Knee & Ankle Injury Prevention

Objectives:

- Participants will be able to identify the most common ankle and knee injuries.
- Participants will be able to demonstrate 2 training principles to prevent lower extremity injuries.
- Participants will be able to demonstrate 2 exercises to improve ankle stability during cutting maneuvers.
- Participants will be able to demonstrate 2 exercises to decrease knee valgus during dynamic loading activities.
A Leg to Stand On

Mechanics: Progressive Loading

- Foot
- Knee
- Hip
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Injuries: Traumatic
- Fractures
- Sprains/Ruptures (ACL, MCL, ATFL, CFL)
- Strains (Quad, Hamstrings, Adductor (groin), Gastrocs, Hip flexor)

Injuries: Overuse
- Shin Splints
- Sever’s
- Plantar Fasciitis
- Neuroma’s
- Anterior knee pain
- Osgood-Schlatter’s
- ITB syndrome
A Leg to Stand On
BALANCE OF STRENGTH
AGONIST
ANTAGONIST

A Leg to Stand On
BALANCE OF MUSCLE LENGTH
EXTENSORS
FLEXORS
A Leg to Stand On

B alance of forces

Prevention:
Where is the weakest link?

Keeping alignment in dynamic situations is the key
Athletic Stance

- Foundation for all movement
- Must allow for linear, lateral, and multi-directional movement

Correct Athletic Stance

- Shoulders
  - Pushed forward, shoulder blades retracted
- Arms
  - Elbows bent, hands relaxed
- Knees
  - Slightly inside of feet
- Feet
  - Wider than shoulder width
  - Pointed straight ahead
Correct Athletic Stance

- **Back**
  - In neutral

- **Hips**
  - Pushed back

- **Knees**
  - Pushed forward over toes for positive shin angle

A Leg to Stand On

**BALANCE OF MUSCLE LENGTH**

Static Stretching:
- Improve length
- Done POST-performance
- Intensity

Stretching program:
- Quads v. Hamstrings
- Gastroc v. Ant. Tibialis
- Adductor v. ITB/TFL
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BALANCE OF STRENGTH

- Hypertrophy and/or Endurance
  - Weight Room
- Neuromuscular Control
  - Proprioception
  - Deceleration
  - Core stability

AGONIST

ANTAGONIST

Lauren Arnold, PT, DPT Performance Enhancement, 2009
Teaching proper landing is key!
Requires eccentric strength

A Leg to Stand On

Teaching Control:
- Proximal to distal
- Even to Uneven
- Static to Dynamic
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CORE FIRST:
- Proper static activation
- Endurance
- Proper dynamic activation

Squats: Form for Landing

- Sit back and keep weight on heels
- Keep chest up, upper/lower back arched and tight, feet shoulder width apart
- Descend slowly until tops of thighs are parallel to floor
- Keep knees over midfoot and drive heels into floor
Teaching proper landing is key!

Box step offs

• Initially, teach athlete to land on outside of foot, rolling to inside to dissipate forces
• As strength increases, athlete can land only on ball of foot

Jump and Hop Progression
Plyometric Sequence

- Landing phase
  - Eccentric loading
- Amortization phase
  - Time on the ground
  - Time between eccentric loading and concentric contraction
- Take off phase
  - Concentric contraction

Deceleration Training

- Proper position of the feet, legs, and upper body to dissipate forces is crucial for the prevention of injuries and for sports performance!

- Injuries primarily occur during deceleration and rotational circumstances
Components and Length of warm up

- Based on objective of training session
- Range from 10-30 minutes
- Depends on environmental conditions and intensity of practice
Progression of warm up

- General to specific
- Low intensity to high intensity
- Linear to lateral to multidirectional movements

Sample Warm Up

- Ankling
- Walking knee hug
- Cradle walk
- Shin grabs
- Easy skip
- Soldier kicks
- Inchworms
- Spidermans
- High skipping
- Lateral shuffle
- Carioka
- Falling starts
- Get up and go
- Back Pedal

Lauren Arnold, PT, DPT Performance Enhancement, 2009
Cutting Progression

- In place stabilization hop
- Walk → stabilization hop
- Jog → stabilization hop
- Run → stabilization hop
- In place cutting maneuver
- Walk → cutting maneuver
- Jog → cutting maneuver
- Run → cutting maneuver

Jump and Hop Progression

- Moving Hops
  - Linear
    - Forward
    - Backward
    - Medial/lateral
  - Multi-directional
    - Star pattern
    - On command
Components of a sound strength training program

- Core strength
- Power exercises
- Knee dominant exercises
- Hip dominant exercises
- Horz. pressing movements
- Horz. pulling movements
- Vertical pressing movements
- Vertical pulling movements

Knee & Ankle Injury Prevention

Bibliography:

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