

Development and Validation of a Swimmer's Functional Pain Scale

Coaching Application

Shawn M. Drake¹, Brian Krabak², George T. Edelman³, Erin Pounders¹, Sharmon Robinson¹, Brittany Wixson¹

¹Arkansas State University
PO Box 910
Jonesboro (State University), Arkansas, USA

²Rehabilitation, Orthopedics and Sports Medicine
University of Washington and Seattle Children's Sports Medicine
1959 N.E. Pacific Street
Seattle, Washington, USA

³99 Wolf Creek Blvd., Suite 2
Dover, Delaware, USA

Abstract

Swimmers frequently complain of shoulder pain sometime during their careers. The purpose of this study was to develop and validate a self-administered questionnaire that measures pain and functional status of the shoulder in swimmers that may alert a coach or swimmer to seek follow up with a healthcare provider. Participants completed the developed Swimmer's Functional Pain Scale (SFPS) and compared it to another questionnaire designed for other sports. Fifty-eight USA Swimming age group and collegiate swimmers completed the SFPS. Results of this study indicated that the SFPS is a valid and reliable tool for swimmers to determine when a referral to a healthcare provider is appropriate.

Introduction

Competitive swimmers place high demands on their shoulders by excessive shoulder revolutions and power strokes. Shoulder pain is common at all levels of the sport. From the local recreational club programs that may have a part-time coach with limited resources, to the center of excellence programs with full-time coaches that are training elite level and professional athletes. Swimmers may train as many as 6-8 workouts each week for 50 weeks each year. The high training volume results in few opportunities for a swimmer to take a break from the sport to allow the shoulders to recover from the high demands.

Coaches deal with shoulder pain in their swimmers on a daily basis. Often, the coach must determine the extent of the problem and make decisions on whether to allow a swimmer to continue or discontinue swimming and seek a health care provider. The cause of the pain can be many and based on the background of the coach, it can be challenging for them to determine the extent of the pain/injury.

The perception of pain and the relative nature of pain can be interpreted differently from one culture to another and one athlete to another. It is natural for an intense swimming workout or consecutive intense workouts to contribute to shoulder soreness. Muscle soreness is expected in the competitive athlete; however, pain may be a sign of potential anatomical damage. Differentiating pain from soreness and/or interpreting the athlete's perception of pain can be challenging for the athlete and coach.

Pain scales are common in medicine and sports activities. There are a number of functional measurement tools for the upper extremity. However, these tools are not specific to swimming. Pink et al. (2010), first proposed a measurement tool for swimming to help categorize pain and provide strategies for management of shoulder pain. The pain scale mimics the typical visual analog pain scale, which uses a 10 cm horizontal line to mark and measure the pain. The pain scale designed by Pink et al. (2010) provided guidelines for management strategies related to shoulder pain, including the need for a referral to a health care professional. The tool categorizes pain into four zones that correspond to increasing levels of pain. The four zones include a white, yellow, orange and red zone. Each zone has descriptions that are intended to help the coach and athlete label the discomfort. For example, "shampoo arm syndrome" (i.e. the athlete has difficulty shampooing his/her hair after workout) corresponded to a pain level of 3 (Figure 1). The treatment for a swimmer's reported pain level of 3 included ice, but the athlete could still complete a full workout even though the athlete minimized certain strokes to avoid pain.



Figure 1. Shampoo arm syndrome is characterized by shoulder pain while the swimmer washes his or her hair.

The purpose of this study was to develop and validate a self-administered questionnaire that measures pain and functional status of the shoulder in swimmers that may alert a coach or swimmer to seek follow up with a healthcare provider. The Swimmer’s Functional Pain Scale (SFPS) focuses on pain during the swimmer’s functional activities (see figure 2) both in the water and out of the water with activities of daily living. The investigators adapted the initial measurement tool from Pink et al. (2010) and added functional components to help arrive at the pain zones. The SFPS uses guiding questions about functional activity to determine the score instead of using the 10 cm visual analog scale (VAS).

