

Physical Activity Promotion Following ACLR

Objectives

- 1) Clinicians will understand the disproportions in physical activity among individuals following ACLR and their healthy age-matched peers.
- 2) Clinicians will recognize and understand the need for implementation of general physical activity promotion following ACLR in a clinical setting.
- 3) Clinicians will understand the recommendation for implementing general physical activity promotion in a clinical setting.
- 4) Clinicians will demonstrate how to apply clinical recommendations in everyday practice setting using recommendations, evaluating, and creating specific recommendations that fit the need of each individual patient.

Definitions

Physical Activity: any bodily movement produces by skeletal muscle that required energy expenditure. This can include household tasks (cleaning, laundry cooking), occupational, sports, yardwork, conditioning, etc. (Dasso 2019)

Exercise: subcategory of physical activity that is planned, structured, repetitive, and purposefully focused on improvement or maintenance of one or more components of physical activity (Dasso 2019)

Project Outline

1) Introduction

- a. Current rehabilitation
 - i. Focus on resolving impairments
 - ii. Returning to sport/activity training and testing
 1. Expecting they fully return to sport/activity, and many do not
 2. Approximately 81% of individuals return to any level of sport, 65% return to preinjury level of sport, only 55% return to competitive level (Arden 2014)
 - a. If not returning to their previous, structure sport, what physical activity will they be doing? Will they remain active?
 - iii. Physical activity habits not addressed
 1. Physical activity and step count change significantly following ACLR

2) Deficits

- a. Individuals following ACLR report high levels of knee function with low levels of pain and persistent quadriceps strength deficits
 - i. However, there was a lack of significant relationship between objectively measured PA and patient reported assessment of PA
 1. Disconnect between perception of individuals with ACLR compared to objective measure of MVPA (Kuenze 2019 PA and clinical outcomes)

- b. Hx of ACLR spent significantly less time in MVPA had significantly lower step count than compared to control (Bell)
 - i. Only 24% of ACLR group met 10,000 steps per day compared to 42% of control group (Bell)
 - ii. ACLR group participated in 15 minutes less PA a day resulting in 5500 minutes less per year (Bell)
 - iii. ACLR group demonstrated 1611 fewer steps per day resulting in approximately 600,000 steps less per year (Bell)
 - iv. ACLR group participated in 43 less minutes of moderate-to-vigorous intensity ambulation/cadence (>100 steps per min) compared to uninjured controls (Lisee 2021)
- c. Individuals an average of 8 years following ACL injury and/or reconstruction were participating in 13.5 minutes less daily physical activity spent in MVPA than compared to uninjured peers (Toomey 2022)
 - i. Previously injured females spent even less time in MVPA, 10.8 less minutes than compared to males (Toomey 2022)
- d. Females following ACLR were 2.54 time worse off than healthy females for engaging in greater than 150 minutes of PA (Kuenze Sex Diff)
- e. Physical activity increased 2 to 4 months following ACLR, however, did not increase 4 to 6 months following ACLR (JOSPT CSM Wellsandt 2022)
- f. Between 6-12 months post ACLR adolescents demonstrate lower daily steps (24% less) and engage in fewer minutes of MVPA per day (33% less) than compared to adults (Kuenze Adolescents 2022)
 - i. Adolescents are less likely to meet adolescent PA guidelines compared to adults to meet PA guidelines 6-12 months post-ACLR (Kuenze Adolescents 2022)
- g. Those with Hx of ACLR, objectively measured PA NOT significantly related to self-reported PA level, patient reported knee function, time since surgery, or involved quad strength (Kuenze 2019 PA)
 - i. Individuals may be overestimating their own behavior
 - ii. Self-reported knee efficacy, Landing Error Scoring System Score and not returning to sport were associated with daily steps (Baez 2019)

3) Importance/outcomes of Deficits

a. Effects of knee injury

- b. MSK injury has been identified as primary cause for reduced participation in PA (Arden 2011)
 - i. Ceasing PA at young age (ACL injury age) could negatively influence PA participation across lifespan (Jose 2011)
- c. Majority of knee injuries occur in adolescents and early adulthood (Whittaker 2021 OA and Cartilage)
 - ii. Need to intervene at this age
 - 1. Form habits for the remainder of lives during this time
- iii. Less daily time spent in MVPA was associated with worse KOOS self-reported knee function related to sports and recreation (Toomey 2022)

