

Pediatric Shoulder Rehabilitation

Brittany Kunz, BSN, Pediatric DNP Student

Arizona State University

Abstract

Objectives

As a result of increased participation in competitive sports, shoulder instability, subluxations, and dislocations are common injuries in the adolescent athlete. These injuries worsen when athletes over train, make physical contact, and do not take enough time for rest between injuries. Protocols and therapies need to be implemented to prevent subsequent injuries, including progressive measurement of rehabilitation and return to play (RTP) outcomes. The goal of treatment for these athletes is to return them to their previous level of performance and prevent re-injury.

The purpose of this quality improvement evidence-based project was to determine if the use of the Pediatric Adolescent Shoulder Survey (PASS) affects return to play. The aims of this project were to determine if there was a change in return to play (RTP) outcomes, compare length of RTP between operative and non-operative groups, and determine if PASS scores improved over time.

Methods

The PASS is a 13 item, patient reported outcomes (PROs) survey assessing symptoms, limitations, compensatory mechanisms, and emotional distress. It is reliable and valid for athletes who have acute shoulder injuries and decreased range of motion or strength.

After obtaining Institutional Review Board (IRB) approval from the institution and university, providers at a southwestern sports medicine clinic were educated on administration and scoring of the survey. Surveys were administered to athletes ages 8-18 who presented with shoulder injuries at intervals. Retrospective and prospective chart reviews were obtained at baseline (control group) and post intervention (intervention group). Return to play (RTP) days and Pediatric Adolescent Shoulder Survey scores were recorded.

Results

Independent t-tests were calculated to compare mean RTP days from control and intervention groups, RTP for operative and non-operative groups within the control and intervention groups. Statistically significant $t(20) = -2.827, p = 0.03$ differences were noted between operative group for the intervention group, ($n=9$), $M=136.00$ ($SD=51.49$) days vs non-operative group, $M= 83.68$ ($SD=31.78$) days. No statistically significant difference between control group $M=118.68$ ($SD=55.95$) days and intervention group $M=107.52$ (48.77) days was noted. PASS scores showed improvement over time.

Conclusion

The PASS instrument may positively affect RTP. There was a significant change in RTP for the whole group. Non-operative patients RTP sooner than operative for the whole sample. PASS scores improved over time for all patients.

Keywords: shoulder injuries, shoulder dislocation, labral tears, rehabilitation, athletes

Background and Significance

In the pediatric throwing athlete, shoulder dislocations and glenoid labral tears are a common, nonfatal, unintentional injury (Ahmad, Padaki, Noticewala, Makhi, & Popkin, 2016; DiFiori et al., 2014; Dicken, Owens, Campbell, & Cameron, 2013; Kinsella & Carl, 2013; Shanley, Rauh, Michener, & Ellenbecker, 2011). Athletes with first-time anterior dislocations have a 95% reoccurrence rate, and those with posterior dislocations have a 5% reoccurrence rate (May & Bishop, 2012). With anterior dislocations, a traumatic event forces the abducted and externally rotated arm into an extended position causing the humeral head to exit the glenohumeral joint (McCarty, Ritchie, Hapreet, & McFarland, 2004). A posterior dislocation occurs when the adducted outstretched arm receives posterior stress (McCarty et al., 2004). Athletes with shoulder pain and inflammation without a traumatic event or instability suffer from increased laxity or instability of the glenohumeral joint (McCarty et al., 2004). These injuries worsen and occur most often when athletes over train, make physical contact, and do not take enough time for rest between minor injuries (Krabak, 2012).

Athletes who become injured have two options: operative or non-operative intervention with rehabilitation (Blacknall, Mackie, & Wallace, 2014; Jaggi, Alexander, Herbert, Funk, & Ginn, 2014; Kinsella & Carl, 2013). Evidence showed that protocols and therapies needed to be in place to prevent injury and re injury including but not limited to, progressive measurement of rehabilitation related to return to play, appropriate strength training programs, mobility exercises, and education for injury prevention to avoid school absences and participation in sports (Blacknall et al., 2014; Jaggi et al., 2014; Kinsella & Carl, 2013). For patients to restore full function and previous level of performance, a progressive rehabilitation program should be

implemented. Without proper management of shoulder rehabilitation, there is a risk for re-injury (Blacknall et al., 2014; Jaggi et al, 2014; Kinsella & Carl, 2013).

Problem Statement

Glenoid labral tears and dislocations create a problem for adolescent athletes. The most vulnerable athletes are those participating in swimming, baseball, and football. When injuries occur and do not heal properly, the consequences are subsequent dislocations or tears and worsening health in the shoulder joint, leading to a decrease quality of life (Cheron, LeScanff, Leboeuf-Yde, (2016). It is necessary for these athletes to adhere to guidelines given to them by their providers, actively participate in rehabilitation programs, and follow their specific instructions for return to play (Blacknall et al., 2014; Jaggi, 2014; Kinsella & Carl, 2013).

