

Management of The Injured Soccer Player

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Objectives



Objectives

- Understand the specific physical demands of a soccer player
- Recognize the most common soccer related injuries
- Improve the rehabilitation management of the soccer player from clinic to field
- Understand criterion-based return to play considerations

Background



Background



Background



Background



#HamlinePiper

Background



Background



Soccer Demands

- Contact team sport with intermittent bouts of high-intensity actions with intermittent rest periods
- Primarily aerobic power but “game changing” anaerobic actions
- Change of direction ever 3.5 sec, high-intensity action every 60 sec and max effort every 4 min
 - 1200 - 1400 changes of direction per game

Soccer Demands



Soccer Demands



Soccer Demands



Soccer Demands

- Youth vs Professional
 - Lower total distance
 - 5 - 8 km/match, which is 3-4 km/match less than professional
 - Physical performance markers more similar 3-4 years after peak height velocity (17-18 years)
- Female vs Male
 - Less high intensity activities
 - Lower volume

Soccer Demands



Soccer Demands

- Positional Differences
 - Forwards
 - Midfielders
 - Defenders
 - Goalkeepers

Forwards

- More deceleration actions from higher accelerations
- Shuffling movements with sprints
 - Curved sprints
- Lower volume of distance
- Frequent physical contact and jumping for headers

Midfielders

- Cover larger volume of distance
- Diagonal and arc movements to evade opponent
- Central vs wide midfielder
 - Wide players = more high speed running/sprinting
 - Central players = more total volume and change in accelerations

Defenders

- Jogging, skipping, shuffling
- Less sprinting and running, more lateral and backwards
- Physical contact and backwards jumping for headers
- Wide vs central defenders
 - Wide players = more high speed running/sprinting
 - Central players = least physically demanding

Goalkeepers

- Explosive movements
- Forwards, lateral, shuffle, getting up from the ground
- Jumping
- Physical contact
- Goal kicks and punts

Goalkeepers



Match Length Differences

Age Group	Game Length	Overtime Periods	Size	Number of Players
17U, 18U & 19U	Two 45' halves	Two 15' halves	#5	Full-sided
15U & 16U	Two 40' halves	Two 15' halves	#5	Full-sided
13U & 14U	Two 35' halves	Two 10' halves	#5	Full-sided
11U & 12U	Two 30' halves	Two 10' halves	#4	9v9; goalkeepers
9U & 10U	Two 25' halves	NONE	#4	7v7; goalkeepers
6U, 7U & 8U	4-10' quarters	NONE	#3	4v4; No goalkeepers

Field Size Differences

Standards Chart



	U6	U7	U8	U9	U10	U11	U12	U13
Field Size	30x20 yards	30x20 yards	30x20 yards	47x30 yards	47x30 yards	75x47 yards	75x47 yards	112x75 yards
# of Players	4v4	4v4	4v4	7v7	7v7	9v9	9v9	11v11
GK	No	No	No	Yes	Yes	Yes	Yes	Yes
Playing Times	4x 8 min	4x 8 min	3x 15 min	2x 25 min	2x 25 min	2x 30 min	2x 30 min	2x 35 min
Break Times	5 min	5 min	5 min	10 min	10 min	10 min	10 min	15 min
Ball Size	3	3	3	4	4	4	4	5
Goal Size	4'x6'	4'x6'	4'x6'	6.5'x18.5'	6.5'x18.5'	6.5'x18.5'	6.5'x18.5'	8'x24'
Offside	No	No	No	Yes	Yes	Yes	Yes	Yes

Substitution Differences

- Most youth level competitions have unlimited subs
- Higher level competition has limitation on re-entry

Common Soccer Injuries



Common Soccer Injuries

- Professional level
 - 60-87% involve lower extremity
 - 57-80% occur in matches vs training
 - 25% due to foul play
- Rates similar for amateur and youth
 - Females 15-19 years old = highest incidence
- Dominant limb injuries more frequent across all levels
- Goalkeepers have lower rate vs field players at all levels

Muscle Strains

- Increases with age, previous history, later portions of match, pre/post season
 - Women = 31%
 - Men = 35%
- Hamstrings, adductors, hip flexors/quadriceps, calf
 - Hamstring = variable time of season (UEFA = later, USA = early)
 - Adductors = overuse vs trauma
 - Quadriceps = kicking leg, preseason
 - Adductors and calf = later in season

Muscle Strains



Muscle Strains



Ligament Sprains

- Women = 19.1%
 - ACL more common compared to males
- Men = 18%
 - Primarily ankle
 - MCL more common compared to female
- Knee sprains less common but more serious in both genders

Ligament Sprains



ACL Mechanisms

- Defending Puts the Anterior Cruciate Ligament at Risk During Soccer: A Gender-Based Analysis (2015).

