Evidence Update Review for ASSET EBP Research Subcommittee

Article(s): Ann M. Cools, Fredrik R. Johansson, Dorien Borms, and Annelies Maenhout. Prevention of shoulder injuries in overhead athletes: a science-based approach. Braz J Phys Ther. 2015 Sep-Oct; 19(5): 331–339.

Potential Relevance to ASSET members:

Primary and secondary injury prevention efforts to reduce the risk of shoulder injury are important to athletes and health care providers alike. The authors of the reviewed article recommend evaluating the athlete prior to sports participation for the presence of known risk factors including asymmetries in the shoulder Range of motion, rotator cuff strength deficits, and impairments in scapular position and strength. The authors suggest that cutoff scores be used to determine risk profile and subsequently return to play status.

Recommended cut-off scores to identify higher risk athletes include:

1. Isolated IR ROM losses of ≥18° or ≥ 5° loss of the total arc of motion.
2. Isokinetic ER/IR strength ratio of <66%, or an isometric ER/IR ratio of <75%; absolute peak force values should be normalized to body weight and then compared to norm values.
3. Scapular position in full elevation should be should be at least 45-55° for upward inclination.
4. Scapular strength ratios should be symmetrical (1:1) for athletes in bilateral sports; and for those in one-handed overhead sports, an increase of 10% in scapular muscle strength is advised on the dominant side.

This article provides cut off scores to assist the clinician with making return to sport decisions for adult athletes. There are some differences between the range of motion cut off scores advocated in this article and those provided by other authors where the populations differ in age. For young athletes side-to-side differences of horizontal adduction >15° and internal rotation >13° may discriminate between those adolescent overhead athletes at 4 and 6 times greater risk of injury, respectively.

Prior research has also established normative strength values for the shoulder rotators and for the scapulothoracic muscles. Peak force values have been normalized to body weight to allow for direct comparison.

Adults	**Adolescents**
External rotation	**External rotation**
Males 0.19-0.20	17.5 ± 4
Females 0.15-0.16	
Internal rotation	**Internal rotation**
Males 0.27	18.7 ± 5
Females 0.21	
Prone flexion	
Males 0.11 -0.12	
Females 0.10	

ER/IR ratio
96 ± 22

*Strength reported as percent of body weight.

Scapular muscle strength ratios have been reported as:

Elevation: depression ratio of 2.5:1

Upward: downward rotation ratio of 1.5:1

Protraction: retraction ratio of 1.25:1.

Normative values for scapular muscle strength in adolescent athletes have not been established.

Strength data comparisons to normative values in return to sport assessments may be valuable though some authors have reported limited ability of strength and existing functional performance tests to distinguish between subjects with and without shoulder pain. For this reason prospective studies that establish predictive validity of shoulder tests are of particular importance.

Until research delineates which shoulder tests are the most valid predictors of injury, clinicians can best manage the athlete by evaluating the range of motion and comparing strength values to established norms. Functional testing and patient-derived outcome measures such as the Penn shoulder scale, sport DASH, or kerlan-jobe orthopedic clinic questionnaire (KJOC) may provide additional information to inform the return to play decision.

Article Link: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4647145/

Review Completed by: Gabriel Brooks

Parsonage Turner Syndrome

Roger Harward, PT

Rationale: Due to its rarity, Parsonage Turner Syndrome is frequently misdiagnosed and mistreated. Because this condition's chief complaint is acute onset severe shoulder pain, the Orthopedic Practitioner and Physical/Occupational Therapist may be the first to see these patients. Better understanding of this rare disorder will allow the medical professional to prevent unnecessary prolonged suffering and increased medical costs.

Abstract: Parsonage Turner Syndrome (PTS), also referred to as Acute Brachial Neuropathy, is a rare neurological disorder that commonly presents with acute onset of severe shoulder and arm pain, followed by progressive neuromuscular deficits. Etiology is unclear but researchers believe it may be an immune-mediated inflammatory response effecting the brachial plexus. Cause of such response is not known but often is a result of a "triggering" event such as infection, trauma (acute or post-surgical), rheumatic or autoimmune disorders. The severity of symptoms can vary but may be quite severe. Patients who suffer with this condition are often misdiagnosed and mismanaged. The purpose of this presentation is to provide society members, through education and case study, a clear summary of this condition, its symptoms, signs and appropriate treatment options.

