BRIDGING THE GAP FROM PHYSICAL THERAPY TO PERFORMANCE

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DISCLOSURES

I have no financial interest in any of the products and trade names used during this presentation

ABOUT ME

- 12 Years as an athletic trainer
- Middle school to professional athletes
- Developed Midwest Orthopaedics at Rush's Functional Sports Assessment
- Regional coordinator for Athletico's ACL 3P program
- Risk assessments and return to sport testing for 8 years
- Head athletic trainer at Oak Park River Forest High School for 9 years
- Head athletic trainer for the McDonald's All-American basketball teams for 8 years
- Strength and Conditioning coach at Dominican University

CROSSING THE BRIDGE

- Returning to Baseline
- Addressing Unresolved Risk Factors
- Addressing Fear

- Exercise Progressions
- Testing Performance
- Managing Expectations

CURRENT OUTLOOK ON RETURNING TO HIGH LEVEL PERFORMANCE

- 81% return to sport participation, 65% return to prior level of play (Ardern et al, 2014)
- 84% returned to any level of activity, 52% returned to pre-injury sport level, 51% returned to high-level/competitive sport (Grassi et al 2015)
- 74% return to sport in High School and College athletes, 62% of recreational athletes (Shelbourne et. al 2014)
- 73% had good objective results and satisfactory subjective results, 57% returned to same level of sport activity (Andriolo et al. 2015)
- 23% return after second tear (Hewett et. al, 2016)
- MOON group: less than 50% at 2 years (Wright et. al, 2014)

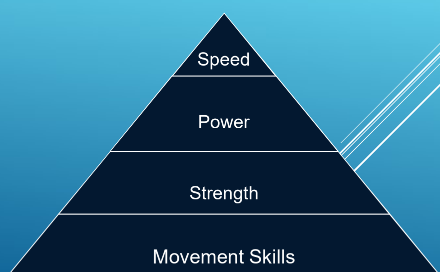
ORTHOPEDIC BASELINING

- Preseason/preinjury data is ideal
  - Anthropometrics
  - Range of motion and stability assessments
    - Functional Movement Screening
    - Fusionetics
    - Dorsavi
    - Customized Ortho Screen
  - Proprioception
    - Y-Balance (UE/LE)
    - Star Excursion
    - BESS
  - Hop Testing
    - Single, triple, crossover, hop for time
    - 34% who achieve 90% limb symmetry do not achieve pre-injury capacity (Wellstandt et al, 2017)
- If no preseason data, rely on contralateral side

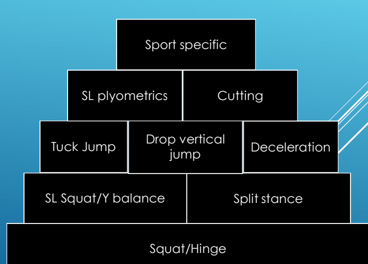
ADDRESSING UNRESOLVED RISK FACTORS

- Compare to baseline data
- Recognize deficits in bilateral movement patterns
- Identify movement deficits in uninvolved vs involved limb
- Compensatory patterns since surgery
- Anecdotally common deficits
  - LE specific
    - Lack of eccentric control
    - Poor frontal plane control during transition from Knee FLX to EXT
    - Quad dominant patterns
  - Global
    - Lack of core stability and bracing
    - Poor conditioning

ADDRESSING UNRESOLVED RISK FACTORS



ADDRESSING UNRESOLVED RISK FACTORS



ADDRESSING UNRESOLVED RISK FACTORS

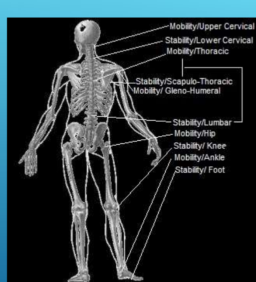
- Novice (1-2 years)
  - Early improvements are neuromuscular
  - Allows to train at lower percentage and still produce training effect
  - Need variety in movement skills
  - Need little variety in progressively overloaded movement
- Intermediate (2-4 years)
  - Train with "intent"
  - Can do more variety of progressively overloaded drills
  - Have mastered the "basics"
- Advanced (4+years)
  - Benefit from periodization
  - Seeking specific adaptation in bi-motor ability

ADDRESSING UNRESOLVED RISK FACTORS

- Training should be based on the training experience of the athlete
- Highly skilled athletes can be beginners in terms of strength and performance training
- **Our athletes/patients are novice skill level**
- Everything works…. for about 6 weeks
- Need to learn how to produce force through basic movement patterns
- **Basic training carries over to all activities**

ADDRESSING UNRESOLVED RISK FACTORS

- Big toe- mobility
- Mid-foot- stability
- Talocrural- mobility
- Knee- stability
- Hip- mobility
- Lumbar- stability
- Thoracic- mobility
- Scapulothoracic- stability
- Glenohumeral- mobility
- Cervical spine- stability
- OA/AA- mobility
- Elbow- stability
- Wrist- mobility