Brophy RH, Stepan JG, Silvers HJ, Mandelbaum BR

- Female soccer players 2-3x more likely to suffer ACL injury
- Primarily occurs during defending
 - Tackling, cutting
- In females, 80% of tackling involved contact compared with 54% in males
- Females more likely to injure their left leg compared to males
- Possibly due to leg dominance with kicking

ACL Mechanisms



ACL Mechanisms

- Tackling is the most at risk maneuver
 - Requires a last min reactive movement with LE in vulnerable position
 - Likely poor neuromuscular control and mechanics
- Potential sex-based differences in mechanism of noncontact injuries
 - Side to side hip abd and ER strength

ACL Mechanisms



ACL Mechanisms

- Although many occur via non-contact, 80% of injuries in the study were contact
- Similar results of other studies indicate majority of non contact injuries in non dominant leg (left)
- Soccer players at increased risk of ACL injury when defending and tackling, especially females, with over half due to contact mechanism

ACL Mechanisms



ACL Mechanisms

- *Mechanism of Anterior Cruciate Ligament Injury in Female Soccer Players, Asian J Sports Med (2017).*

Kaneko S, Sasaki S, Hirose N, Nagano Y, Fukano M, et al.

- Similar results - ACL injury during pressing in professional soccer players
- Non contact injuries during pressing more common in female players
- Most common age = 18 years old, reduced after the age of 20
- Previous study reported incidence was highest at 15-19 years of age

ACL Mechanisms

- Take Home
 - Players < 18 years old seem to suffer more non-contact defending ACL injuries
 - Older players seem to suffer = amount of contact and non contact defending ACL injuries
 - May be due to increased physical demands at higher levels
 - Physical maturation and improved neuromuscular control, possible reduction in non-contact injuries
 - Turf leading to increased incidence is inconclusive

Concussions

- 4 - 22% of all injuries involve head/neck
- Incidence higher in matches vs training
- Mechanisms of concussions
 - Head to body part
 - Against ground
 - Goal frame
 - Ball to unprepared player

Concussions



Concussions

- Player to player contact = highest proportion of concussions
 - Females > Males
 - Rarely with purposeful heading
- Age restriction on heading
 - Under 10 : prohibited
 - U11-12: limitation on time/touches per week
 - U13 plus: unrestricted

Rehabilitation Management

- **Subjective:**
 - Who, What, When, Where, Why
 - Soccer specific questions

Rehabilitation Management

- **Who:**
 - Age
 - Gender
 - Level of Competition
 - Position
 - In/Out Season
 - Other sports

Rehabilitation Management

- **What:**
 - Pain Level
 - Description
 - Effusion

Rehabilitation Management

- **When:**
 - Specific soccer actions
 - Trauma during what point
 - Pain develops during beginning, middle, or end of match/training

Rehabilitation Management

- **Where:**
 - Location
 - Kicking or non-kicking foot

Rehabilitation Management

- **Why:**
 - Contact or non-contact
 - Repetitive microtrauma
 - Injury history

Rehabilitation Management

- **Objective:**

- The basics
 - Gait, ADLs, ROM, strength, proprioception, palpation
- Special considerations
 - Plant leg vs kicking leg
 - Ankle DF in wt bearing
 - Goalkeeper diving