Injury and re-injury may occur from decreased compliance of formal physical therapy, necessity of surgical intervention, or RTP before injury is healed (Ismail & Shorbagy, 2014; Jaggi et al., 2014; Ozturk et.al, 2013). Shoulder injuries and the subsequent rehabilitation take time away from the athlete's sport, create absences from school, and decrease the teen's QOL (Cheron et al., 2016; Ismail & Shorbagy, 2014; Jaggi et al., 2014; Ozturk et.al, 2013). Patient reported outcomes tools can be used to measure pain and quality of life in order to measure rehabilitation and facilitate release of activities (Blacknall et al., 2014; Jaggi et al, 2014; Edmonds, Bastrom, Roocroft, & Calandra-Young, 2017; Kinsella & Carl, 2013). In a pediatric orthopedic clinic in the southwest, a patient reported outcomes tool was not being utilized to formally track shoulder injuries. As part of a quality improvement initiative, the Pediatric Adolescent Shoulder Survey (PASS) was implemented to evaluate the progress post injury for shoulder rehabilitation.

PICOT Question

Does the implementation of the Pediatric Adolescent Shoulder Survey (PASS) into a southwestern orthopedic practice change the time of return to play in patients with shoulder injuries as compared to not using the PASS survey?

Exhaustive Search

A literature search was conducted using the following databases: PubMed, CINAHL, Cochrane Library, and SPORTDiscus (Appendix A). Rapid critical appraisal was performed on 20 articles. Fifteen articles were read in full and ten studies were selected for relevance to problem. An additional two articles were obtained through ancestry of articles. Search terms were *shoulder dislocations, shoulder instability, labral tears, shoulder injuries, multidirectional instability, rehabilitation, physical therapy, exercise, adolescents, teens, teenagers, and youth*. Limits were set to include current evidence within the last five years (2011-Feb 2017) with the exception of one RCT from 2004. Additional parameters for English language and peer-reviewed journals were made.

A total of 12 studies were selected. Included in this search were five systematic reviews (SR), five randomized controlled trials (RCT), and two cohort studies (CHS). Quality and strength of evidence was verified. Using the rating system for the hierarchy of evidence for quantitative studies, levels of evidence exhibited level I to level III (Melnik & Fineout-Overhalt, 2011). The SRs selected consist of RCTs and prospective, retrospective, or cross-sectional studies. The RCTs were blinded and un-blinded, predominately consisted of adolescent to young adult male athletes, and included greater than 30 participants. (Appendix B)

Synthesis of Evidence

Primary outcomes in the evidence included successful physical therapy (PT) as defined by return to play, re-injury or recurrence, long-term residual pain, subjective instability, and

results of patient perception of quality of life (QOL) and functional assessment (Blacknall et al., 2014; Ismail & Shorbagy, 2014; Kromer, de Bie, & Bastiaenen, 2013). Secondary outcomes included evaluation of instability by physical therapist, stiffness of joints, range of motion (ROM), muscle strength, and patient satisfaction (McIntyre et al, 2016; Dickens, Owens, Campbell, & Cameron, 2013; Warby, Pizzari, Ford, Hahne, & Watson, 2014). There were no biases in these articles and tools used for measurement and instrumentation were reliable and valid. CHSs included 19-58 participants and studied effectiveness of PT as primary treatment and surgical intervention as secondary (Dickens et al., 2013; Ozturk et al., 2013; Warby et al., 2014).

In the studies reviewed, the age of the participants ranged from 18-75 years old. Most studies were predominately males aged 18-25 years old as they are the most at-risk population for shoulder injuries. One study reported on athletes 19 years or younger who were enrolled in sports (Cheron et al., 2016). Another study reported on all males who were military personnel (Shih, Hung, Shih, Lee, & Ho, 2011). All studies specified if the injuries were traumatic or atraumatic and whether the injury was a first-time or repeat injury.

A consistent variety of instrumentation was used to assess three major time frames in the RCTs and CHSs: control, post-surgical or non-surgical intervention, and post rehabilitation. These tools included Western Ontario shoulder instability index (WOSI), shoulder pain and disability index (SPADI), ROM, and Oxford instability shoulder score (OISS) (Blacknall et al., 2014; Dickens et al., 2013; Shih, et al., 2011). Additionally, American shoulder and elbow surgeons survey (ASESS), single assessment numeric evaluation (SANE), and disability of arm, shoulder, and hand (DASH) were reported (Blacknall et al., 2014; Dickens et al., 2013; Shih et al., 2011). All tools were self report and addressed specific conditions and outcomes of patients

with instability, dislocations, or labral tears of the shoulder. These included patient perceptions of QOL, ability to perform activities of daily living, and ROM in the shoulder joint.

