Sport Injuries: patterns, Trends and Current Thinking

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Current Roles

- Audit coaches and performance staff at institutions of high performance, globally.

- Mentor performance staff members on multiple facets of sport excellence.

- Gate keeper duties and enforcement driver for action points agreed upon by key stake holders.
Purpose of Discussion

- Become a better coach, athlete and or practitioner
- Become a better consumer of sports medicine services
- Improve communication among athletes, coaches and performance service providers
- Improve understanding of kinesiological factors for wellness
- Improve work quality and capacities
- Reduce acute and chronic injury occurrences
- Reduce lost man hours and competition absences
- Improve coach/athlete reporting skills
Most Common Injuries: Our Data Sets

- Muscle: Hamstrings, Adductors, Quadriceps, Adductors, Gastrocnemius, Soleus, Abdominals/Spinal/Paraspinals
- Tendon: Achilles, Patella, Rotator Cuff, Biceps
- Ligamentous: Ankle, Knee, Elbow, Foot, Pelvis
- Hip Labrum
- Capsule
- Fascia
- Stress Fractures and or Reactions
The 4 Drivers of Injury

- Programming
- Lifestyle Factors
- Biomechanics
- Sports Medicine Strategies
Co-conspirators

- Bias
- Myopics
- Silos
- Blame Game
- Unawareness
Movement Control Factors

- Muscle Systems
- Skeletal System
- Fascial Systems
- Tendons, Ligaments, Bursae, Fat Pads and Capsules
- Joint Hydraulics
- Brain, Spinal Cord and CNS
- Proprioceptors
- Lymphatic System
- Organs
Ergonomics of Muscle Performance
Fluid Dynamics and Joint Positions
Movement Screens or Grids

• Coaches have been using this concept for centuries, its called watching practice intently.

• Every item on the training schedule is a movement screen

• One must train the eye to see using landmarks, planes, axes and angles.

• Seeing in real time is built upon video and photo review skills.
Have a Biomechanical Sound Model: For All Sporting Movements and Activities

Athletes have positive and negative movement strategies built upon experiences, injuries and misconceptions!

- Leverage variables to gain speed
- Use lever and axes systems
- Apply Joint and muscle timing systems, alarm theory
- Sense Momentum factors
- Crave Speed of movement
- Manipulate Support Phases to influence postures
- Reveal issues during Flight Phases
- Pathways of limbs and athlete’s C of G never lie
Perceptional Grids for Analysis

- Range of Movement
- Speed of Movement
- Joint Sequencing
- Reactiveness
- Sequencing of Gross Movements
- Sequencing of Fine Movements
- Postures of Key Support Mechanisms
- Symmetries
- Aberrations
- Readiness/Body Language
- Perspective of Observation
- Axes of Rotation (Longitudinal, transverse)
- Contact/Flight time relationships
Interventions

- Mobility Exercises
- Prescribed Flexibility or Fascial Exercises
- Activation Exercises
- Soft Tissue Manipulation
- Joint Manipulation
- Acupuncture
- Recue correct themes or movements
- Plan B
- Plan C
- Cessation of session
- Refinement of Long Term Rehab/Pre-hab Strategies
The Big Rock-Return to Play

• Acute Rehab, Transitional Training and Real Time, Real World Demands

• Component analysis of sessions and games to build final testing of readiness is critical

• Cognitive/Perceptional tasks are late stage but critical factors of analysis
The Power of Perspective

REAR VIEW, 300 frames per second

What else, where else?
It is a bit more complicated than strength, power and rate of force development.

Movement signatures are critical factors in the return to play paradigm.
Variability of a “force signature” during windmill softball pitching and relationship between discrete force variables and pitch velocity

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abstract

This study assessed reliability of discrete ground reaction force (GRF) variables over multiple pitching trials, investigated the relationships between discrete GRF variables and pitch velocity (PV) and assessed the variability of the “force signature” or continuous force-time curve during the pitching motion of windmill softball pitchers. Intraclasse correlation coefficient (ICC) for all discrete variables was high (0.86–0.99) while the coefficient of variance (CV) was low (1.4–5.2%). Two discrete variables were significantly correlated to PV; second vertical peak force (r(5) = 0.81, p = 0.03) and time between peak forces (r(5) = 0.79; p = 0.03). High ICCs and low CVs support the reliability of discrete GRF and PV measures.
An Overlooked Factor

- Joint positioning
- Joint Dynamics
Athlete History, Genetics and Sport Demands

- Induction Interviews
- Debrief Systems
- Gate Keepers
- Networks
- Key Genetical Markers
Debates

• Acute, Rote Sports Medical Procedures versus Holistic, Concurrent Return to Play Schemes and Philosophy
The World of Sports Medicine

- Injections, Surgeries, Scripts, Appliances, Therapies and Exercises

Sports Medicine

- Disciplines required for sports medicine:
  - Anatomy
  - Physiology
  - Strength Training
  - Injury prevention, diagnosis, and treatment
  - Psychology
  - Nutrition
  - Knowledge of sports and athletic activity
Training gaps

- Plan A, Plan B, Plan C and timelines for reintroduction
Ergonomics, KPIs and Hierarchies

• Isolatory Versus Concurrent Mythologies
Experimental Findings

• Progressions, Time Lines, Landmarks and Task Ergonomic Analyses
Progressions

- Walking
Dribbling Exercises

Ankle

Knee

Calf
Plyometrics
Advanced Plyos
THROWING

- Multi-directional
- Multi-planar
- Velocity Factors
- Load Factors
- Complexity
Simple Power Development throws
TRANSCERENCE THROWS
Complexities

- Closed Versus Open Chain Factors
Acceleration

A complex, real time, real world task.
Over Development, Over training and Other Program blunders

• Sport Postures and Demands
• Train More and Harder Myths
• Force/Size Bias
• Energy System Bias
• Menu Bias by Athlete
Patterns and Trends

- LSU study on hamstrings
- NHL study on adductor/shoulder factors
- Annular Disc Tear in therapists
The Fatigue Factor in all Equations

- TMG and EMG studies
- Weak versus Tired Muscle Systems?
- Session, Week, Cycle and Games Factors
Change of Direction

- Kinematic Factors
- Kinetic Factors
- Cognitive Perceptive Factors
Thanks