Rehabilitation Management

- **Clinic:**

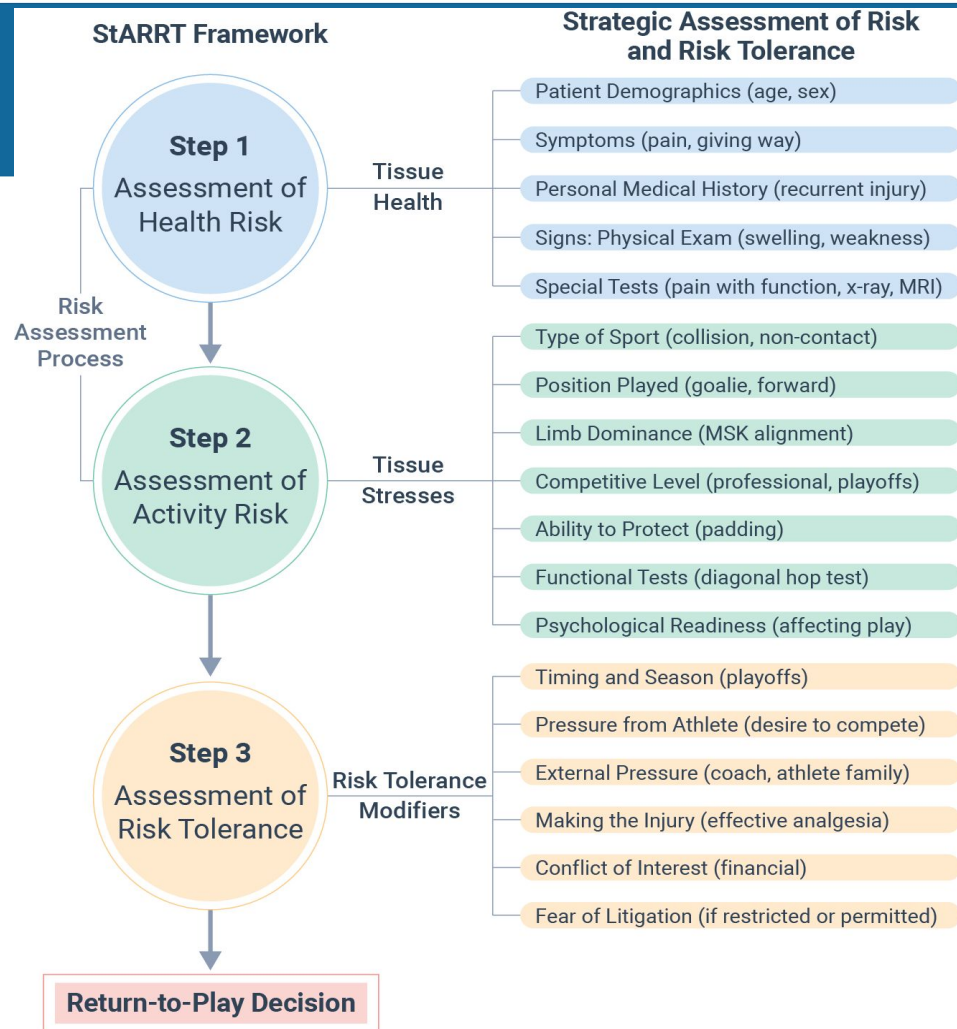
- The basics
 - Reduce pain/swelling
 - Normalize ROM, strength, gait, proprioception
 - ADLs
- Special considerations
 - Incorporate a soccer ball

Rehabilitation Management

- **Return to 3P's:**
 - Participation
 - Play
 - Performance

Rehabilitation Management

Assessment



Criterion-Based Return

- Interval kicking program
- Return to run program
- Return to sprinting progression
- Copenhagen adductor protocol
- FIFA 11+ Warm Up

Criterion-Based Return

- Interval kicking program
 - Arundale A, Silvers H, Logerstedt D, Rojas J, Snyder-Mackler L. An interval kicking progression for return to soccer following lower extremity injury. (2015)
- Progressive program
 - Basic kicking and passing
 - Passing and basic shooting
 - Advanced shooting
 - Increased intensity and distance
 - Initiating return to sport

Criterion-Based Return

- Return to run program
 - University of Delaware
- Controlled volume
- Treadmill or track