Overall, evidence suggests rehabilitation after a shoulder dislocation or subsequent tear requires a multifaceted approach (Blacknall et al., 2014; Dickens et al., 2013; Shih et al., 2011). Operative and non-operative management were the two available forms of treatment (Ismail & Shorbagy, 2014; Jaggi et al., 2014; Ozturk et.al, 2013). Athletes who incurred first-time traumatic or atraumatic injuries had an increased likelihood of surgery when choosing non-operative management as first line of treatment (Blacknall et al., 2014; Dickens et al., 2013; Shih et al., 2011). Rehabilitation programs were the first line of treatment before surgery was considered. Progressive rehabilitation programs were initiated post operatively. Instruments to measure patient reported outcomes were used to determine patient perception of pain and quality of life (Edmonds et al., 2017).

Purpose Statement

A review of the clinic's current protocols indicated there was not a standardized instrument used to evaluate progress post injury for shoulder rehabilitation. The purpose of this single site, quality improvement study was to determine if the use of the Pediatric Adolescent Shoulder Survey (PASS), a patient-reported outcomes tool, affects return to play outcomes. Aims of the project were to determine RTP outcomes, compare length of RTP between operative and non-operative groups, and establish improved PASS scores over time.

EBP Model/Theoretical Model

Iowa Model

The Iowa Model is an organized framework used to promote quality care. It gives clinicians guidance in discovering the answers to questions they may have about current

practices and guidelines. The model is based on the identification of a problem in the clinical setting. A problem-focused question has guided this project and led to an opportunity for quality improvement. (See Appendix C)

An interdisciplinary team approach is used to achieve a process improvement. Initially a problem in the clinical setting is identified. Then a team collects, reviews, evaluates, critiques, and synthesizes current research to guide the evidenced based change in order to put together a pilot study. Working on a continual feedback loop, outcomes are measured in a small clinical setting and then implementation and evaluation of change is conducted in order to determine if the change can be disseminated onto a larger scale (Melnyk, & Fineout-Overholt).

The Iowa Model was well suited for the identification of this process improvement at a local southwestern orthopedic clinic. There was not an instrument to qualitatively or quantitatively measure progression of rehabilitation in pediatric patients with shoulder dislocation and labral tears consistently. This orthopedic clinic identified the need for change and began working on a pilot study to make a change. An interdisciplinary team was formed. The desired outcomes were to prove the usefulness of the PASS. The PASS was utilized into practice as a patient reported outcomes (PROs) tool to determine if its use changed time of RTP and had an improvement of scores over time. After implementation in the clinical setting, outcomes were assessed on a continual feedback loop at each stage of the process; forming a team, collecting adequate research, evaluating quality of the tool, willingness of providers to implement change into practice, and dissemination of results (Melnyk & Fineout-Overholt, 2015; Reed & Shearer, 2009; Titler et al., 2001).

Health Promotion Model

Nola Pender introduced the health promotion model looking at the multidimensional aspects of persons as they interact in their environment in order to achieve health (Pender, Murdaugh, & Parsons 2015). Health promotion is defined as an internal motivation to make a change by increasing a person's well being and maximizing health. Individuals are motivated to change behavior by perceived self-efficacy, benefits of making a change, committing to a plan of care, and identifying barriers to the change (Pender et al., 2015). Participants of this project were intrinsically motivated to return to their previous level of performance and be released to RTP. The goals of the providers were to implement an instrument to enhance their assessments of ROM, pain, and quality of life in order to achieve positive patient outcomes.

Methods

Instruments for Data Collection: Reliability and Validity

Previous to the development of the PASS, there were only adult assessment tools for the measurement of progression of rehabilitation in patients with shoulder injuries. The Pediatric Adolescent Shoulder Survey is a developmentally appropriate tool for the pediatric population using word choice and grammar set at fourth-grade reading level (Edmonds et al., 2017). The PASS is used as a PRO and is a 13-item questionnaire, assessing symptoms, limitations, compensatory mechanisms, and emotional distress.

The PASS survey has been found to be valid and reliable with a Cronbach $\alpha = 0.86$. It was validated on patients aged 8-18 who had acute shoulder injuries with decreased ROM or strength. Initially 127 surveys were distributed to patients on the initial visit and 2 weeks later to compare the PASS with the QuikDASH and SANE in the evaluation of shoulder injuries. There was a significant correlation of scores. The secondary validation review yielded 132 surveys from a different participant group and they were given the QuickDash and PASS. The PASS

showed overall discriminant reliability similar to the QuickDASH for this population. In a 25 patient subgroup given the PASS pre and post 16 weeks later there was a significant increase in scores. Overall, the expectation is that any intervention will yield improvement in scores. This tool can be utilized alone or in conjunction with other tools (Edmonds et al., 2017).