ADDRESSING UNRESOLVED RISK FACTORS

- Foot Stability- neutral foot
- Ankle Mobility- dorsiflexion
- Knee Stability- knee tracking in line with foot
- Hip Mobility- ER, IR, Flexion and Extension
- Lumbar Stability- neutral spine
- Thoracic Mobility- thoracic extension
- Cervical Stability- packed neck
- GH Mobility- external rotation

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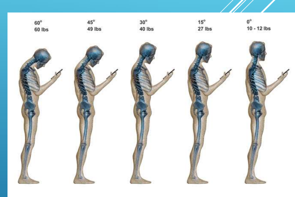
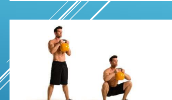


ADDRESSING UNRESOLVED RISK FACTORS

- Squat progression
  - Leg press
  - Assisted squat
  - Squat from target
  - Goblet squat
  - Front squat
  - Back squat
- Split stance progression
  - Split squat
  - Reverse lunge
  - Lunge
  - RFE split squat

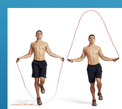
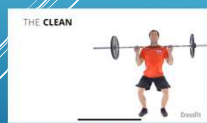
- Single leg squat progression
  - Step-up
  - Step-down
  - Assisted SL squat
  - SL squat- on box
  - SL squat to/from target



ADDRESSING UNRESOLVED RISK FACTORS

- Lack of eccentric control
  - Bridge walk-outs
  - Ball leg curls – double to single
  - Glute-ham raises
  - Russian Hamstring curls
  - Deep squat with eccentric focus
  - Cleans
  - Falling lunges
  - Plyometric split squats
  - Jump rope - Initial force attenuation at foot and ankle
  - Skill acquisition - Jump training, cutting drills, deceleration
  - Add sports specifics



ADDRESSING UNRESOLVED RISK FACTORS

- Poor frontal plane control during transition from Knee FLX to EXT
  - Side plank progressions – change hip and knee position, add contralateral ABD
  - Adding IR/ADD force to existing therex early
    - Step up
    - Step up w/knee drive
    - Reverse lunge w/knee drive
    - Split squat
    - Single leg squat
  - Skier squat jumps
  - Cutting Progressions
  - Training motions with feedback
  - Rule out ankle and foot contribution


ADDRESSING UNRESOLVED RISK FACTORS

- Quad dominant patterns
  - Planks with hip extension
  - Kettlebell swings – single and double*
  - Kettlebell cleans
  - Good Mornings
  - Deadlifts
  - Single leg kettlebell deadlifts
  - Glute-ham raises
  - Russian hamstring curls

ADDRESSING UNRESOLVED RISK FACTORS

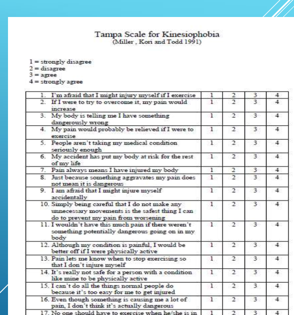
- Core Stability and Bracing
  - Resisting movement before producing movement
  - Teaching proper breathing and TA activation on day 1
  - Plank progressions
  - Adding UE involvement in LE therex
    - Overhead squat
    - Thrusters
    - Lunge with overhead press
    - Battle ropes with isometric holds
  - Kettlebell swings – single and double*
  - Turkish Get-ups

ADDRESSING UNRESOLVED RISK FACTORS

- Fatigue may lead to at risk mechanics (Tamura et al 2016)
- Poor Conditioning – warmup/end of session
  - Nustep intervals (How many steps in 10 minutes?)
  - Bike intervals
    - High intensity interval training (Dorien et al 2018)
      - Tabata – 20 minute warmup, 20 seconds max effort, 10 seconds rest x 8
      - Resistance changes – 10 seconds max effort at moderate resistance, 20 seconds at max resistance, 90 seconds of rest x 10
  - Jump rope – work to double unders and sprints
  - Incorporate UE and core
    - Rowing
    - Airdyne

ADDRESSING FEAR

- Quantifying Fear
  - Tampa Kinesiophobia scale
  - ACL – RSI (Anterior Cruciate Ligament Return to Sport After Injury scale)
  - KOOS – Knee Injury and Osteoarthritis Outcome Score
  - IKDC
- Comparing to baseline data
- Progressions – challenge and encourage
- Fear of the unpredictable – introducing unpredictability into training
- Have objective return to sport criteria



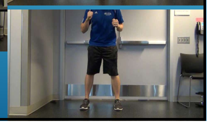
Tampa Scale for Kinesiophobia
(Miller , Kori and Todd 1991)