Criterion-Based Return

Running Progression*		
Level	Treadmill	Track
Level 1	0.1-mi walk/0.1-mi jog, repeat 10 times	Jog straights/walk curves (2 mi)
Level 2	Alternate 0.1-mi walk/0.2-mi jog (2 mi)	Jog straights/jog 1 curve every other lap (2 mi)
Level 3	Alternate 0.1-mi walk/0.3-mi jog (2 mi)	Jog straights/jog 1 curve every lap (2 mi)
Level 4	Alternate 0.1-mi walk/0.4-mi jog (2 mi)	Jog 1.75 laps/walk curve (2 mi)
Level 5	Jog full 2 mi	Jog all laps (2 mi)
Level 6	Increase workout to 2.5 mi	Increase workout to 2.5 mi
Level 7	Increase workout to 3 mi	Increase workout to 3 mi
Level 8	Alternate between running/jogging every 0.25 mi	Increase speed on straights/jog curves
<p>*Progress to next level when patient is able to perform activity for 2 mi without increased effusion or pain. Perform no more than 4 times in 1 week and no more frequently than every other day. Do not progress more than 2 levels in a 7-day period. Conversion: 1 mi = 1.6 km.</p>		

Criterion-Based Return

- Return to sprinting progression
 - Lorenz D, Domzalski S. Criteria-based Return to Sprinting Progression Following Lower Extremity Injury. Int J Sports Phys Ther. (2020)
- Three stages with high volume/low intensity to low volume/high intensity
 - Build capacity
 - Speed development, technique, build RSA
 - Max effort, sport specific

Criterion-Based Return

Return to sprinting progression

Step 1	Step 2	Step 3	Step 4	Step 1	Step 2	Step 3	Step 4	Step 1	Step 2	Step 3	Step 4
20 yd × 3 untimed	20 yd × 4 untimed	20 yd × 3	20 yd × 3	20 yd × 3	20 yd × 3	20 yd × 2	20 yd × 2	20 yd × 6	10 yd × 3	10 yd × 3	10 yd × 2
40 yd × 2 untimed	40 yd × 3 untimed	40 yd × 4	40 yd × 4	40 yd × 2	40 yd × 2	40 yd × 2	40 yd × 2	40 yd × 2	20 yd × 4	20 yd × 3	20 yd × 3
60 yd × 2 untimed	60 yd × 2 untimed	60 yd × 2	60 yd × 2	60 yd × 2	60 yd × 1	60 yd × 1	60 yd × 2	60 yd × 1	40 yd × 2	30 yd × 2	30 yd × 2
80 yd × 2 untimed	80 yd × 2 untimed	80 yd × 2	80 yd × 2	80 yd × 1	80 yd × 1	80 yd × 1	80 yd × 1	40 yd × 2	60 yd × 1	40 yd × 2	40 yd × 1
100 yd × 1 untimed	100 yd × 1 untimed	100 yd × 1	100 yd × 2	100 yd × 1	100 yd × 1	100 yd × 1	60 yd × 2	20 yd × 6	40 yd × 2	60 yd × 1	60 yd × 1
80 yd × 2 untimed	80 yd × 2 untimed	80 yd × 2	80 yd × 1	80 yd × 1	80 yd × 1	80 yd × 1	40 yd × 2	10 yd × 3	30 yd × 1	30 yd × 2	40 yd × 1
60 yd × 2 untimed	60 yd × 2 untimed	60 yd × 2	60 yd × 2	60 yd × 2	60 yd × 1	60 yd × 1	20 yd × 2		20 yd × 4	20 yd × 3	30 yd × 2
40 yd × 2 untimed	40 yd × 3 untimed	40 yd × 4	40 yd × 4	40 yd × 2	40 yd × 2	40 yd × 2			10 yd × 2	10 yd × 3	20 yd × 3
20 yd × 3 untimed	20 yd × 4 untimed	20 yd × 3	20 yd × 3	20 yd × 3	20 yd × 3	20 yd × 2		**Full subjective recovery	**Full subjective recovery		10 yd × 2
20 runs @ 940 yds	22 runs @ 1060 yds	23 runs @ 1100 yds	23 runs @ 1120 yds	17 runs @ 780 yds	15 runs @ 660 yds	13 runs @ 620 yds	13 runs @ 560 yds	19 runs @ 490 yards	19 runs @ 470 yards	19 runs @ 440 yds	17 runs @ 420 yds