Responses are reported on a 0 to 5 or 0 to 10 scale, with a scoring calculation to a total of 100 possible points. Items 1 through 9 are reversed scored so that a response of 1 is given a 10 (on a 10-point item) or a 5 (on a 5-point item) and vice versa. Responses 10 through 13 are recorded at their face value. A total score of 100 points equals no pain or impact on quality of life and a score of 10 indicates extreme pain and decreased quality of life. Function is measured by total score: <40 poor, 40-59 fair, 60-74 good, >75 excellent (Edmonds et al., 2017). Due to the small sample size, function scores were condensed from four categories to two: poor to fair (0-59) and good to excellent (60-100).

Study Design

After Institutional Review Board approval was obtained from both Arizona State University and a southwestern hospital, providers were educated on the PASS tool and its implications for implementation into practice. The education included a 13 slide Power Point presentation given at a division meeting with six of six sports medicine providers in attendance. Each provider was emailed a copy of the final PowerPoint. Inclusion criteria were all patients of both genders ages 8-18, who played sports, presented with shoulder injuries from December 1, 2017 to March 31, 2018 and who spoke and wrote English. Exclusion criteria were those patients with prior shoulder injuries, congenital anomalies to bone or muscle, or complications during treatment.

Sample

Patients who met inclusion criteria were asked to fill out the PASS during intake for their appointments at intervals 0, 2, 6 and 12 weeks from December 1, 2017 to March 31, 2018. Demographics obtained from chart included, age, gender, sports played, and type of injury. Return to play timelines for the control and intervention group were collected in days and PASS scores were recorded. Return to play was defined as the initial visit for non-operative and operative date for patients requiring surgery to release to full activity.

SPSSr23 was used to store, manage, and analyze the data. Descriptive statistics were used to describe the sample and outcome variable RTP. An independent t-test was used to analyze the means of (1) RTP between groups, (2) RTP and operative/non-operative for the control group, and (3) RTP and operative/ non-operative for the intervention group and the critical value was set at $p < 0.05$. Frequencies were used to describe PASS scores.

Study Risk

This was a quality improvement study and therefore proposed no risk to this population.

Data Security

Patients meeting inclusion criteria were assigned codes, data was entered in SPSSr23. HIPPA sensitive data linking the patient to the code number was erased. Only the research team had access to this information.

Study Benefits

The survey was reported in addition to the standard of care assessment. Providers were able to look at the scores from the PASS and determine if changes needed to be implemented in the patient's treatment plan based on the score calculated. Additionally, they were able to note a trend in PASS scores over time to ensure patients were progressing with their rehabilitation plans.

Findings

A retrospective chart review for the control group that did not receive the PASS was performed from December 1, 2016 to March 31, 2017. In this group, 93 charts were reviewed and 19 met inclusion criteria. A prospective chart review was performed for the intervention group that did receive the PASS from December 1, 2017 to March 31, 2018. In this group 134 charts were reviewed, 25 met inclusion criteria, two participants received at least three surveys, six received at least two surveys and 20 received at least one survey, and 13 participants met RTP within the study time frame. Each group included the same diagnosis codes for labral tears, dislocations, and subluxations.

The ages of the control group (n=19) ranged from 11-18 with M=15.10 (SD=2.13) years, male 11(57.9%) and female 8 (42.1%), and those requiring surgery were 12(63.2 %). The age of the intervention group (n=20) ranged from 8-18 with M=14.80(SD=2.82) years, male 12(60%) and female 8(40%), and those requiring surgery were 9(45%) (Table 1).

Table 1. *Demographics*

	Control Group (n=19)	Intervention Group (n=20)
Age	15.1 years (SD 2.13) Range: 11-18	14.8 years (SD 2.82) Range: 8-18
Gender	57.9% male (n=11) 42.1% female (n=8)	60% male (n=12) 40% female (n=8)
Required Surgery	63.2%	45%

Change in RTP days was set at p-value < 0.05 as statistically significant. When compared between groups (N = 39), there was no statistically significant difference $t(39)=0.67$, $p=0.31$ in RTP between control group (n=19), M=118.68 (SD=55.95) days and intervention group (n=20),

M=107.52 (SD=48.77) days. Length of RTP in days within the control group (n= 19) was not statistically significant $t(19)=-0.23$, $p=0.12$ between the operative group (n=12), M=121.00 (SD=41.51) and non-operative group (n=7), M=114.71 (SD=78.76). Length of RTP in days within the intervention (n = 20) group for operative group (n=11), M=136.00 (SD=51.49) versus non-operative group (n=9), M=83.68 (SD=31.78) was statistically significant $t(20) = -2.827$; $p=0.03$.

