

Anterior Cruciate Ligament Injury Prevention and Primary Prevention of Knee Osteoarthritis

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After decades of epidemiologic and mechanistic research, anterior cruciate ligament (ACL) injuries are clearly a growing problem among active youth and adults. On average each year, there are approximately 113 000 ambulatory health care visits for initial care of cruciate ligament injuries and about 75 000 outpatient surgical reconstructions.¹ Assuming that the average surgical cost of reconstruction is \$25 000,² then surgical costs over a 10-year period exceed \$18.7 billion. However, these simple estimates do not take into account either the physical pain, lost school and work days, activity limitations, and disability associated with ACL injuries or the possible long-term sequelae of a major joint injury, such as posttraumatic osteoarthritis.

Prior knee injury is one of the strongest risk factors for the development of osteoarthritis: 1 in 2 adults with a serious knee injury will develop knee osteoarthritis over his or her lifetime.³ In fact, more than 50% of ACL-injured knees will develop osteoarthritis in as few as 10 years.^{4,5} This figure is alarming given the numbers of ACL injuries occurring every year, most in adolescents and young adults during sport and recreation activities. A teenage soccer player who injures a knee at age 16 may develop osteoarthritis by his or her early 30s. With the average annual cost (both direct and indirect) of knee osteoarthritis among primary care patients older than age 55 at \$5700,⁶ this young adult may expend more than \$285 000 over a lifetime. In addition, a proportion of patients will develop knee osteoarthritis severe enough to require total knee replacement. In 2009, 679 260 total knee replacements⁷ for osteoarthritis were performed at an average cost of \$47 179 per procedure, totaling more than \$34 million. Clearly, the human and financial costs of both ACL injury and knee osteoarthritis are staggering.

The take-home message from ACL Research Retreat VI is that the mechanisms of ACL injury are multidimensional and complex. Considerable work remains to be done to both identify specific mechanisms of injury and refine current neuromuscular injury-prevention training programs for the greatest cost effectiveness. The challenge to the ACL research community over the next few years is to begin translating and disseminating neuromuscular training programs that have been proven to prevent lower extremity injuries in general and ACL injuries specifically. Waiting to implement effective programs until we know more about specific mechanisms or about which specific components of these programs are responsible for reducing injury rates does a significant disservice to the millions of adolescents and young adults who may have to live with the pain and disability of ACL injury and posttraumatic osteoarthritis.

As we move forward from ACL Research Retreat VI, we must begin to implement and widely disseminate effective neuromuscular training programs in community-based, scholastic, and collegiate sports. To do this, ACL researchers may have to venture out of their comfort zones. They will need to develop the skills to effectively plan, translate, and implement programs that are acceptable to athletes, coaches, parents, and sports organization administrators and feasible in the community setting using available resources. The ACL research community also needs to initiate and nurture partnerships with other organizations that can help raise awareness and disseminate effective injury-prevention interventions. The Arthritis Foundation's Osteoarthritis Action Alliance (OAAA) is a group of more than 35 stakeholder organizations with the goal of "promoting action to prevent and control osteoarthritis." Groups interested in injury prevention are welcome to join the OAAA Injury Prevention Workgroup; information is available at www.oaactionalliance.org. The Injury Prevention Workgroup of the OAAA is in the initial stages of developing a research agenda that will identify gaps in the scientific knowledge related to injury prevention for the primary prevention of osteoarthritis. Long-term activities will include collecting and marketing best practices in injury prevention and identifying and addressing barriers and facilitators related to dissemination of effective programs.

DISCLAIMER

The findings and conclusions in this commentary are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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