Pectoralis Major Tendon Rupture in a Professional Baseball Player.

Keith Kocher, PT, MOMT, FAAOMPT

Case Study Presentation:

Introduction: Pectoralis major tendon injuries are relatively uncommon. Today, more than 200 cases have been described[1]. Injury typically occurs during lifting activities with the arm in a position of extension and external rotation. Most commonly occurring in weight-lifters, pectoralis major tendon ruptures have been reported in other sports such as boxing, jiu-jitsu, and wind-surfing[2]. Rupture is often associated with an audible pop, a tearing sensation, immediate pain, and/or weakness[3].

Anatomically, the pectoralis major muscle is triangular in shape, originating at the medial clavicle, anterior sternum, costal cartilage, and aponeurosis of the external oblique abdominal muscle. The pectoralis major muscle is divided into two portions: the clavicular head and the sternal head. The clavicular segment serves primarily to forward flex and adduct the arm, while the sternal portion acts primarily to internally rotate and adduct the arm[4].

Surgically treated patients experience improved results when compared to those treated non-operatively. Overall surgical outcomes were excellent 90% of the time compared with 17% of nonsurgical patients who had excellent outcomes. Patients who are younger in age and whose ruptures are surgically repaired prior to 8 weeks have a slight advantage[5]. Return to sport after pectoralis tendon injury is higher after surgical repair. We report the surgical treatment, rehabilitation, and return to sport in an elite level baseball player. Due to the overhead nature of his sport, we felt it important to outline the rehabilitation protocol utilized to return to his previous level of play and function.

Patient Presentation: A twenty-two year-old right-hand dominant professional third baseman injured his right shoulder while weightlifting. The patient reported feeling a pop in his right shoulder while bench pressing and described an immediate onset of “tightness” in his chest. The patient presented approximately one week after injury with considerable improvement in his pain, but with continued sensation of tightness. He denied any previous history of injury or antecedent pain. His past medical history and general physical exam were unremarkable. Examination of the right shoulder revealed ecchymosis and swelling of the right upper arm. There was an obvious deformity noted of the right pectoralis and axilla, with a palpable pectoralis tendon noted at the base of the axilla.

An MRI was performed which revealed complete rupture of the pectoralis tendon with retraction (Figure 1). The tear involved both the sternal and clavicular heads of the tendon. The treatment options were discussed with the patient. Given his age, activity level, dominant extremity involvement, and his profession as a baseball player, surgical repair was recommended.

Surgical Technique: Examination under anesthesia revealed a palpable pectoralis tendon within the axilla. After receiving a general anesthetic, the patient was positioned in the modified beach chair position and then was sterilely prepped and draped. A modified deltopectoral incision was made, and the interval was developed. Complete rupture of the clavicular and sternal heads was confirmed. Blunt dissection was performed to mobilize the pectoralis tendon. The rupture of the sternal head was more consistent with a myotendinous rupture. Three running locking sutures were placed through the tendon using #5 FiberWire (Arthrex, Naples, FL, USA). The anatomic insertion of the pectoralis tendon on the humerus was identified and debrided of remaining soft-tissue. Three staggered unicortical drill holes were made over the insertion site approximately 10-15 millimeters apart. The free suture #5 FiberWire ends were then inserted through three Pec Buttons (Arthrex, Naples, FL, USA). Reduction of the tendon was performed by sliding the sutures through the buttons. The free ends were then tied down, securing the repair. The wound was then irrigated and closed. Sterile dressings were applied and the patient placed into an abduction sling.