PASS scores post injury/post-operative date were analyzed by percentages in the intervention group. Scores were condensed to 2 groups from 4 due to small sample size. At week 2 (n = 14), 11 (79%) participants scored poor to fair and 3 (21%) participants scored good to excellent. This may indicate patients have increased pain and QOL soon after injury and post operatively. At week 6 (n = 8), 3 (38%) participants scored poor to fair and 5 (62%) participants scored good to excellent. These scores may indicate a continued need for further rehabilitation in this patient group. At week 12 (n = 2), 2 (100%) participants scored good to excellent. These scores indicate an increased QOL and decreased pain.

Table 2. *PASS Scores for Intervention group*

	Week 2 (n=14)	Week 6 (n=8)	Week 12 (n=2)
Poor to Fair	11(79%)	3(38%)	NA
Good to Excellent	3(38%)	5(62%)	2(100%)

Note. Total function scores: <40 poor, 40-59 fair, 60-74 good, >75 excellent

For the two groups control and intervention, the RTP was not significantly different, which may indicate the two samples had the same RTP and were essentially the same confirming the two groups had similar variances. In simple terms, the two groups were about the same and can be compared. In general, the non-operative groups return to play sooner than the operative

group. For the intervention group assuming equal variances, there is a significant difference ($p=0.03$) between the operative and non-operative group which may indicate that these patients benefitted the most from the PASS. For the control group, there was no significant difference in the operative versus non-operative groups in return to play days. In the intervention group, PASS scores improved over time.

Discussion

Strengths and Limitations

Overall, the project was completed within the guidelines of the student's institution. Initially the project inception began with a great site champion who was eager to make a change in practice at this facility. Institutional Review Board approval was granted from both the project site and the educational institution. Surveys were formatted according to institution policy and implementation began with the site champion. About two months into implementation, the site champion left the practice and did not communicate to other providers about the status of the project at the institution.

The student researcher recruited a new site champion; the department head of sports medicine at the southwestern orthopedic clinic. Two physicians in the practice began implementation of the surveys after IRB approval, but the previous site champion had not discussed the implementation of the surveys with the other providers. The co department head met with the student researcher to discuss proceedings of project within time frame for completion and to frame the project to further benefit the institution.

In order to create familiarity with the PASS, provider education was given via a PowerPoint presentation during a staff meeting in mid-February of 2018. At this point, the

project implementation time frame was shortened to 6 weeks in order to complete within project guidelines of the student researcher.

In this orthopedic setting, the PASS can be used by providers to determine progression of rehabilitation. Generalizability may be affected by a small convenience sample in one clinic with limited opportunity to assess long term follow up. Future studies should determine if providers change their practice based on PROs, development of evidenced based flow charts for providers to implement change based on PASS scores, and to compare range of motion and strength assessments with PASS scores. Expanding diagnosis codes or extending to wider areas of the southwestern region would increase number of participants. Future implications include ongoing investigation through 12 weeks post intervention for patients who did not meet return to play within the study time frame.

Conclusions/Implications for Future Practice

The purpose of this project was to determine if the use of the Pediatric Adolescent Shoulder Survey, a patient reported outcomes tool, changed time of return to play for adolescent athletes. It was determined that the use of the PASS survey may positively affect RTP. There was not a significant change in RTP for the whole group. Non-operative patients returned to play sooner than the operative group for the whole sample as well as the intervention group, but not the control group. This may indicate the PASS affected the RTP in this sample. Additionally, the PASS may offer talking points to discuss patient perception of rehabilitation. There was a clear improvement of PASS scores over time. In this population, it proves to be an adequate measure of rehabilitation for patients with shoulder injuries and providers at this institution decided to continue use of this instrument in the future. The student researcher will submit for publication to the Association of Orthopedic Specialty Sports Medicine Journal and an abstract to present at

their Specialty day in 2019. Further development of protocols based on scores would be useful in guiding treatment for these patients. The next step for this project will be to develop flow charts for providers to guide treatment based on PASS scores.