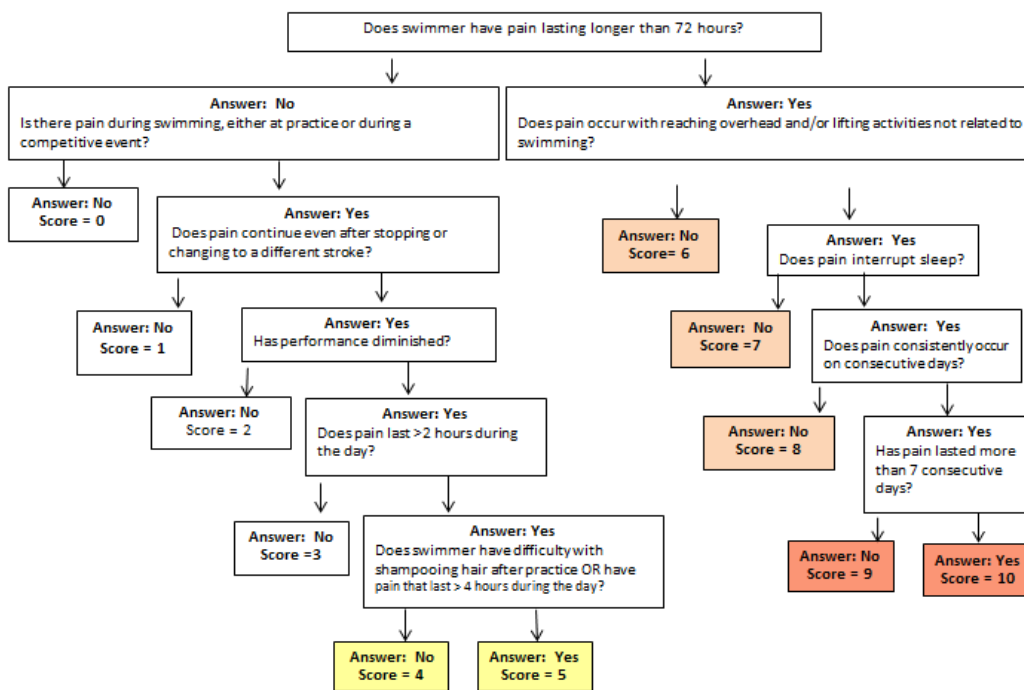


Figure 2. Swimmer Functional Pain Scale focuses on pain and functional status of the shoulder in swimmers.

An expert panel of swim coaches, physical therapists and sports medicine physicians reviewed the SFPS and provided feedback prior to field-testing. The SFPS requires the competitive swimmer to answer a series of yes/no questions (flow chart) regarding his/her level of pain and soreness. The final score of the SFPS represents a score from 0-10, which in turn, falls into one of the four zones: white, yellow, orange or red. Each zone represents increasing pain levels similar to a visual analog scale and also provides specific treatment protocols as proposed by Pink et al. (2010).

Discussion

Managing athletic injuries is an important component of coaching. Having a self-reported functional outcome measure is important for evaluating functional limitations and treatment effectiveness. Currently, there are few tools for swim coaches to use on deck to help decipher a swimmer's complaints. Identifying a potential injury and taking corrective measurements is vital to the overall success of the athlete and the performance of the team/program.

The incidence of shoulder problems in swimmers can range from 41% to as high as 91% depending on the competition level. The majority of swim coaches have limited knowledge regarding evaluation and treatment of injuries. Recognizing when a swimmer needs to seek the advice of a healthcare provider is helpful. The SFPS questionnaire provides a self-reported measurement tool for swimmers and coaches to guide their decisions on who may need a modification to their training and who may need to seek further formal evaluation of his or her shoulder pain.

The aim of this study was to determine the reliability and concurrent validity for the SFPS. The SFPS is a self-reported pain scale that is reliable in the tested population of swimmers and is found to have good validity. The simplicity of the SFPS could be beneficial by providing clinically relevant information to the swim coach for deciding whether a swimmer should continue swimming or seek the evaluation of a health care provider.

Application

While testing the SFPS questionnaire, two swimmers were subsequently referred to a healthcare provider. The following two cases include one collegiate swimmer and one age group swimmer.

Case 1. A collegiate swimmer reported "swimming with pain" and scored a 9 (red zone) on SFPS and a 29.2 on the KJOC. At this point, the coach would refer the swimmer to a health care provider. For this swimmer, a physical therapist further evaluated the swimmer to determine if a referral would be appropriate. Shoulder pain occurred with: 1) shoulder flexion and adduction, 2) shoulder abduction and external rotation, and 3) shoulder extension and internal rotation. Additionally, the swimmer was unable to perform the functional push-up test due to shoulder pain (Figure 3). The swimmer was referred to the college's athletic trainer for follow-up and shoulder rehabilitation. The swimmer returned for post-testing 4-weeks later and reported "swimming with pain" and scored a 7 (orange zone) on the SFPS and scored a 39.2 on the KJOC. On follow-up, she reported pain with 1) shoulder flexion and adduction and 2) shoulder extension and internal rotation. She did not report pain with shoulder abduction and external rotation. The swimmer was still unable to perform a push-up in the pain-free range. This swimmer continued to swim and had not returned to pain-free swimming at the 4-week post-test.



Figure 3. *Performing a functional push-up test.*

Case 2. One Age Group swimmer scored a 9 on the SFPS and was referred to a health care provider. At the 4-week retesting phase, the coach indicated that the swimmer was receiving physical therapy for biceps tendonitis and was not available for follow-up testing. Two months later, researchers followed up with this swimmer, and the swimmer had returned to pain-free swimming. (The second swimmer was not included in data analysis because she did not complete post-testing.)

Summary

Coaches must determine the appropriate time to refer a swimmer to a health care provider for shoulder related pain. Unfortunately, differentiating pain related to muscle soreness versus pain due to injury is difficult. The results of the SFPS indicate that the self-reported pain scale is reliable in the tested population of swimmers. The simplicity of the SFPS allows coaches at all levels to apply the questionnaire on-deck and help them make decisions that will be in the best interest of the athlete.