1 = strongly disagree
2 = disagree
3 = agree
4 = strongly agree

1. I'm afraid that I might injury myself if I exercise	1	2	3	4
2. If I were to try to overcome it, my pain would increase	1	2	3	4
3. My body is telling me I have something dangerously wrong	1	2	3	4
4. My pain would probably be relieved if I were to exercise	1	2	3	4
5. People aren't taking my medical condition seriously enough	1	2	3	4
6. My accident has put my body at risk for the rest of my life	1	2	3	4
7. Pain always means I have injured my body	1	2	3	4
8. Just because something aggravates my pain does not mean it is dangerous	1	2	3	4
9. I am afraid that I might injure myself accidentally	1	2	3	4
10. Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my pain from worsening	1	2	3	4
11. I wouldn't have this much pain if there weren't something potentially dangerous going on in my body	1	2	3	4
12. Although my condition is painful, I would be better off if I were physically active	1	2	3	4
13. Pain lets me know when to stop exercising so that I don't injure myself	1	2	3	4
14. It's really not safe for a person with a condition like mine to be physically active	1	2	3	4
15. I can't do all the things normal people do because it's too easy for me to get injured	1	2	3	4
16. Even though something is causing me a lot of pain, I don't think it's actually dangerous	1	2	3	4
17. No one should have to exercise when he/she is in pain	1	2	3	4

ADDRESSING FEAR - PROGRESSION

- Jumping and landing technique
  - Mini Squat
  - Full Squat
  - Squat with calf raise
  - Squat with calf raise to eccentric reload
  - Vertical jump with UE assist – slowly increasing height of jumps
  - Vertical jump with pause
  - Continuous Vertical jump
  - Box jump
  - Box drop to vertical jump
  - Tuck jump with a pause
  - Continuous tuck jump
  - Agility into tuck jump
  - Single leg jump with a pause
  - Continuous single leg jump
  - Bilateral jumps with perturbations

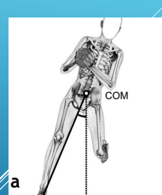


ADDRESSING FEAR - PROGRESSION

- Deceleration
  - Star Lunges
  - Jog to anterior/posterior lunges
  - Anterior jump to land with eccentric focus
  - Ball scoop while jogging
  - Sprint to lunge stop
  - Sprint to lateral stop
  - Sprint to 180 degree turn
  - Sprint to reactive stop

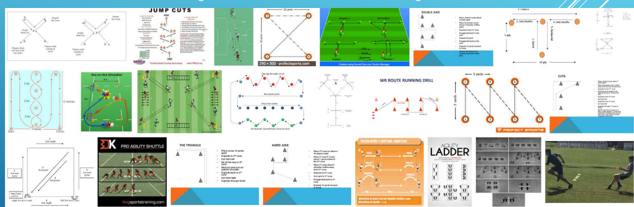
ADDRESSING FEAR - PROGRESSION

- Cutting Progression – monitor form
  - Ladder drills
  - Anterolateral skater hops
  - Dynamic 1-2 cut
  - Zig zag run around cones
  - Zig zag run to cones
  - Random cuts at slow pace
  - Speed Cuts
  - Reactive speed cuts



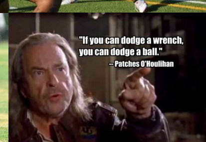
ADDRESSING FEAR - PROGRESSION

Cutting and Deceleration drills…no shortage of resources



ADDRESSING FEAR

- Introduce unpredictability
  - Perturbations throughout
  - Running with a ball catch or scoop
  - Sprint to lunge stop
  - Change of direction reaction drills
  - Tennis ball reaction
  - Mirror drill
  - Dodgeball
  - Tag



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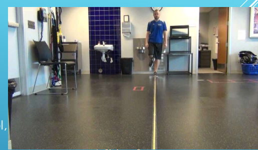
TESTING PERFORMANCE



- Range of Motion assessment
- Proprioceptive Testing
- Hop Testing
- Quality of movement
  - Analysis of high risk motions – eccentric control, frontal plane control, lack of compensation
    - Jumping
    - Landing
    - Cutting
    - Pivoting
    - Change of Direction
    - Deceleration
- Testing when fatigued

MANAGING EXPECTATIONS

- Scaling up from non-contact to contact activities
  - Yes, 70% are non-contact (Wilk et al, 2017)
  - Goal is avoiding unpredictable obstacles on the field
- Setting time limits on team activities
  - 50% of a practice – not just the first half
  - Same constraints for competition once full practice is completed
- Discussions about life-long habits
  - Dynamic Warmup (FIFA 11+ or similar)
  - Checkups on form @ preseason (BASELINING!)
  - Moving away from sport specialization (Anderson et al, 2016)

CONSIDERATIONS FROM DAY 1

- Approach each exercise with the ultimate goal in mind
  - Not ROM or strength expectations for physician
  - Mini squats in early PT are for landing mechanics and explosiveness on the field
  - Progress constantly, be prepared to modify (ability, pain)
  - Change rep schemes to address deficits
  - Change approach to sessions based on feedback
- Address risk factors early
  - Conditioning
  - Core - Plank progressions – activating w/all therex
  - Eccentric loading with UE assist
  - Add ADD/IR forces
  - WATCH FORM! – find balance between addressing deficits and overcorrection