

Evidence Summary: Golf

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BC INJURY research and prevention unit

The British Columbia Injury Research and Prevention Unit (BCIRPU) was established by the Ministry of Health and the Minister's Injury Prevention Advisory Committee in August 1997. BCIRPU is housed within the Evidence to Innovation research theme at BC Children's Hospital (BCCH) and supported by the Provincial Health Services Authority (PHSA) and the University of British Columbia (UBC). BCIRPU's vision is to be a leader in the production and transfer of injury prevention knowledge and the integration of evidence-based injury prevention practices into the daily lives of those at risk, those who care for them, and those with a mandate for public health and safety in British Columbia.

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Evidence synthesis tool

SPORT:	Golf		Target Group:	All age ranges	
Injury Types and Mechanisms:	The most common injuries in golf are overuse injuries. The elbow is the most affected region, followed by the back and shoulder. Mechanisms tend to be related to the biomechanics of the golf swing. (Cabri, Sousa, Kots, & Barreiros, 2009)				
Incidence/Prevalence		Risk Factors	Interventions	Implementation/Evaluation	Resources
Overall More information is new the incidence and preva- golf injuries; however, I has reported that most injuries tend to be from or from a traumatic cau the most common sites include the lower back, wrist, and shoulder. (Ca 2009). Amateur Golfers The incidence rate of go injuries in amateur golf estimated to be 15.8 in 100 golfers. The prevale golf-related injuries am amateur players is estir range between 25.2% a (Cabri et al., 2009) On a per year basis, inju vary between 1.19 and injuries per amateur go (Cabri et al., 2009)	eded on alence of literature golfing n overuse use, and s of injury elbow, abri et al., olf-related fers is juries per ence of iong mated to and 62.0%. ury rates 1.31 lfer.	There are very few high-quality studies examining risk factors for injuries in golf. There are studies that suggest risk factors for injury and they include: previous injury, over practicing, improper warming up, older aged beginners, and improper technique. (Cabri et al., 2009; Sherman & Finch, 2000) Previous Injury The literature suggests that approximately 60% of professionals and 40% of amateur golfers have sustained injuries. Once, injured, these individuals are reported to be more susceptible to subsequent injuries. (Gosheger et al., 2003) Over Practicing It has been proposed that amateurs who play two rounds a week tend to have overuse injuries as a result of striking the ground with the club and poor swing mechanics. (Cabri et al., 2009)	There are no studies that evaluated the effectiveness of an intervention on injury outcomes in golf. Most of the literature making recommendations towards prevention of injury in golf focuses on better equipment such as shoes and clubs. (Sherman & Finch, 2000) More information is required on what types of shoes should be recommended for golfers, while clubs with graphite shafts are recommended rather than clubs with steel shafts due to their lighter weight and shock absorption properties that can potentially reduce stress on the body. (Sherman & Finch, 2000) Proper warm ups have been suggested as a strategy that can reduce injuries. According to a survey of 522 female golfers, golfers who did not warm up on a regular basis were 45 times more	Currently there is limited research on the implementation of interventions for golfing.	Websites http://www.sportsmed.org/ aossmimis/stop/downloads/ Golf.pdf

The most common sites of injury		likely to have sustained a golfing	
in golf include the low back,	Improper warm Op	injury in the 12 months prior than	
elbow, wrist and hand, and the	Most golfers do not normally warm	those reported frequent warm-	
shoulder. (Cabri et al., 2009;	up before participating, (Fradkin et	up (OR=45.2; 95%Cl:13.5,151.7).	
Lindsay & Vandervoort, 2014;	al., 2007) and this is believed to	(Fradkin et al., 2007).	
Sherman & Finch, 2000)	present a risk for many common	Unfortunately, this study did not	
	injuries; according to a survey of	identify what type of warm-up	
Professional Golfers	522 female golfers, golfers who did	the participants were doing.	
Injury rates in professional	not warm up on a regular basis	Anothor important factor that	
golfers are close to two injuries	were 45 times more likely to have	should be considered to provent	
per golfer per year, with a	sustained a golfing injury in the 12	injuries in golf is proper training	
prevalence rate of approximately	months prior than those reported	programs that include strength	
89%. (Cabri et al., 2009)	frequent warm-up (OR=45.2;	training core stabilization	
	95%CI:13.5,151.7). Some studies	shoulder exercises and	
The most common sites of	report that preventative measures	neriodization to limit overtraining	
injuries for professional golfers	such as warming-up, conditioning	injuries (Lehman 2006)	
include the head, the lumbar	and using proper swing mechanics		
spine, and the wrist/hand.	can reduce the risk of injury in golf.	Cost Effectiveness	
(Lindsay & Vandervoort, 2014;	(Cohn, Lee, & Strauss, 2013;	There is no information about the	
Sherman & Finch, 2000)	Fradkin, Cameron, & Gabbe, 2007)	costs associated with programs	
	Older Age Beginners	to reduce golf injuries: however.	
One study indicated that 60% of		consideration should be taken to	
professional golfers experienced	Literature suggests that those who	the extent of overuse injuries in	
a traumatic or overuse goir injury	begin golfing later in life (over 50	the context of chronic, long-term	
compared to only 40% of	years old) tend to have a higher	pain.	
amateur goners. (Michardy,	total number of injuries compared		
Follard, & Luo, 2006; Sherman &	to their younger peers. This may be		
Finch, 2000)	due to changes in physiology and		
	the musculoskeletal system as a		
	result of the aging process; (Cabri		
	et al., 2009) however, there are no		
	studies directly comparing injuries		
	between different age groups,		
	therefore more information is		
	I needed about ago as a rick factor		
	needed about age as a risk factor		
	needed about age as a risk factor for injury.		