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Appendix A PubMed Database Search

Search	Add to builder	Query	Items found	Time
#33	Add	Search ((multidirectional instability) AND exercise) AND shoulder	31	19:49:14
#32	Add	Search ((multidirectional instability) AND exercise) AND shoulder Filters: Adolescent: 13-18 years	10	19:47:19
#31	Add	Search ((multidirectional instability) AND (exercise OR rehab OR physiotherapy OR "physical therapy")) AND shoulder Filters: Adolescent: 13-18 years	18	19:46:24
#27	Add	Search (((shoulder) AND physiotherapy) AND rehab) AND exercise Filters: Adolescent: 13-18 years	20	19:45:32
#30	Add	Search (((multidirectional instability) AND physiotherapy) AND rehab) AND exercise	2	19:45:00
#29	Add	Search (((multidirectional instability) AND physiotherapy) AND rehab) AND exercise Schema: all Filters: Adolescent: 13-18 years	0	19:44:45
#28	Add	Search (((multidirectional instability) AND physiotherapy) AND rehab) AND exercise Filters: Adolescent: 13-18 years	0	19:44:45
#26	Add	Search (((shoulder) AND physiotherapy) AND rehab) AND exercise	240	19:44:05
#24	Add	Search ((multidirectional instability) AND shoulder) AND exercise	31	19:28:49
#23	Add	Search ((multidirectional instability) AND shoulder) AND exercise Schema: all Filters: published in the last 10 years; Adolescent: 13-18 years	0	19:24:21
#22	Add	Search ((multidirectional instability) AND shoulder) AND exercise Filters: published in the last 10 years; Adolescent: 13-18 years	0	19:24:21
#21	Add	Search (shoulder) AND rehabilitation Filters: published in the last 10 years; Adolescent: 13-18 years	631	18:59:38
#20	Add	Search (ACL repair) AND (rehabilitation OR "physical therapy" OR physiotherapy) Filters: published in the last 10 years; Adolescent: 13-18 years	46	18:58:58
#19	Add	Search (((("Shoulder Dislocation"[Mesh]) AND ("Joint Instability/rehabilitation"[Mesh] OR "Joint Instability/therapy"[Mesh])) AND ("Shoulder Joint/injuries"[Mesh] OR "Shoulder Joint/surgery"[Mesh] OR "Shoulder Joint/therapy"[Mesh])) AND return to play Filters: published in the last 10 years; Adolescent: 13-18 years	4	18:57:28
#18	Add	Search (((("Shoulder Dislocation"[Mesh]) AND ("Joint Instability"[Mesh] OR "Joint Instability/therapy"[Mesh])) AND ("Shoulder Joint/injuries"[Mesh] OR "Shoulder Joint/surgery"[Mesh] OR "Shoulder Joint/therapy"[Mesh])) AND (physiotherapy OR physical therapy OR rehabilitation) Filters: published in the last 10 years; Adolescent: 13-18 years	14	18:56:48
#17	Add	Search (((("Shoulder Dislocation"[Mesh]) AND ("Joint Instability/rehabilitation"[Mesh] OR "Joint Instability/therapy"[Mesh])) AND ("Shoulder Joint/injuries"[Mesh] OR "Shoulder Joint/surgery"[Mesh] OR "Shoulder Joint/therapy"[Mesh])) AND (physiotherapy OR physical therapy OR rehabilitation) Filters: published in the last 10 years; Adolescent: 13-18 years	9	18:22:50
#16	Add	Search (((("Shoulder Dislocation"[Mesh]) AND ("Joint Instability/rehabilitation"[Mesh] OR "Joint Instability/therapy"[Mesh])) AND ("Shoulder Joint/injuries"[Mesh] OR "Shoulder Joint/surgery"[Mesh] OR "Shoulder Joint/therapy"[Mesh])) AND (physiotherapy OR "physical therapy" OR rehabilitation) Filters: published in the last 10 years; Adolescent: 13-18 years	0	18:22:31

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Search ID	Search Terms	Search Options	Actions
51	shoulders AND (exercise OR physiotherapy OR "physical therapy") AND multidirectional instability	Search modes - Boolean/Phrase	View Results (28) View Details Edit

Refine Results

Current Search

BooleanPhrase: shoulders AND (exercise OR physiotherapy OR "physical therapy") AND multidirectional instability

Limit To

Full Text

Search Results: 1 - 28 of 28

Relevance Page Options Share Plum Print

- Neuromuscular retraining for multidirectional instability of the shoulder -- a case study.**

(includes abstract) Darlow B. New Zealand Journal of Physiotherapy, Jul2006, 34(2): 60-65. (6p) (Journal Article - case study, pictorial, tables/charts) ISSN: 0003-7159 AN: 105930397

Abstract: Multidirectional instability of the shoulder is a challenging clinical presentation that often requires surgical management. The presentation, assessment and physiotherapy management of a patient with multidirectional shoulder instability are described in this case. The patient presented with a long history of shoulder subluxation/dislocation in a variety of positions. The primary management was neuromuscular retraining of the concave-concave mechanism of the rotator cuff and of the scapular stabilisers. The patient attended nine physiotherapy sessions over a 29-week period. His Western Ontario Shoulder Instability Index score decreased from 53% to 14% during the treatment period, and was 10% eight months after discharge. He was able to return to all sporting activities without limitation, and he was no longer experiencing shoulder subluxation/dislocation.