Post-Operative Rehabilitation:
Phase One (0-6 weeks post-operative):
The goals of phase one (reparative phase) were to decrease pain and guarding, provide optimal stimulation for tissue repair, while coordinating movement around a physiological axis through full range of motion. This player was seen one-week post-operative. A baseline subjective evaluation was performed along with a modified objective evaluation due to recent surgery. The main concern was that it was involved extremity was his dominant throwing right shoulder. A pain scale was used along with the Upper Extremity Functional Index (UEFI).

The patient was allowed full active elbow and wrist range of motion, but remained in the arm sling for a total of 4 weeks post-operatively. Treatment was initiated with soft tissue techniques to decrease pain and guarding, joint mobilization techniques to correct any arthrokinematic restrictions of the glenohumeral joint and AC joint and scar mobilization to prevent restrictions. Passive range of motion of the shoulder and arm was started one week postoperatively. Special attention was given to protect end-range flexion, abduction, and external rotation, but advanced as indicated and tolerated. Each plane was isolated until full motion was achieved, then advanced to combine movement multi-planar patterns. Active motion of the non-surgically involved musculature was initiated at 3 weeks.

Phase Two (6 weeks-full recovery)
The goals of phase two (maturation) were to coordinate tonic and phasic musculature, increase tissue tolerance and endurance to stress and functional activities. At six weeks post-operative, the patient demonstrated full passive range of motion compared to the contralateral extremity, but demonstrated expected muscular deconditioning and strength. Unrestricted active range of motion was allowed at this juncture in all planes with progressive activation lightweight and high repetition exercises. Focus was on the tonic musculature, i.e. rotator cuff and scapular musculature.

At 12 weeks post-operative, the resistance was advanced to focus on strengthening of both he tonic and phasic musculature. This was advanced as clinically indicated and tolerated. Exercises were initiated utilizing single planes and isolating muscle groups, then advanced to multi-planar patterns. Exercises were initiated with concentric exercises, then isometric exercise, followed by eccentric exercises to control tension. Plyometric exercises where incorporated at 16 weeks to include chest pass, wall ball, and follow through. We also initiated the speed pulley at this time which included internal and external rotation, and push and pull.
We not only monitored player symptoms, during and following treatments, but also applied scientific knowledge of tissue healing[6]. Clinical judgment was used in response to subjective and objective findings, but knowledge of tissue healing was applied to advance. Manual therapy was used during every treatment to identify and address pain, tissue guarding, and joint mobility. The qualities of exercises and functional assessments were used to advance the patient's rehabilitation. At 5 months, the player was started on a throwing program (Figure 1). He was progressed symptom free and released back to full baseball activities without symptoms or disability.

Conclusion: Sports-related injuries account for the majority of all reported pectoralis major ruptures. Surgical treatment is generally recommended for ruptures in the young, active patient population, with good results and return of function. To our knowledge, this is the first report of pectoralis major tendon repair and return to play in a professional baseball player.

Throwing Program			
	Monday	**Wednesday**	**Friday**
Week 1	45' x 5 min	45' x 5 min	45' x 7 min
Week 2	45' x 7 min	45' x 10 min	45' x 10 min
Week 3	60' x 10 min	60' x 10 min	60' x 10 min
Week 4	75' x 10 min	75' x 10 min	75' x 10 min
Week 5	90' x 10 min	90' x 10 min	90' x 10 min
Week 6	105' x 10 min	105' x 10 min	105' x 10 min
Week 7	120' x 10 min	120' x 10 min	120' x 10 min

Figure 1: Throwing program for return to play.

Bibliography

1. Aarimaa, V., Rantanen, J., Heikkila, J., Helttula, I., & Orava, S. (2004). Rupture of the pectoralis major muscle. Am J Sports Med , 32 (5), 1256-62.
2. Connell, D., HG., P., Sherman, M., & Wickiewicz, T. (1999). Injuries of the pectoralis major muscle: evaluation with MR imaging. Radiology , 210 (3), 785-91.
3. Gautschi, O., & Zellweger, R. (2007). A complete tear of the pectoralis major muscle from a seat belt injury. Eur J Emerg Med , 14 (2), 90-1.
4. Rockwood, C. (2004). The Shoulder. Philadelphia, PA: Saunders.
5. Bak, K., & Magnusson, S. (1997). Shoulder strength and range of motion in symptomatic and pain-free elite swimmers. Am J Sports Med , 25 (4), 454-9.
6. Woo, S., & Buckwalter, J. (1988). Injury and repair of the musculoskeletal soft tissues. . J Orthop Res , 6 (6), 907-31.