Technique and prepar		
rechnique and proper		
biomechanical movement is		
extremely important within the		
game of golf. (Fradkin et al., 2007;		
Lindsay & Vandervoort, 2014;		
Sherman & Finch, 2000) Injuries in		
golf can be associated with poor		
technique, limited flexibility, badly		
executed strength training, and		
lack of physical conditioning. (Cabri		
et al., 2009; Lehman, 2006; Lindsay		
& Vandervoort, 2014; Sherman &		
Finch, 2000) Other factors include		
poor swing dynamics leading to		
excessive side-bend and over-		
rotation of the spine, poor trunk		
endurance, and restricted lead hip		
internal rotation, which if practiced		
over time, may lead to injury.		
(Cabri et al., 2009; Fradkin et al.,		
2007; McHardy et al., 2006)		

Cabri, J., Sousa, J.P., Kots, M., & Barreiros, I. (2009). Golf-related injuries: a systematic review. European Journal of Sport Science, end Spara Science, 9(6). 333-366. Cohn, M.A., Lee, S.K., & Strauss, E.J. (2013). Upree extremity golf Sport Science, off, Jack Science, 9(1). 333-366. Cohn, M.A., Lee, S.K., & Strauss, E.J. (2013). Upree extremity golf Science and Michardy, A., Pollard, H., & Luo, K. (2000). Golf-related low back pain: a review of causative factors and prevention strategies. Asian Journal of Science and Medicine in Sport. Science, 9(1). Sports deficine in Sport, 10(1). 66-71.Fradkin, A.J., Cameron, P.A., & golf Science and Michardy, A., Pollard, H., & Luo, K. (2006). Golf injuries. Sports Medicine in Sport, 3(1), 65-78.Fradkin, A.J., Cameron, P.A., & golf Science and Medicine in Sport, 3(1), 65-78.Medicine in Sport, 3(1), 65-78.Gosheger, G., Liem, D., Ludwig, K., Greshake, O., Winkeimann, W. (2003). Injuries and overuse syndromes in golf. An J Sports Medicine, in Sport, 3(1), 65-78.Sherman, C.A., & Finch, C.F. (2000). Preventing injuries to competitive and recreational adult golfers: what is the evention strategies. Asian Journal of Science and Medicine, in Sport, 3(1), 65-78.Sherman, C.A., & Finch, C.F. (2000). Preventing injuries to competitive and recreational adult golfers: what is the evention strategies. Asian Journal of Sports Medicine, 5(4), e24289.Sherman, C.A., & Finch, C.F. (2000). Preventing injuries to competitive and recreational adult, epifers: what is the evention strategies. Asian Journal of Sports Medicine, 5(4), e24289.Sherman, C.A., & Finch, C.F. (2000). Preventing injuries to competitive and recreational adult adults in the epifers: Sherman, C.A., & Finch, C.F. (2000). Preventing injuries	Works Cited:	Works Cited:	Works Cited:	
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Review of Sport Injury Burden, Risk Factors and Prevention

Golf

Incidence and Prevalence

With over 55 million participants and a 10% increase in people joining every year, golf is gaining popularity across all age groups. (Cabri et al., 2009). Although normally considered low-intensity, the risk of injury in golf is moderate. (Cabri et al., 2009) Injury rates are estimated to be between 1.19 and 1.31 injuries per golfer per year for amateurs and close to 2 injuries per year for professionals. (Cabri et al., 2009) Like incidence rates, the prevalence rates for golfers also differ depending on level of play. For amateur golfers, the prevalence rates of injury range from 25.2%-62.0% while for professional golfers the prevalence rate of injury is closer to 89%. (Cabri et al., 2009)

Golf injuries are most often the result of overuse and occur in the elbow, back, shoulder, wrist, and hand. (Sherman & Finch, 2000; Lehman, 2006; McHardy, Pollard, & Luo, 2006; Fradkin, Cameron, & Gabbe, 2007; Cabri et al., 2009; Lee & Strauss, 2013) Common injury sites differ slightly between levels of play. Amateur golfers tend to have more injuries to the lower back, elbow, wrist, hand, and shoulder, while professional golfers tend to have more head, lumbar spine, wrist and hand injuries.