1. Previously injured youth who spend less time in MVPA also have difficulty with squatting, running, jumping, kneeling, twisting/turning on injured knee up to 12 years following injury (Toomey 2022)
 - a. 10 years following injury is considered highest risk for developing PTOA (Toomey 2022)
 - i. Very important time to intervene

b. Physical Activity Consequences

- a. Physical inactivity is primary predictor of wide variety of chronic disease and premature mortality (Biswas 2015)
- d. Absence of physical activity due to non-weightbearing restrictions results in cartilage thinning and atrophy (Souza 2012)
- e. Physically inactive participants had higher knee pain intensity compared to participations with higher physical activity levels (Skou 2018)
 - i. Even 8 years following ACL injury and/or reconstruction, spending less time in MVPA leads to (Toomey 2022)
 1. Increase mortality risk
 2. Cardiometabolic risk
 3. Obesity markers
 - a. Participating in MVPA is protective against these markers

f. Post-Traumatic Osteoarthritis (PTOA)

- ii. Greater burden of PTOA in young adults following collateral ligament injuries and reconstructions than compared to other injuries/non-injured peers (Wellsandt)
 1. Particularly between ages of 15-35 years (Whittaker 2021 OA and Cartilage)
 - a. 6-fold greater risk for structural knee OA (Whittaker 2021 OA and Cartilage)
 - a. ACL injury increases risk of OA by eightfold within 11 years of injury (Snoeker 2020)
 - b. Patients with ACL + concomitant injury are higher risk for developing PTOA than ACL alone (Whittaker Presentation)
 - c. Risk for total knee after ACL injury in 20 times greater during 3rd decade of life (Abram 2019)
 - d. Risk for total knee after ACL injury is 7.5 times greater during 4th decade of life (Abram 2019)
 - g. Many young individuals believe they are not at increased for OA (Whittaker Presentation)
 - iii. Only 2% believed they were at increased risk

h. Difficulties with Returning to Sport

- i. RTS is limited in ability to assess the frequency, time, and intensity of PA (Kuenze 2021 ACL for beyond RTS)
- j. Approximately 81% of individuals return to any level of sport, 65% return to preinjury level of sport, only 55% return to competitive level (Arden 2014)
 - i. If not returning to their previous, structure sport, what physical activity will they be doing? Will they remain active?
- k. Only 14% of youth undergoing ACLR meet RTS criteria (Toole 2017)

- iv. Not meeting RTS criteria is 4-fold increase in re-tear
- 1. Following injury (Whittaker Presentation)
 - v. 8% of youth drop out of sport after injury
 - vi. 20% with an ACL tear don't ever return to sport
 - vii. Increased fat 1 year following injury
- m. Psychosocial**
 - viii. Attitudes, priorities, and perceptions of exercise-based activities *directly* influence current and future exercise behaviors (Wiese-Bjornstal 2010 AND Pickens 2005)
- c. Physical Activity Benefits**
 - 1. Engaging in physical activities that promote joint health and preserve articular tissue integrity (Whittaker OA and Cartilage 2021)
 - a. Addressing movement adaptation while promoting normal joint loading habits (Whittaker OA and Cartilage 2021)
 - b. General physical activity participation shown to be significant for MSK health, cartilage health and control of adiposity (Whittaker OA and Cartilage 2021)
 - c. Educating on lifelong MSK health and mobility (Whittaker Presentation)
 - i. Remain active to remainder of lives, not just near future if returning to specific sport
 - ii. Individual's report wanting to engage in exercise to minimize long-term consequences and without restriction later on in life (Truong 2020)
 - n. High levels of PA may be protective against OA (Hafer 2019)
 - ii. May mitigate mechanical risk factors of knee OA
 - 1. Concentric knee extension muscle power and femoral anterior displacement

4) Recommendation

- a. Need to shift to a secondary prevention model (Whittaker Presentation AND Palmieri-Smith 2017)
 - 1. Identify and slow down onset of symptomatic OA in pre-clinical populations
 - ii. Intervening and educating during crucial time frame
- b. 4-6 months post ACLR (JOSPT CSM Wellsandt 2022)
 - i. Physical activity increased 2 to 4 months following ACLR, however, there was no increased at 4 to 6 months following ACLR (JOSPT CSM Wellsandt 2022)
 - 1. Need to ensure promotion of physical activity is happening at this time frame and individuals are meeting physical activity recommendations to prevent future knee health problems and lack of physical activity following ACLR in the future
 - a. Still do not know optimal physical activity during rehabilitation
 - i. Nothing to suggest guidelines are harmful
- c. 3-10 years following injury (Ezzat 2018)