Integration of Video Analysis in the Treatment of Throwing Athletes. A Practitioners' Guide to Detecting and Correcting Common Throwing Errors.

Travis Manners, PT, SCS, CSCS

Educational Topic Presentation:

Current estimates show that over 5.6 million 6 to 18 year olds play baseball in the United States. Throwing a baseball has some of the most unique demands on the body in all of sports. Those unique demands however place a great deal of stress on certain joints, muscles, tendons, ligaments and bones. Reports vary in the amount of injuries seen in baseball. Studies have shown anywhere from 20% to 60% of players under the age of 18 experience shoulder and/or elbow pain each year.

Multiple factors have been correlated with throwing related injuries. Some of those factors include excessive pitch counts, playing multiple positions in games that have high throwing numbers, throwing through arm fatigue, increased velocity at younger ages, poor physical conditioning, and poor throwing mechanics.

In the current youth baseball landscape, there are not coaching licenses or pathways in developing coaches like in sports such as soccer or hockey. Therefore, many coaches and instructors rely on their previous playing experiences to teach players how to properly throw. These experiences may or may not be in line with what the medical research community has come to understand about throwing mechanics. Therefore, it is reasonable to assume that improper mechanics can contribute to the development of a throwing related injury.

In order to properly treat these throwing related injuries, PTs and ATC need to understand what are the common throwing errors young throwers make and provide some corrective drills to help resolve them. The purpose of this presentation of to discuss some common throwing errors, how to look for them in an in-clinic assessment, and what drills can be useful in helping correct those errors.

Using a neuro-imaging technique to improve shoulder function.

Aaron Sciascia, MS, ATC, PES: Shoulder Center of Kentucky, Lexington, KY

Case Study Presentation:

Patient: A 46 year-old male patient presented with severe scapular pain and inability to use his right arm in forward flexion or during overhead activities. His initial injury occurred when he was attempting to cut steel bolts as part of his regular work duties. In the middle of a cut, the tool slipped causing the patient's arm to be forcefully distracted away from his body. He immediately felt a pop and burning pain over the medial border of his scapula. He underwent numerous physician evaluations, receiving diagnoses of impingement, rotator cuff tendonitis, and cervical radiculopathy. After multiple months of physical therapy and little to no relief in pain, he was referred to our office where he was diagnosed with a scapular muscle detachment. Surgical treatment was selected which revealed that both his lower trapezius and rhomboids were detached from the scapula. The muscles were reattached and the patient performed approximately 8 months of post-operative physical therapy.

Problem: The surgical intervention and subsequent post-operative rehabilitation reduced the pain however; the patient began to develop kinesiophobic traits where he was afraid to move his arm forward due to the fear of the pre-surgical pain returning. On a follow-up visit over 18 months after the surgery, the patient stated that, "I can move my arm only if I think about. When I move my arm without thinking, the pain in the shoulder blade and under my armpit takes my breath away". He also reported hypersensitivity with low-level nocioception.

Intervention: Based on this statement, it was decided that the next treatment approach would be rooted in the principles of motor control, mainly neuroimaging. The thought was that there might be a disconnect between body perception and pain processing similar to an amputee experiencing phantom-limb pain. During the same follow-up visit, the patient was positioned standing with 2 full-length mirrors in front of him and 1 mirror perpendicular to his body. The perpendicular mirror impeded the patient's view of his involved arm while only being able to view the non-involved arm. The patient was instructed to focus on the reflection of the non-involved limb in the mirrors so it appeared as though he was looking at a full image of his body. When the patient signaled that the image looked complete, he was instructed to elevate both arms forward up to 90 degrees of elevation. After performing 12 repetitions, he was then instructed to go as far past shoulder level as he felt comfortable with.

