Clinician's Commentary on Cupido et al.¹

For a physical therapist in orthopaedic practice, anterior cruciate ligament (ACL) injury management is common. The ACL, placed between the proximal tibia and distal femur, plays a significant role in restraining anterior tibial translation and lesser roles in transverse tibial rotation.² As many therapists can attest, ACL lesions significantly impair knee function^{3,4} and affect joint biochemistry^{5,6} and mechanics.^{7–9} ACL injuries affect activities, restrict sport and leisure participation, and have consequences for long-term joint health.^{10–15} Through prevention programmes and prehabilitation or rehabilitation for those who choose to undergo surgical restoration procedures, physical therapists have used their expertise to help many people return to pre-ACL injury levels of function. Despite this involvement in ACL injury management, however, the clinical course of recovery after reconstruction—defined by Cupido and colleagues¹ as how patients change over the course of treatment with respect to outcomes of interest—is not clearly delineated. As a result, SMART (Specific, Measurable, Achievable, Relevant, and Time sensitive) goal setting and prognostics have been limited, and therapists may struggle to apply evidence-based reasoning in the context of rehabilitation after ACL reconstruction. Cupido and colleagues' insightful investigation into the clinical course of recovery outcomes after ACL reconstruction provides helpful information for physical therapists managing clients who have undergone ACL reconstruction.

Through an International Classification of Function framework, Cupido and colleagues model how knee-joint impairments (knee range of motion [ROM] and pain) and activity limitations, measured using the Lower Extremity Functional Scale (LEFS), changed over the first 26 weeks following ACL reconstruction in 29 patients. They also estimate the minimal detectable change (MDC) using test–retest reliability measures during weeks 20–22 and illustrate how these data can be exploited in the clinical decision-making process.

A variety of factors associated with ACL reconstruction can influence graft health and ultimate ligament function, including graft selection, tunnel placement, initial graft tension, graft fixation, graft tunnel motion, and rate of graft healing.² While Cupido and colleagues do not describe these factors, they did designate concomitant surgical debridement procedures and include these cohorts in their analyses; the resulting outcome change trajectories are similar to those observed for ACL reconstruction alone.¹ The measurements of pain and self-reported function used in the study are well described and could easily be replicated in clinical practice. The rehabilitation programme followed the management progressions expected in post-reconstruction physical therapy, based on the Fowler Kennedy Sport Medicine Clinic ACL protocol.¹⁶

Cupido and colleagues clearly illustrate the results of their investigation, as well as the implications of those results, and provide a thoughtful clinical application to contextualize their detailed statistical analysis, ensuring that the findings are clinically relevant and can be quickly applied in orthopaedic clinical practice. To summarize, physical therapists can expect rapid gains in ROM and reductions in pain, with a limit value between 12 and 14 weeks, and slower gains in self-reported function

(LEFS scores continue to improve at 26 weeks). This trajectory matches the foci of the rehabilitation programme described by Cupido and colleagues.¹ Based on the MDC₉₀ (i.e., the limit within which 90% of truly unchanged patients will display random fluctuations), a change of approximately 4 points on the pain scale (P4), 2° of extension, 8° of flexion, and 7 points on the LEFS constitutes clinical change in this sample. Given the clinical research focus of this study, these data provide a foundation for further research in this area to strengthen the findings and build support for clinicians to set SMART goals and discuss prognosis with their patients using evidence-based principles. In addition, Cupido and colleagues carried out their study in the context of clinical practice, which should make uptake and continued clinical investigation feasible on a wider scale.

It is important to note some considerations for the interpretation of these data. First, readers are unaware of which ACL graft type was used in this study. Bone–patellar tendon–bone and hamstring autografts have been shown to result in differing clinical outcomes.^{17,18} Second, the outcomes measured should be considered in light of the underlying biochemical and biomechanical processes associated with graft recovery. Physical therapists often see clients who “feel” ready for return to sport within 5 months after reconstruction and whose outcome measure scores also indicate readiness, yet these underlying processes are not optimized, and return to sport may therefore lead to further joint damage.¹⁹ In Cupido and colleagues' study, while ROM and pain measures provided evidence of recovery, LEFS scores had not recovered after 26 weeks. In addition, joint biomechanics and biochemical markers of tissue degradation may not normalize until after 26 weeks post injury;^{6,8} this has implications for current pathomechanical frameworks proposed for the aetiology of knee osteoarthritis (OA), a significant concern for anyone who has sustained an ACL ligament rupture. Despite our best efforts, reconstruction does not always reduce early signs and symptoms of OA, particularly when there is concomitant meniscal damage.^{19–21} Therapists should be aware of this and include these considerations when discussing prognostics based on Cupido and colleagues' findings. Finally, many therapists recognize a “quadriceps lag” after ACL reconstruction even after the client has regained full passive extension ROM. While Cupido and colleagues do not describe whether ROM testing was passive or active,¹ many people self-report high levels of function despite not using full ROM during weight-bearing activities; it would be interesting to know how their ROM and LEFS scores correlate to knee-joint mechanics during weight-bearing dynamic activity. Future research could investigate the clinical course of recovering dynamic knee-joint function using objective metrics by following the methodology outlined by Cupido and colleagues.

The clinical course of any neuromusculoskeletal dysfunction must be considered when setting goals and planning treatment. Cupido and colleagues sought to model how knee-joint impairment and activity limitations recover during the first 26 weeks of rehabilitation following ACL reconstruction.¹ Their study identifies change trajectories related to these outcomes and provides a very useful clinical application of the data. Further work is

required to expand these analyses to a larger population, different rehabilitation protocols, and other outcomes relevant to physical therapy practice while considering the short- and long-term implications of ACL injuries on knee-joint tissue health.

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DOI:10.3138/ptc.2013-19-CC