50% intensity

75% intensity

90%+ intensity

Criterion-Based Return

Copenhagen Adductor Protocol



Criterion-Based Return

Copenhagen Adductor Protocol

Training protocol for the Adductor Strengthening Programme			
Week	Weekly sessions	Sets per side	Repetitions per side
Preseason (weeks)			
1	2	1	3-5
2	3	1	3-5
3-4	3	1	7-10
5-6	3	1	12-15
7-8	2	1	12-15
In season	1	1	12-15

Criterion-Based Return

FIFA 11+

PART 1 RUNNING EXERCISES - 8 MINUTES

<p>1 RUNNING STRAIGHT AHEAD</p> <p>Run straight ahead for 30 seconds. Then, turn 90 degrees to the right and run for 30 seconds. Repeat this pattern for the remainder of the 8 minutes.</p>	<p>2 RUNNING HIP OUT</p> <p>Run in a circle for 30 seconds. Then, run in a circle for 30 seconds. Repeat this pattern for the remainder of the 8 minutes.</p>	<p>3 RUNNING HIP IN</p> <p>Run in a circle for 30 seconds. Then, run in a circle for 30 seconds. Repeat this pattern for the remainder of the 8 minutes.</p>
<p>4 RUNNING CIRCULING PARTNER</p> <p>Run in a circle for 30 seconds. Then, run in a circle for 30 seconds. Repeat this pattern for the remainder of the 8 minutes.</p>	<p>5 RUNNING SHOCKER CONTACT</p> <p>Run in a circle for 30 seconds. Then, run in a circle for 30 seconds. Repeat this pattern for the remainder of the 8 minutes.</p>	<p>6 RUNNING QUICK FORWARDS & BACKWARDS</p> <p>Run in a circle for 30 seconds. Then, run in a circle for 30 seconds. Repeat this pattern for the remainder of the 8 minutes.</p>

PART 2 STRENGTH - PLYOMETRICS - BALANCE - 10 MINUTES

<p>7 THE BENCH STATIC</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>	<p>8 THE BENCH ALTERNATE LEGS</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>	<p>9 THE BENCH ONE LEG LIFT AND HOLD</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>
<p>10 SIDEWAYS BENCH STATIC</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>	<p>11 SIDEWAYS BENCH BACK & LOWER HIP</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>	<p>12 SIDEWAYS BENCH WITH LEG LIFT</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>
<p>13 HAMSTRINGS BEGINNER</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>	<p>14 HAMSTRINGS INTERMEDIATE</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>	<p>15 HAMSTRINGS ADVANCED</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>
<p>16 SINGLE LEG STANCE HOLD THE BALL</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>	<p>17 SINGLE LEG STANCE THROWING BALL WITH PARTNER</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>	<p>18 SINGLE LEG STANCE TEST YOUR PARTNER</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>
<p>19 SQUATS WITH TOE RAISE</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>	<p>20 SQUATS WALKING LUNGES</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>	<p>21 SQUATS ONE LEG SQUATS</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>
<p>22 JUMPING VERTICAL JUMPS</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>	<p>23 JUMPING LATERAL JUMPS</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>	<p>24 JUMPING BOX JUMPS</p> <p>Stand on a bench for 30 seconds. Then, stand on a bench for 30 seconds. Repeat this pattern for the remainder of the 10 minutes.</p>

PART 3 RUNNING EXERCISES - 2 MINUTES

<p>25 RUNNING ACROSS THE PITCH</p> <p>Run across the pitch for 30 seconds. Then, run across the pitch for 30 seconds. Repeat this pattern for the remainder of the 2 minutes.</p>	<p>26 RUNNING BOUNDING</p> <p>Run across the pitch for 30 seconds. Then, run across the pitch for 30 seconds. Repeat this pattern for the remainder of the 2 minutes.</p>	<p>27 RUNNING PLANT & CUT</p> <p>Run across the pitch for 30 seconds. Then, run across the pitch for 30 seconds. Repeat this pattern for the remainder of the 2 minutes.</p>
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**TWIN CITIES
ORTHOPEDICS**



**F-MARC
FOOTBALL
FEDERATION**

Criterion-Based Return

- LE testing battery
 - Hand Held Dynamometry
 - Y-Balance anterior reach
 - Single leg hop for distance
 - Triple hop for distance
 - Single leg vertical jump for height
 - Pro-agility test
 - Reverse 45 deg agility test
 - ACL - RSI