Risk and Protective Factors

There are very few high-quality studies examining risk factors for injuries in golf. The main risk factors proposed across the literature are previous injury, over practicing/excessive play, improper warming up, older aged beginners, a lower handicap, and improper golfing technique. (Cabri et al., 2009; Sherman & Finch, 2000)

The literature suggests that approximately 60% of professionals and 40% of amateur golfers have sustained injuries. Once, injured, these individuals are reported to be more susceptible to subsequent injuries. (Gosheger et al., 2003) In addition, both amateur and professional golfers are prone to overuse injuries. (Sherman & Finch, 2000; McHardy et al., 2006; Cabri et al., 2009; Lindsay & Vandervoort, 2014) It has been proposed that risk factors for overuse injuries include lack of proper warm-up, limited mobility, reduced flexibility, lack of strength training, incorrect form (over-rotation and excessive bending), and lack of physical conditioning. (Sherman & Finch, 2000; Cabri et al., 2009; Cohn et al., 2013; Lindsay & Vandervoort, 2014) Proper strength training of correct muscle groups and periodization to ensure that athletes are not overtraining can prevent overuse injuries in golfers. (Lindsay & Vandervoort, 2014)

Most golfers do not normally warm up before participating. (Fradkin et al., 2007) It is believed that many common injuries in golf can be avoided with warming-up, conditioning and using proper swing mechanics. (Cohn, Lee, & Strauss, 2013; Fradkin, Cameron, & Gabbe, 2007)

There is some evidence suggesting that those who begin golfing later in life (over 50 years old) have a higher total number of injuries compared to their younger peers. (Cabri et al., 2009) A reason for this has been suggested as changes in musculoskeletal physiology during the aging process; (Cabri et al., 2009) however, there are no studies directly comparing injuries between different age groups, therefore more information is needed about age as a risk factor for injury.

Technique and proper biomechanical movement is extremely important when playing the game of golf. (Fradkin et al., 2007; Lindsay & Vandervoort, 2014; Sherman & Finch, 2000) Poor swing dynamics can lead to excessive side-bend and over-rotation of the spine, poor trunk endurance, and restricted lead hip internal rotation. If these movements are practiced over time, they can lead to an increased risk of injury. (Cabri et al., 2009; Fradkin et al., 2007; McHardy et al., 2006)

Opportunities for Prevention: Effective Interventions, Cost-Effectiveness, Implementation and Evaluation

There is a lack of information on the implementation and evaluation of injury prevention interventions in golf. (Cabri et al., 2009) Much of the literature reports on the most effective swing or best golf clubs, to reduce the risk of injury. (Sherman & Finch, 2000) While further research is needed to determine the best shoe type for golfers, clubs with graphite shafts are recommended over those with steel shafts due to their lighter weight and shock absorption properties that can potentially reduce stress on the body. (Sherman & Finch, 2000)

Most intervention strategies to prevent golfing injuries focus on warming up and strength training to prevent injuries. One study found that approximately one-third (35.2%) of golfers reported at least one golfing injury within the previous year. Golfers who reported frequently warming up were 45 times less likely to suffer injuries over those who did not. (Fradkin et al., 2007) Golfers who did not warm up were 45 times more likely (OR=45.2; 95%CI: 13.5,151.7) to suffer an injury compared to those that did not warm up. (Fradkin et al., 2007). Other studies show that improvement in golf swings through conditioning programs that focus on increasing trunk stability; enhancing shoulder control; strength training and periodization are effective in preventing injuries. (Lehman, 2006; Cabri et al., 2009; Cohn et al., 2013) Further research is needed to evaluate the effectiveness of strength training, warm-ups and equipment on injury prevention in golf.

Limiting practice or play time, obtaining professional assessment, regulating swing mechanics, increasing trunk and hip flexibility, wearing proper footwear, and employing proper lift mechanics (or avoidance of lifting the golf bag) have also been proposed to reduce the risk of injury in golfers. (Cohn, Lee, & Strauss, 2013; Fradkin, Cameron, & Gabbe, 2007Cabri et al., 2009; Lindsay & Vandervoort, 2014). Proper training programs that include strength training, core stabilization, and shoulder exercises should be considered as part of an injury prevention program in golf. (Lehman, 2006)

While there are no studies that evaluated the effectiveness of an intervention on injury outcomes in golf, some of the next steps for risk factor research are evaluating environmental factors and better equipment.

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