Outcome: With the use of the mirrors, the patient could raise both arms equally to approximately 110 degrees of forward elevation with little reported pain. When the mirrors were taken away, the patient began to become inhibited again only being able to perform 5 repetitions of elevation before pain prohibited him from continuing. The patient was instructed to perform a similar regimen for 20 minutes a day, 5 days a week until his next follow-up which was 3 months later. On the next follow-up, the patient had full arm elevation (160 degrees) with little to no pain and without use of the mirrors.

Discussion/Clinical Application: Pain sensation and the response to those sensations are regulated by brain maps, the areas of the brain that process information which then send the information onto the appropriate structures to execute the response, which are activated by external and internal stimuli. In the case above, the mirror technique

eliminated or decreased pain by altering patient perception of body image. Pain and body image are described as being closely related, with the brain maps processing sensory input and also producing the image for the person. Since the brain maps are designed to conduct both tasks, it is reasonable to consider that one task can influence the other. Historically, pain has been viewed as unidirectional with the pain traveling from the area of injury to the brain. However, in the case above, it appears as though the opposite occurred in that the brain projected pain onto the body which confounds the unidirectional pathway idea. The body perception concept is typically not considered as an intervention to control pain and function as most clinicians who treat musculoskeletal conditions instruct patients to perform unilateral, ipsilateral actions while focusing on muscle contraction sensations and global movements with little involvement of the non-involved side. The body image concept would suggest that bilateral movements may be beneficial as part of neuromuscular education. Theoretically, the ability to see both limbs during a dynamic task would help a patient "re-train" the brain to perceive an appropriate, balanced body image thus improving function.

Thoracodorsal Nerve Transfer for Long thoracic nerve palsy.

Tanya Anne Mackenzie, PhD

Case Study Presentation:

Patient clinical presentation: A 47 year old right handed gentleman who sells computer software presented to the clinic. He had previously sustained an AC joint dislocation of his right shoulder when he came off his mountain bike. After which he returned to his normal activities including swimming, cycling and running. Three weeks later he noticed aching from his shoulder blade whilst he was driving then winging of his shoulder blade. He then found he had a reduced range of movement of his shoulder with discomfort in the shoulder and scapula area. On objective examination in standing he had marked winged scapula with marked inferior border prominence and protraction. He had shoulder elevation limited to 80 degrees with significant scapula winging and dysrhythmia (Type I and II). Shoulder ER, IR were both full. Testing of serratus anterior strength showed marked weakness. There was no trapezius, rhomboids or lat dorsi weakness. There was no rotator cuff weakness. (Videos of initial motion and scapular dyskinesia available)

Problem: Nerve conduction EMG studies revealed he had along thoracic nerve injury.

Intervention: *Surgical intervention*: exploration and attempted neurolysis of the long thoracic nerve. (Video available to illustrate the testing of this during surgery). Neurolyiss during surgery did not restore normal conductivity to the long thoracic nerve so a branch of the thoracodorsal nerve was transferred to co-apt onto the long thoracic nerve. *Rehabilitation intervention:* The first challenge was to find a method to grade/assess the serratus muscle in order to provide appropriate targeted rehabilitation of this muscle. I drew up my own guidelines/protocol since no others were available and can present these. Cortical mapping and relearning are key factors in optimizing patient outcome following motor nerve transfers so I used feedback learning co-contraction of newly innervated serratus anterior and contraction of latissimus dorsi to induce synergistic action. Videos of the rehab implemented and the time frames of recovery can be shown.

Outcome measures: Observation of scapular motion and shoulder elevation range of motion with time frames recorded.