Criterion-Based Return

- Field:
 - Position Specific
 - Partial Training Introduction
 - Partial Training Intermediate
 - Full Training Competition Integration
 - Full Return

Position Specific

- Goals
 - Individual technical training and linear movements
- Entry Criteria
 - Little to no pain or swelling
 - Technical movement proficiency
 - LSI > 70%
- Guidelines
 - Planned exercises in specific order
 - Single or several tasks sequenced together
 - Appropriate work:rest ratio (1:3 - 1:5)
 - Submax linear running
 - No external defender

Position Specific

- Activities
 - Individual ball work
 - Dribbling
 - Juggling
 - Passing/receiving
 - Shooting
 - Heading

Position Specific



Position Specific



Position Specific



Partial Training - Introduction

- Goals
 - Advanced technical training and multidirectional movements
- Entry Criteria
 - No pain or swelling
 - Proper sagittal plane deceleration
 - Completed return to run program
 - Completed previous stage
- Guidelines
 - Varied exercises but still predictable
 - Link multiple tasks together
 - Decreasing work:rest ratio (1:1-1:2)
 - High speed running
 - Submax change of direction movements

Partial Training - Introduction

- Activities
 - Long distance passing/receiving
 - Dynamic shooting/dribbling
 - Outside neutral or target player for small sided games
 - Passing/movement patterns
 - Shadow attacking play

Partial Training - Introduction



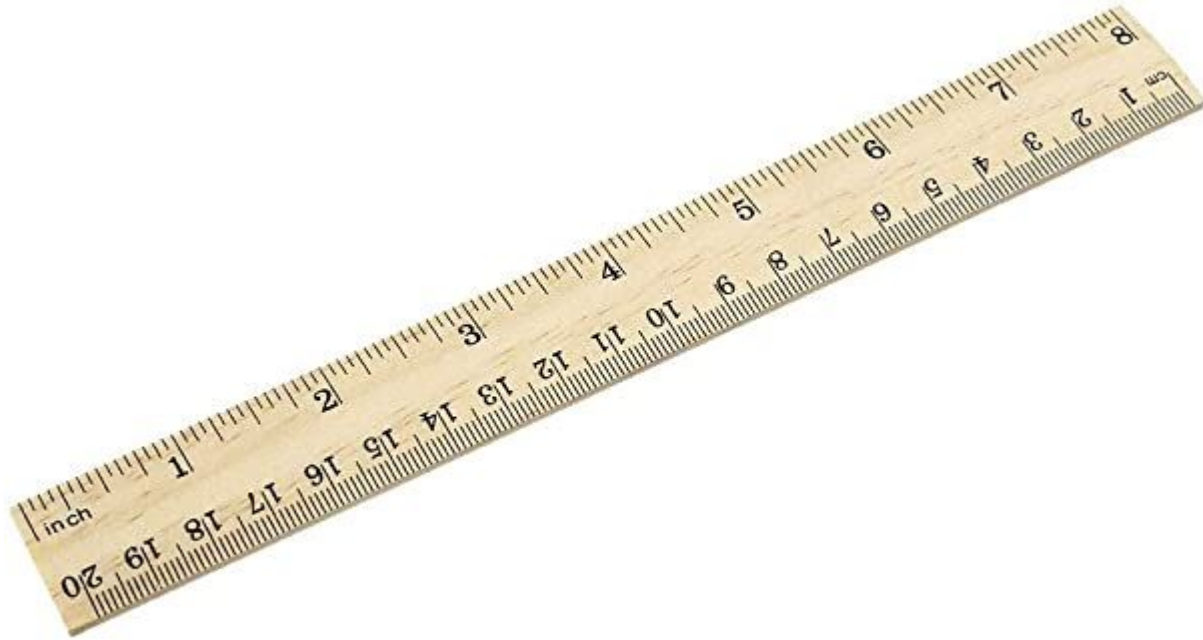
Partial Training - Introduction



Partial Training - Introduction



Does Size Matter?



