Knee Injury Prevention Program (KIPP®)

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Workshop Goals

• Gain and understanding of how and why ACL injuries occur.

• Learn about prevention programs and how they can be used.

• Participate in a demonstration of Lurie Childrens’ KIPP!
What is the ACL?

- **ACL = Anterior Cruciate Ligament**
  - Stabilizes the knee
  - Protects the *meniscus* from shearing forces due to twisting and pivoting.

- **Meniscus**
  - C-shaped piece of cartilage
  - Shock absorber
  - Meniscus injury makes knee prone to early degenerative arthritis (wear-and-tear arthritis)
Why are ACL injuries a serious concern?

• **ACL injuries typically require surgery** and/or months of intensive rehabilitation to enable return to sport.

• Athletes often miss whole seasons of play.

• Average treatment cost is **$17,000 - $25,000** per injury.

• Regardless of treatment, people with ACL injuries are **10x more likely to have degenerative arthritis** of the knee at an early age.
How do ACL injuries occur?

• 70-80% occur without any contact with another player, while athlete is:
  – Landing from a jump
  – Decelerating (slowing down quickly)
  – Changing direction (cutting)
  – Overly fatigued/overtrained
Who gets ACL injuries?

• **Girls are 4-6 times more likely to tear the ACL** than boys playing similar sports.

• ~20,000 ACL injuries occur each year in high school female athletes.

• **Soccer and basketball** are the two girls’ sports with highest rates of ACL injury.
Why are girls more prone to ACL injuries?

- **Hormonal differences**
  - May play a role, but data so far are NOT conclusive
  - Some studies show the ACL is more susceptible to injury after ovulation phase of the menstrual cycle.
  - However, others show no relationship between the menstrual cycle and susceptibility to ACL injury.
Why are girls more prone to ACL injuries?

• Anatomic differences
  - Girls’ wider pelvis creates a larger quadriceps angle (Q-angle), however, this has not been consistently linked with ACL injury risk.
Why are girls more prone to ACL injuries?

- **Anatomic differences**
  - Girls have a smaller bony tunnel (notch) for the ACL.
  - 2 studies show increase ACL injury risk, however several others show no link between notch width and ACL injury risk.
  - Individuals with knee hyperextension and generalized joint hypermobility are 2-3x more likely to injury their ACL.
  - However, anatomy is not modifiable
Why are girls more prone to ACL injuries?

- **Neuromuscular differences**
  - Most important risk factor
  - Girls use their muscles differently than boys to control knee motion.
  - Muscle activation differences start to appear during the adolescent growth spurt, which for most girls occurs between 11 and 12 years of age.

- Neuromuscular risk factors are modifiable!
Can you find the 4 main neuromuscular differences between these photos?
1) **Quadriceps dominance** – Girls tend to use quadriceps more than hamstrings.
2) **Leg dominance** - Girls tend to have one leg that is stronger than the other.
3) **Ligament dominance** – Girls tend to rely on ligaments instead of muscles to stop knee motion.
4) **Poor core stability** - Girls tend to have less coordination between trunk and leg movements.
How can ACL injuries be prevented?

- **Neuromuscular training programs**
  - Reduce adolescent girls’ ACL injury risk by 72%.
  - Examples include:
How can ACL injuries be prevented?

- **Neuromuscular training programs**
  - Key components:
    - Progressive **strengthening** for core/leg muscles
    - **Plyometrics** that progress in difficulty
      - Jumping in place >> traveling jumps
      - Two-legged landings >> one-legged landings
    - **Supervision and feedback** to athletes on their form
      - How to avoid high risk knee positions
      - How to use safe landing and deceleration techniques
Our previous research

• In 2006, we implemented our neuromuscular training program called the Knee Injury Prevention Program (KIPP) in 46 Chicago public high schools.
  – For full details see attached article, “Effect of neuromuscular warm-up on injuries in female soccer and basketball athletes in urban public high schools: A cluster-randomized controlled trial.”

• 106 girls’ basketball and soccer teams participated.

• Schools were randomized to intervention or control group.
Our previous research

• Intervention coaches used the KIPP warm-up before all practices and games.

• Control coaches used their usual warm-up.

• All coaches reported athlete participation and injuries over the course of one season.
Our previous research

- Statistical analysis compared injury rates between intervention and control groups.

- The KIPP warm-up significantly reduced:
  - ACL injuries by 80%
  - Knee sprains by 70%
  - Ankle sprains by 62%