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Physician And Non-physician Inter- And Intra-observer Reliability Of A Field-based Drop Vertical Jump Screening Test For ACL Injury Risk

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Objectives: There is an epidemic of ACL injuries in pediatric and adolescent athletes. Poor neuromuscular control is an easily modifiable risk factor for ACL injury, and can be screened for by observing dynamic knee valgus on landing in a drop-vertical jump test. This study aims to validate a simple, clinically useful population-based screening test to identify at-risk athletes prior to participation in organized sports. We evaluated the inter- and intra-rater reliability of risk assessment by various observer groups, including physicians and non-physicians, commonly involved in the care of youth athletes.

Methods: The screening involves observers watching a simple drop vertical jump in sports field conditions, without the use of additional analytic equipment. 15 athletes age 9-17 were filmed performing a drop vertical jump test. These videos were viewed by 242 observers including orthopaedic surgeons, residents/fellows, coaches, athletic trainers (ATC), and physical therapists (PT), with the observer asked to subjectively estimate the risk level of each jumper. Analytical objective injury risk was calculated using normalized knee separation distance (measured using Dartfish, Alpharetta, GA), based on previously published studies. Risk assessments by observers were compared to each other to determine inter-rater reliability and to the objectively calculated risk level to determine sensitivity and specificity. 71 observers repeated the test at a minimum of 6 weeks later to determine intra-rater reliability.

Results: Overall, between groups (ATCs, attending physicians, coaches, residents/fellows, and PTs), the inter-rater reliability was high, $\kappa = 0.92$ (95% CI 0.829-0.969, $p<0.05$), indicating that no one group gave better (or worse) answers, including comparisons between physicians and non-physicians. With a screening cutoff of only jumpers identified by observers as “high risk”, the sensitivity was 63.06% and specificity 82.81%. Reducing the screening cutoff to also include jumpers identified as “medium risk” increased sensitivity to 95.04% and decreased the specificity to 46.07%. Intra-rater reliability was substantial, $\kappa = 0.55$ (95% CI 0.49-0.61, $p<0.05$), indicating that individual observers made reproducible risk assessments.

Conclusion: This study supports the use of a simple, field-based observational drop vertical jump screening test to identify athletes at higher risk for ACL injury. Among those who could potentially be involved in this screening process, our study shows good inter- and intra-rater reliability and high sensitivity, and can be performed without significant training by coaches and athletic trainers in addition to healthcare professionals. Identification of these high-risk athletes may play a role in enrollment in...
appropriate preventative neuromuscular training programs, which have been shown to decrease the incidence of ACL injuries in this population.