Subjects: Musculoskeletal Diseases Rehabilitation; Physical Therapy Methods; Shoulder Instability; Multidirectional Diagnosis; Shoulder Instability; Multidirectional Pathology; Shoulder Instability; Multidirectional Rehabilitation

Cited References: (44)

Cochrane Library Database Search

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Search: Title, Abstract, Keywords: athlete
AND Search All Text: shoulder
AND Search All Text: physiotherapy OR exercise
(Word variations have been searched)

All Results (33)
 Cochrane Reviews (2)
 All
 Review
 Protocol
 Other Reviews (0)
 Trials (31)
 Methods Studies (0)
 Technology Assessments (0)
 Economic Evaluations (0)
 Cochrane Groups (0)
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 Current Issue

Methodology
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Cochrane Central Register of Controlled Trials : Issue 1 of 12, January 2017
 There are 31 results from 1010379 records for your search on 'athlete in Title, Abstract, Keywords and shoulder and physiotherapy OR exercise in Trials'
 Pages 1 - 25 | 26 - 31
 Sort by: Relevance: high to low

Select all | Export all | Export selected

- Effectiveness of physiotherapy interventions for patients with shoulder impingement syndrome: A systematic review.
Kromer TO, Tautenhahn UG, DeBie RA, Staal JB and Bastiaenen CHG
Physiotherapy (United Kingdom), 2011, 97, eS638
Publication Year: 2011
- Scapular bracing and alteration of posture and muscle activity in overhead athletes with poor posture.
Cole AK, McGrath ML, Harrington SE, Patus DA, Rudinski TJ and Prentice WE
Journal of athletic training, 2013, 48(1), 12
Publication Year: 2013
- Scapular muscle-activation ratios in patients with shoulder injuries during functional shoulder exercises.
Moeller CR, Bliven KC and Valier AR
Journal of athletic training, 2014, 49(3), 345
Publication Year: 2014

SPORTDiscus Database Search

Searching: SPORTDiscus with Full Text [Choose Database](#)

shoulders
AND - multidirectional instability
AND - exercise OR physiotherapy OR *
Basic Search | [Advanced Search](#) | [Search History](#)

Refine Results
 Current Search
Boolean/Phrase:
 shoulders AND multidirectional instability AND (exercise OR phys...
 Limit To
 Full Text
 References Available
 English Abstract Available
 1991 Publication Date 2017
 Show More
 Source Types
 All Results
 Academic Journals (11)

Search Results: 1 - 10 of 17

1. **Physiotherapy vs. capsular shift and physiotherapy in multidirectional shoulder joint instability**
 Kiss, Rita M.; Byls, Anja; Kiss, Jan; Journal of Electromyography & Kinesiology Jun2010, Vol. 20 Issue 3, p489 (English Abstract Available) Abstract: Abstract: Purpose: The aim of the study was to compare the kinematic parameters and the on-off pattern of the muscles of patients with multidirectional instability (MDI) treated by physiotherapy or by capsular shift and postoperative physiotherapy before and after treatment during elevation in the scapular plane. Scope: The study was carried out on 32 patients with MDI of the shoulder treated with physiotherapy, 19 patients with MDI of the shoulder treated by capsular shift and postoperative physiotherapy, and 25 healthy subjects. The motion of skeletal elements was modeled by the range of humeral elevation, scapulohumeral angle and glenohumeral angle, scapulohumeral (SH) and glenohumeral (GH) rhythms, and relative displacement between the rotation centers of the humerus and scapula. The muscle pattern was modeled by the on-off pattern of muscles around the shoulder, which summarizes the activity duration of the investigated muscles. Results: The different SH and GH rhythms and the increased relative displacement between the rotation centers of the scapula and the humerus were observed in MDI patients. The physiotherapy strengthened the rotator cuff, slope brachii, triceps brachii, deltoid muscles, and increase the neuromuscular control of the shoulder joints. Capsular shift and physiotherapy related slower SH and GH rhythms and the normal relative displacement between the rotation centers of the scapula and humerus to be restored. After surgery and physiotherapy, the duration of muscular activity was almost normal. Conclusion: The significant alteration in shoulder kinematics observed in MDI patients cannot be restored by physiotherapy only. After the capsular shift and the duration of muscular activity were restored. Copyright © Elsevier
Subjects: PHYSICAL therapy; KINEMATICS; JOINTS (Anatomy) -- Diseases; PATIENTS; SHOULDER joint; ELECTROMYOGRAPHY; BODY movement; JOINTS (Anatomy) -- Hypemobility; TREATMENT; MULTIAXIAL Diagnostic Inventory
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2. **Rehabilitation for Patients With Posterior Instability and Multidirectional Instability**
 Wilk, Kevin E.; Macrina, Leonard C.; Operative Techniques in Sports Medicine 2014, Vol. 22 Issue 1, p108 (English Abstract Available) Abstract: The glenohumeral joint is an inherently unstable joint that relies on the interaction of the dynamic and static stabilizers to maintain stability. Disruption of this interplay or poor development of any of these factors may result in instability, pain, and a loss of function. Rehabilitation varies based on the type of instability present and the key principles described. A comprehensive program designed to establish full range of motion, balance capsular mobility, along with

