Heat Illnesses (NCAA)

- Allow for 7-10 days to acclimatize
  - 80% acclimatization
- 2 months for full acclimatization

General Information

- White → Reflects 30% of the heat
- Dark → Reflects 18% of the heat
  (skin or clothing)
- Male: Lower % body fat
- Female: Higher % body fat
  - Core temperature must get higher before sweating occurs

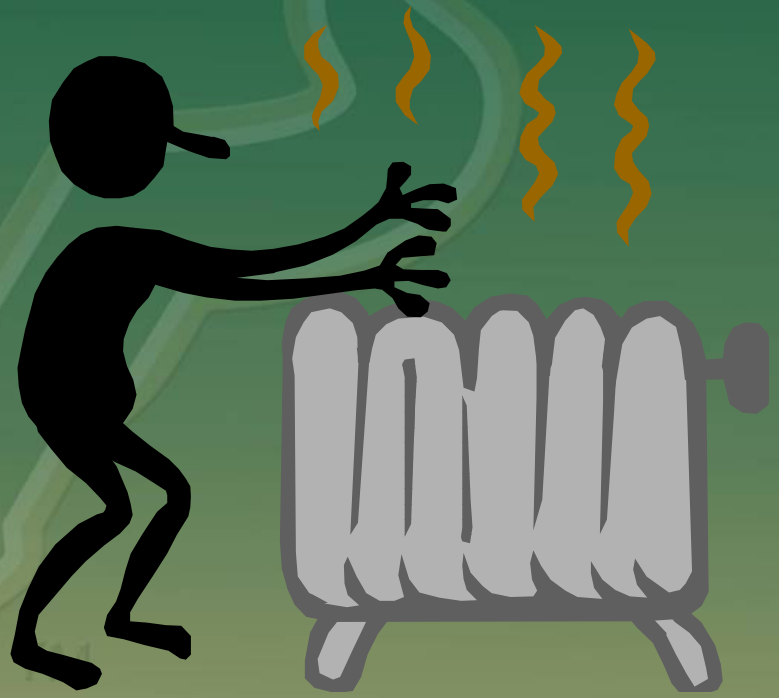
- Core temperature: for every one degree of increased core temperature – there is an increase in heart rate (about 10 beats/1 degree)

Heat Illnesses - Causes

- Dehydration
  - 60+ % of total body water
  - Sugar in the stomach prevents rehydration
  - Observe until urination occurs (key)
- Electrolyte Imbalance
  - Depletion occurs over a period of 2-5 days
  - Ion-chemical charge

Types of Heat Illnesses

- Heat rash
- Heat syncope
- Heat cramps
- Heat exhaustion
- Heatstroke



Fluid Replacement

- Before exercise: drink 17-20 oz. 2-3 hrs prior.
- 17-20 oz 10-20 min. prior to exercise.
- During exercise: 7-10 oz. every 10-20 min.
- After exercise: within 2 hrs, drink enough to replace weight loss from exercise.

USF Health Sports Medicine

http://usf**ortho**.com

MRSA

Methicillin-resistant Staphylococcus aureus

The Silent Killer

Ways to combat MRSA:

- Keep hands clean
- Shower immediately after exercise
- Keep cuts and scrapes covered
- Wear clean exercise clothes
- Don't share razors or other personal items
- Notify the athletic trainer of any unusual sores

If you remember nothing else….

- Volleyball is a relatively safe sport.
- Most acute injuries occur in front row players and can be minimized with proper coaching and conditioning, court awareness, and in the case of ankle injuries, the use of a brace
- Most chronic injuries are related to frequency and technique and can be modified

Summary

- Most acute volleyball injuries occur from contact and involve the lower extremity.
- Prevention strategies include:
  - Pre-season and in-season programs for strength and flexibility
  - Coaching proper technique and court awareness for front row players
  - Use of protective equipment (ankle braces)

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