Injury Prevention Strategies and Mechanics for Softball Players

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Objectives

- Identify similarities and differences among the sports of baseball and softball
- Develop a better understanding of the phases of the windmill throwing motion.
- Gain knowledge on injury prevention recommendations for softball pitchers.
- Discuss treatment concepts/ideas to prevent both upper extremity and lower extremity injuries.
Ball Specifics for Sport

- **Softball**
  - 11” circumference for 12 and under and
  - Increases to 12” circumference for all other ages
  - Weight is between 6.25 oz and 7 oz for an official 12” ball.

- **Baseball**
  - 9 to 9.25” in circumference for all ages
  - 5 to 5.25 oz in weight
Field Dimensions

Softball

• Base path is 60’ distance for all ages once over 10 years old.
• Pitchers mound progresses from 35’ to 43’ with no elevation present.

Baseball

• Depending on organization base path progresses from 60’ to 75’ to 90’ for HS and beyond.
• Pitchers mound moves from 46’ to 54’ to 60’ 6” for HS and beyond.
• There is a 10” elevation of the pitchers mound in baseball
Injury Rates and Body Region

- **Softball**
  - 2004 survey based study of 180 college pitchers
    - 92 overuse injuries
    - Only 17 in the lower extremity
  - Sources site 40-52% of injuries involve the UE

- **Shoulder**
- **Upper Arm/Biceps**
- **Elbow**
- **Back**
- **Knee**
Phases of Overhand Motion

- Knee Up
- Foot Contact
- Max ER
- Release
- Max IR
- Wind-up
- Stride
- Arm Cocking
- Arm Acceleration
- Arm Deceleration
- Follow-through
Phases of Windmill Motion

Windup
PHASE 1

6 o'clock
PHASE 2

3 o'clock
PHASE 3

12 o'clock
PHASE 4

9 o'clock
PHASE 5

Follow-through
PHASE 6

Ball Release
Phase I – Windup

- Motion is initiated
  - Pelvis is stabilized
  - Increased gluteal max activity
  - Interscapular region – rhomboids
  - Weight is shifted to the right leg, arm begins moving into extension
  - Variance exist from player to player at this phase
Phase II – 6 o’clock

- Arm proceeds from windup, down to 6 o’clock and forward to 3 o’clock
  - Scapula is stabilized by the rhomboids
  - Infraspinatus and supraspinatus muscle activity is high
  - Glut medius stabilizes and begin to create torque at the pelvis
Phase III – 12 o’clock

- Arm moves from 3 to 12 o’clock
  - Muscle activity begins to increase
    - Glut medius stabilizing pelvis
    - Posterior Deltoid, Infraspinatus, teres minor, rhomboids
    - Humeral elevation and external rotation occurs
Phase IV – 9 o’clock

- Arm moves from 12 o’clock down to 9 o’clock
  - Glut medius continue to stabilize
  - “Posting” of plant leg occurs
  - Highest biceps activity
  - Serratus anterior activity increases
  - Pectoralis major and subscapularis assist in IR as arm begins to accelerate
Phase V - Ball Release

- Arm moves from 9 o’clock to ball release
  - Momentum is transferred to adducted arm
  - Pectoralis major, subscapularis, serratus anterior muscle activity remains high
  - Biceps brachii activity remains high
  - Biceps eccentric contraction occurs with highest shoulder distraction stress and elbow extension torque
Phase VI - Follow Through

- Final stage of the windmill motion
  - Forward progress of the humerus is stopped
  - Elbow flexion occurs
Baseball and Softball Differences

- **Baseball**
  - Humerus is abducted during the overhead motion
  - Humeral internal rotation contributes to power of pitch
  - Eccentric muscle action assist in deceleration of the arm

- **Softball**
  - Humerus in plane of the body
  - Adduction across the body contributes to power of the pitch
  - Deceleration of arm by contact with hip
Baseball and Softball Similarities

- Pectoralis major involved in power generation of the shoulder
- Stabilization against anterior forces by anterior wall muscles
- Serratus anterior involved in scapulohumeral rhythm
- LE and core musculature is critical for high level performance and injury prevention
Rehab and Treatment Ideas

- Legs and Hips are the base to the kinetic chain
  - 51-55% of total energy from pitch transferred from LE

- Understand which phase if problematic for each individual athlete as well as the specific muscles that are involved

- [http://www.youtube.com/watch?v=KFnoidp3Sd0](http://www.youtube.com/watch?v=KFnoidp3Sd0)
Rehab and Treatment Ideas

- Basic rotator cuff exercises
- Scapular exercises: I, Y, T
- Gluteal maximus and medius
Rehab and Treatment Ideas

- Phase I and II
  - Kettlebell Drills (walking, karoke, lunges, in place)
    - Allow arm to swing, can add pronation/supination
  - Tubing (extension, flexion)
    - Ok to work in hyperextension of the shoulder
Rehab and Treatment Ideas

- Phase III
  - TRX (rows, stabilization in different ranges)
  - Straight bar (inverted row)
  - ½ kneeling Swiss ball stabilization
Rehab and Treatment Ideas

- Phase IV
  - Pull Ups (different grips – assistance as needed, hanging drills)
  - Tubing (OH pendulums)
  - Shoulder press is ok depending specific injury/issue (light with weight)
Rehab and Treatment Ideas

- Phase V and VI
  - Manual Resistance
  - Med ball (keep arm adducted next to body)
    - Sitting on heels to tall kneeling
    - Standing Rotation
  - Push-ups
  - Pushing Variations
  - Kettleball Drills
Rehab and Treatment Ideas

- Entire kinetic chain needs to always be assessed
- Maintain proper “stacking” of the pelvis, core, scapular region, and cervical musculature with all drills
- Transfer of energy from the lower body to the distal segments is critical for performance and reduction of injuries
Rehab and Treatment Ideas

- UE/LE Disassociate Drills
  - Reformer
    - Seated leg movements with trunk rotation
    - Standing leg movements with trunk rotation
    - Tall kneeling rotations
  - Swiss Ball
    - Dead Bug Progression
  - Med ball with step up
Rehab and Treatment Ideas
Screening and Injury Prevention

- Research still lacks in some areas for softball
- No consistent signs to look for as with baseball (GIRD, decreased horizontal adduction, stride leg IR)
# Pitch Count Recommendations

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References


Additional Resources

- Pitchers interval throwing program

- Data based ITP – position specific
  - http://www.ncbi.nlm.nih.gov/pmc/articles/PMC164345/

- High School ITP