Discussion/clinical application: Since this patient we have had a number of patients with long thoracic nerve palsy referred to the clinic who have had scapular dyskinesia for long periods with lengthy rehabilitation programs. This has generated a multitude of questions: 1. how are we grading and evaluating serratus anterior strength in order to decide if conservative therapy is indicated or if the patient should be referred for nerve conduction studies; 2. What the ASSET members opinion is of the protocols that I have drawn up and any advice; 3. Have other members of ASSET had experience of Thoracodorsal Nerve Transfer for Long thoracic nerve palsy (or neurolysis of the Long thoracic nerve) and the rehabilitation this involves; 4. We have had some dramatic results with neurolysis of the long thoracic nerve and I can share these for discussion.

Can Physical Therapists Pick Out Patients at Risk for Persistent Pain?

Wassinger, CA: East Tennessee State University

Research Presentation:

Background: Up to 30% of patients with acute musculoskeletal pain go on to experience chronic pain. The rate of shoulder pain that becomes chronic ranges between 11-18%. Appropriately classifying patients who may be at risk for persistent musculoskeletal pain can help to guide evaluation and intervention strategies and has been shown to be beneficial for patient outcomes. Physical therapists ability to classify patients into such groups has been questioned. The Orebro Musculoskeletal Pain Questionnaire (OMPQ) is a validated self-report tool that has demonstrated a predictive ability to determine patients risk for persistent pain.

Research Question: Can physical therapists intuition determine a patients risk for persistent pain during routine examination and evaluation?

Study Purpose: The aim of this study was to prospectively quantify the screening accuracy of physical therapists in determining risk for persistent symptoms compared the OMPQ.

Methods: All adult patients and the physical therapists performing their evaluations at seven physical therapy clinics over a one month period were invited to participate. Patients must have been seeking treatment for a painful musculoskeletal condition. Patient participants completed the 10 question OMPQ as part of the intake paperwork on the first day of physical therapy treatment thus classifying them as high or low risk of persistent pain. Physical therapists, blinded to OMPQ risk classification, completed their usual examination and evaluation and were asked to rate the patient at high or low risk for persistent pain. The risk classification from physical therapists was calculated as the screening (diagnostic) accuracy compared to the OMPQ (reference standard) by way of contingency table analysis.

Results: Ninety-nine (99) patients and 14 evaluating physical therapists consented to participate in this survey study. Ninety-six (96) patients classifications (age 50.7, range 18-83 years, 66 female) and 14 corresponding physical therapists (8.2, range 1-30 years' experience) risk estimates were available for analysis. The primary region of symptoms complaint varied with low back, multiple primary areas, and knee as most common. The results of the OMPQ identified a 47% prevalence for high risk of persistent pain. Therapists' sensitivity and specificity (95% CI) for determining risk classifications were 60.0% (44.3-74.3) and 62.8% (48.1-75.6) respectively. The positive and negative likelihood ratios (95% CI) were 1.61 (1.05-2.47) and 0.64 (0.42-0.97).

Discussion: The sensitivity, specificity and likelihood ratios calculated from this study indicate little evidence of physical therapists' ability to correctly identify patients at risk for persistent pain compared to the OMPQ.

Clinical Application: Physical therapists usual examination and evaluation procedures are insufficient to identify patients at risk for persistent pain. The use of validated self-report questionnaires, such as the OMPQ, is recommended to identify patients at risk of persistent musculoskeletal pain and to help guide evaluation and treatment decisions.

VANDERBILT UNIVERSITY MEDICAL CENTER

Bundled Payments and Post- op Rotator Cuff Repair

Rebecca Dickinson, DPT, COMT
Jamie Bergner, OTD, CHT, COMT
John E. Kuhn, MD
Katherine H. Rizzone, MD

VANDERBILT UNIVERSITY MEDICAL CENTER

What are Bundled Payments?