- g. Facilitating adherence
 - i. Social environment/groups, family or peer support had greatest impact for continued exercise (Holt 2020)
 - ii. Exercise/activities need to be fun and enjoyable (Holt 2020)
 - iii. Exercises/activities need to be pain-free (Holt 2020)
 - iv. Having positive attitude toward exercise-based activities and physical activity was important factor that influenced participation and adherence (Truong 2020)
- h. Address barriers to exercise/physical activity
 - i. Lack of time (Holt 2020)
 - ii. Lack of motivation (Holt 2020)
 - iii. Lack of understanding (Holt 2020)
 - iv. Lack of confidence (Holt 2020)
 - v. Physical or psychological barrier limiting their ability to engage in exercise-based activities, regardless of return to sport (Truong 2020)
 - 1. Unexpected and prolonged recovery timelines, persistent symptoms, and weight gain lead to difficult and prolonged acceptance
 - 2. Especially difficulty during adolescents when very formative time and challenge to get through (Truong 2020)
- i. After-care model (Geidl 2019)
 - i. Alternative models of care, promoting an aftercare system once patients are discharged from physical therapy.
 - ii. Resources, check-in times, exercise and physical activity recommendations examples provided, etc.

5) Implementation

- a. Create time within therapy sessions
 - i. Throughout course of therapy, implement time into sessions to discuss general physical activity promotion, questions they may have and implement suggestions to try
 - ii. Use lost time within session
 - 1. During warm-up
 - 2. Between sets
 - 3. During cardio
 - 4. During cool down/stretching, etc.
- b. Education
 - i. Knowledge pertaining to
 - 1. Effects of physical activity (Geidl 2019)
 - 2. Suitable exercises, activities, and daily physical activity integration (Geidl 2019)
 - 3. Execution of physical activity (Geidl 2019)
 - 4. Self-directed load control and progression (Geidl 2019)
 - ii. Provide examples of physical activity for daily life
 - 1. Examples of various activities at a moderate to vigorous activity level (Compendium of PA 2011)
 - a. Brisk Walking

- b. Dancing
 - c. Cycling
 - d. Home activities
 - i. Vacuuming
 - ii. Gardening
 - iii. Lawn mowing
 - c. Active participation
 - i. Include patients in conversations and plans about physical activities during leisure, non-therapy times early on and throughout therapy process and beyond (Geidl 2019)
 - 1. Work with patients to develop their physical activity goals
 - d. Attitudes and Beliefs
 - i. Acceptance and motivation
 - 1. Determine where they are at in accepting their status following ACLR and their motivation levels and meet them there
 - e. Facilitate adherence
 - i. Use of technology
 - 1. Applications, software's, videos, etc. (Geidl 2019)
 - 2. Activity tracking devices [FitBit, Apple Watch, Apple Health App, etc.]
 - a. Step counts
 - i. Having a step count goal and/or the use of a step diary has been shown to significantly increase baseline physical activity (Bravata 2007)
 - 1. Especially be shown to make the biggest impact in young people (Bravata 2007)
 - ii. Utilizing this effect by creating goals individualized and attainable for the individual person based on device they may already use can help improve daily step counts and physical activity
 - b. Workouts
 - c. Activities
 - d. Symptoms
 - i. What was step count and activity?
 - ii. Implement fun and joyful activity suggestion (Holt 2020, Geidl 2019)
 - 1. Group setting/socialization (Holt 2020, Geidl 2019)
 - 2. Implement their interest
- f. Address individual's patient barriers
 - i. Time, motivation, knowledge, etc.
- g. Establish positive, trustworthy relationship to the patient (Geidl 2019)
 - i. Response to needs and adjust as needed throughout process
- h. After-care model (Geidl 2019)
 - i. Providing resources and examples
 - ii. Follow up with check in times
- i. Assessments
 - i. Questionnaires

1. Self-efficacy
 - a. Self-Efficacy for Exercise Scale (Shirley Ryan 2022)
- ii. Interests
- iii. Limitations on movements and activities
 1. Associated suggestions for safe, effective physical activity options

Resources:

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