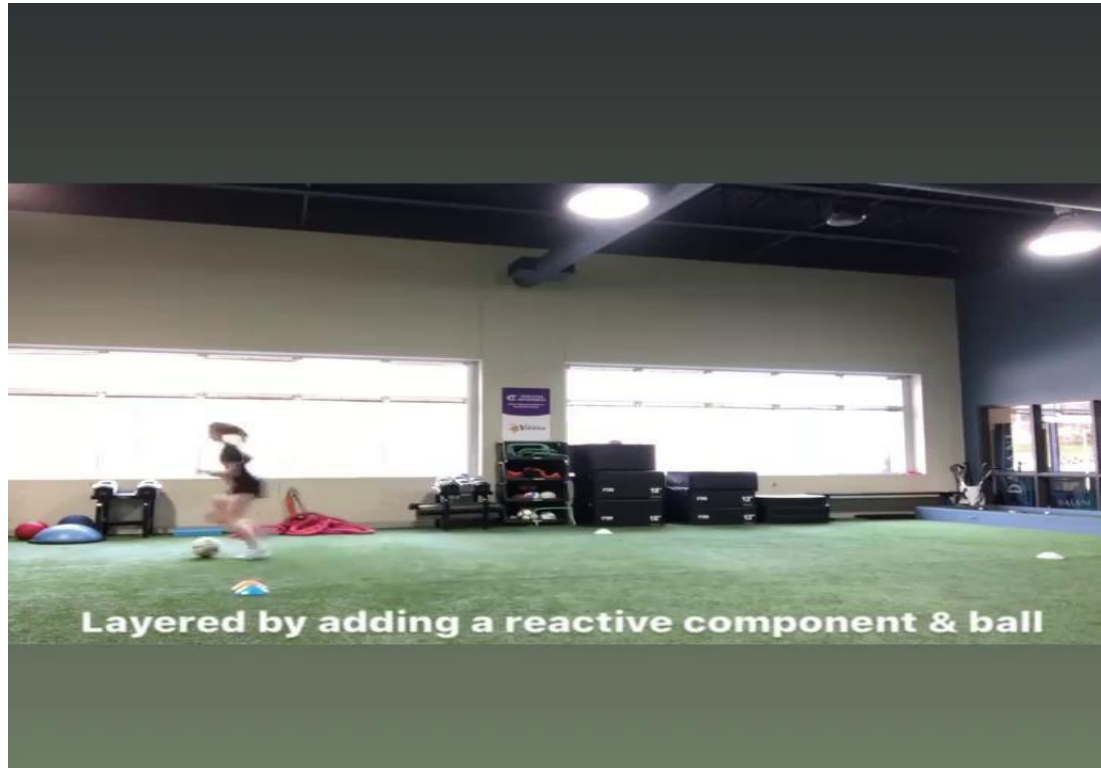
Partial Training - Intermediate

- Goals
 - Unplanned movements
- Entry Criteria
 - No pain or swelling
 - Proper frontal/transverse plane deceleration
 - Good pre-planned movement patterns
 - Completed previous stage
- Guidelines
 - Unpredictable exercises and sequence of tasks
 - Max speed sprints
 - High speed change of direction movements
 - Introduction to defending and contact

Partial Training - Intermediate

- Activities
 - Inside neutral player for small to moderate sided games
 - Shadow defending play
 - Attacking set pieces

Partial Training - Intermediate



Partial Training - Intermediate



Partial Training - Intermediate



Full Training Competition Integration

- Goals
 - Soccer specific conditions
- Entry Criteria
 - No pain or swelling
 - Good reactive movements
 - LSI > 90%
- Guidelines
 - Match like conditions and unpredictable play/tasks
 - Max speed & intensity with movements
 - Limited volume
 - Defending with full contact

Full Training Competition Integration

- Activities
 - Attacking/defending 1v1 to 4v4
 - Small/medium/large sided games
 - Defending set pieces
 - Transitions

Criterion-Based Return



Full Return

- Goals
 - Resume full training
- Entry Criteria
 - No pain or swelling
 - Good max speed movements in all planes
 - Good soccer specific reactive movements
- Guidelines
 - Unrestricted activities

Full Return



Case Study

- Patient: CS, 15 y/o male, R hip pain, R footed
- MOI: Jan 4th - Pain when striking a long pass
- Dx: AIIS avulsion fx
- Showcase in PHX Feb 15th - 18th, only GK on team
- Pain with kicking, running, squatting
- O: Pain with resisted hip flex, tightness with hip ext ROM, normal gait, favors with DL/SL squat, TTP AIIS region