Appendix B

Evidence Synthesis

5 Systematic Reviews

5 Randomized Controlled Trials

2 Cohort Studies

Average age 18 years old

Male/Female

Measured RTP, re-injury, QOL, ROM

First time injuries/Subsequent Injuries

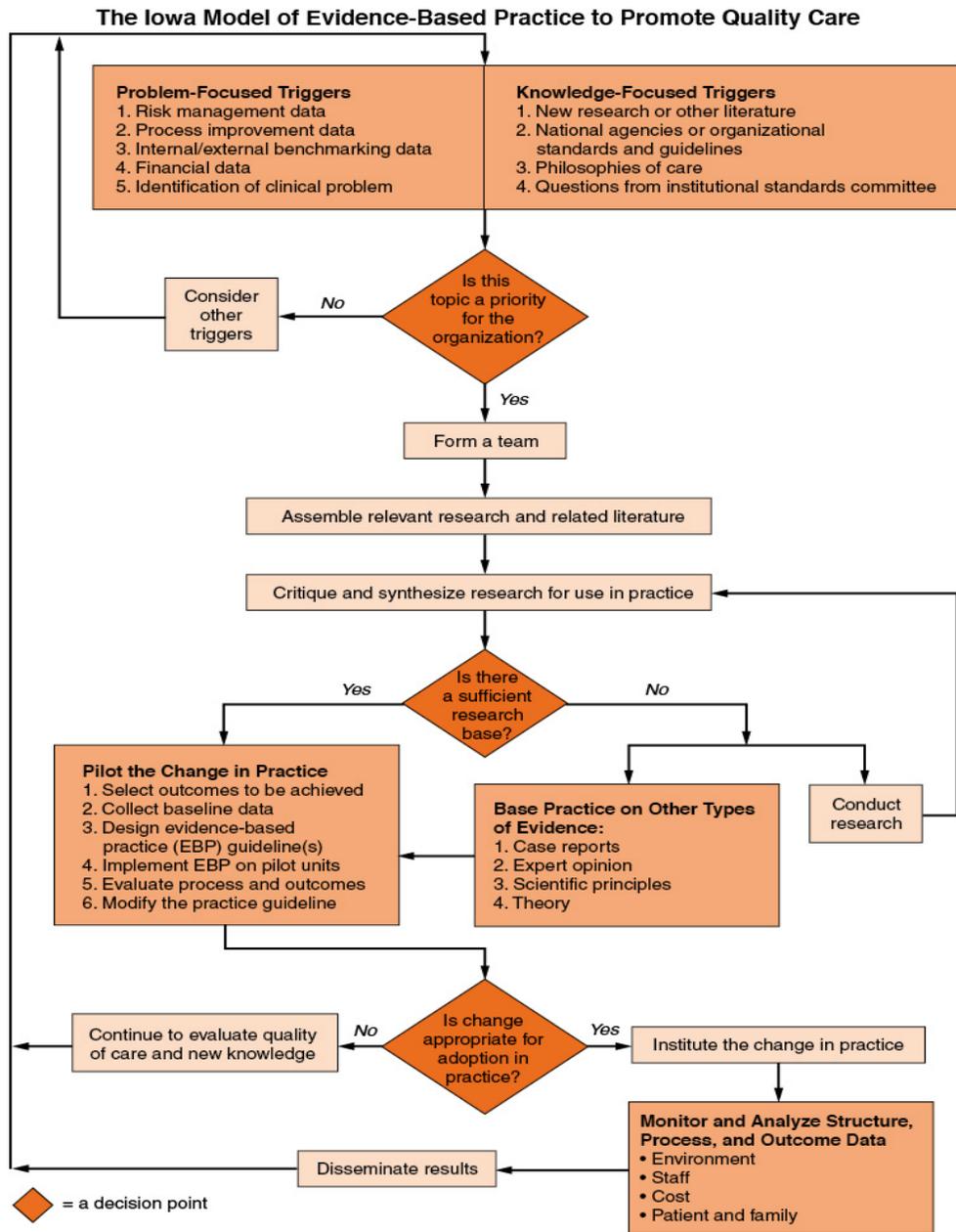
Traumatic/ Atraumatic Injuries

Tools used include: SANE, DASH, QuickDASH, WOSI, PASS

Operative/ Non-operative

Physical Therapy

Appendix C



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