Case Study

- 1/29 - Tx 1: Hip flex iso, prox glute activation, hip flexor/quad stretching
 - Resume light jogging, static GK catching, biking
- 2/1 - Tx 2: No pain with squats, running, jumping
 - Still pain with end range hip flex and resisted testing
 - Increased hip flex iso, hip ext progressions, dynamic GK catching
- 2/4 - Tx 3: Tightness buttock region (piriformis), nonpainful hip ROM or resisted testing
 - Resisted hip flex in multiple angles, lateral movements introduction, increased linear running intensity

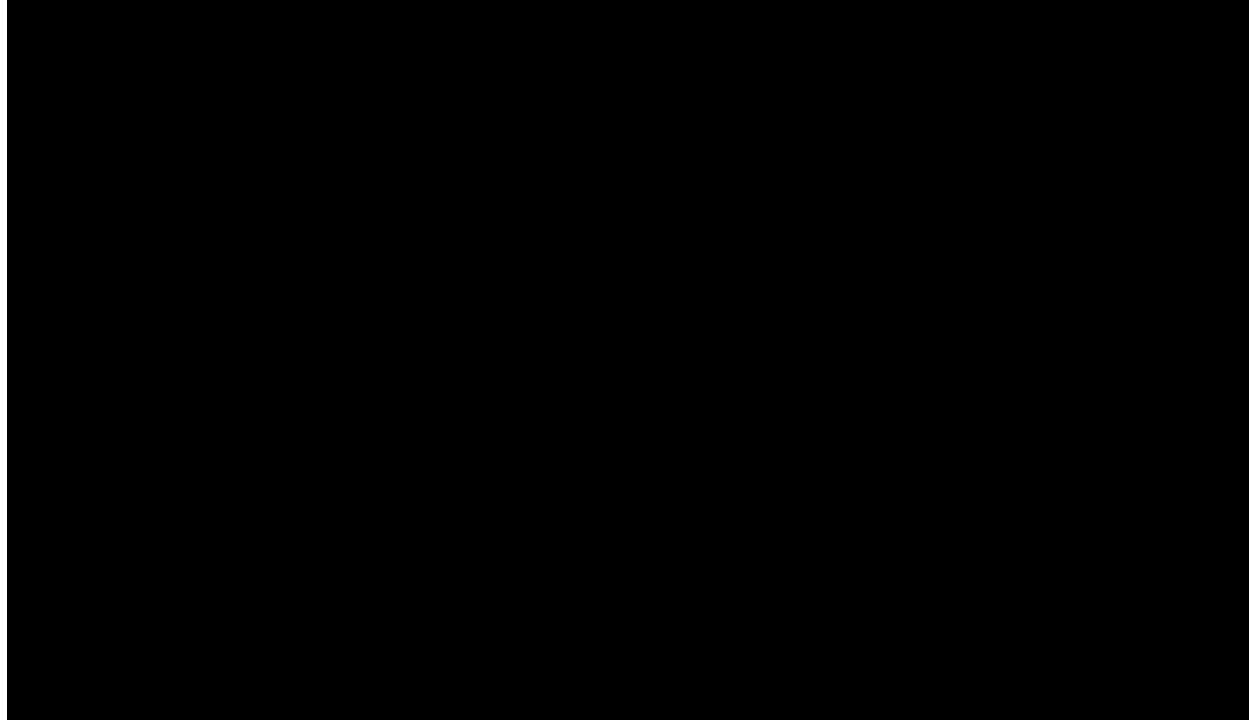
Case Study

- 2/8 - Tx 4: Full range with no pain
 - Return to kicking progressions, increase GK specific training, play ½ scrimmage
- 2/11 - Tx 5: Soreness with kicking but resolved, scrimmage was good
 - Return to full training, progress kicking protocol - GK punts
- 2/14 - Tx 6: Anterior soreness with punts but resolved after 1 day
 - Rotational core/trunk progressions, education on hip spica

Case Study

- 2/15 - 2/18: Tournament Play
 - Modified goal kicks
 - No re-injury
 - Successfully played 3 games

Case Study



Citations

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Last Remarks



Thank You