- As a part of the Patient Protection and Affordable Care Act of 2010, the Centers for Medicare and Medicaid Services (CMS) initiated the Bundled Payments for Care Improvement (BPCI) Initiative
- Combines payments for the multiple services beneficiaries receive within a defined episode of care

CMS. Bundled Payments for Care Improvement (BPCI) Initiative: General Information. 2016. https://innovation.cms.gov/initiatives/bundled-payments/

VANDERBILT UNIVERSITY MEDICAL CENTER

Current Model

- Payments are made individually to providers and institutions for services provided for a single episode of care
- Rewards quantity over quality
- Can result in “over-treatment” and does not encourage coordination of care among disciplines

CMS. Bundled Payments for Care Improvement (BPCI) Initiative: General Information. 2016. https://innovation.cms.gov/initiatives/bundled-payments

VANDERBILT UNIVERSITY MEDICAL CENTER

BCPI Initiative

- Developed by CMS to pilot innovative reimbursement models to reduce cost to CMS and to encourage effective, coordinated care
- Rewards quality over quantity
- CMS will work with pilot facilities to determine outcomes over to course of the initiative

CMS. Bundled Payments for Care Improvement (BPCI) Initiative: General Information. 2016. https://innovation.cms.gov/initiatives/bundled-payments

VANDERBILT UNIVERSITY MEDICAL CENTER

BCPI Initiative Models

- Model 1- Acute care hospital stay- hospital is paid discounted amount under Inpatient Prospective Payment System, physicians are continued to be paid separately
- Model 2- Acute care hospital stay plus all related services for a 90 day period- retrospective payment for all services reconciled against target price

VANDERBILT UNIVERSITY MEDICAL CENTER

BCPI Initiative Models

- Model 3- Triggered by acute care stay, but payment period is first day of post acute care ie, skilled care faciliity, rehab, payment same as model 2
- Model 4- Acute care length of stay- one prospective payment to facility to cover all aspects of care including physician services

CMS. Bundled Payments for Care Improvement (BPCI) Initiative: General Information. 2016. https://innovation.cms.gov/initiatives/bundled-payments

VANDERBILT UNIVERSITY MEDICAL CENTER

BCPI Initiative

- Current orthopedic conditions on the list include total hip and total knee and fall under model 2.
- After all charges are submitted, if the total falls over the target bundle price, the managing hospital is responsible to pay back the difference. If the total falls under, the managing institution will be paid additional funds.

VANDERBILT UNIVERSITY MEDICAL CENTER

BCPI Initiative

- The American Academy of Orthopaedic Surgeons (AAOS) has suggested hip fractures, rotator cuff repair, and knee arthroscopy as possible bundles to be added to the list.

VANDERBILT UNIVERSITY MEDICAL CENTER

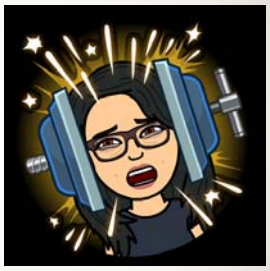
Discussion

- What does this change and/or not change about the way you think about our roles as PT's and OT's in the continuum of care?
- What do we need to change/not change about the way we deliver care?
- What, if any, preparation has you facility done?

VANDERBILT UNIVERSITY MEDICAL CENTER

Rotator Cuff Repair Physical Therapy Dosing

- Systematic Review submitted August 2016
- Looked at dosing, or supervised versus unsupervised, physical therapy after rotator cuff repairs
- Looked at effectiveness and cost efficiency of post operative cryotherapy



VANDERBILT UNIVERSITY MEDICAL CENTER

Who me?

VANDERBILT UNIVERSITY MEDICAL CENTER

VANDERBILT UNIVERSITY MEDICAL CENTER

Methods

- Literature Search with key terms
  Therapy- rotator cuff, rotator cuff repair, exercise therapy, exercise, unsupervised, selfcare, postoperative period, physical therapy, physiotherapy
  Cryotherapy-rotator cuff repair, shoulder, cryotherapy, ice, postoperative shoulder

VANDERBILT UNIVERSITY MEDICAL CENTER

Methods

- Inclusion criteria
  Therapy- specific to rotator cuff repairs, home versus supervised therapy, used validated outcome measures of pain, function, ROM or disability
  Cryotherapy- specific to the postoperative shoulder and cryotherapy

VANDERBILT UNIVERSITY MEDICAL CENTER

Methods

- Exclusion Criteria
  Therapy- diagnoses other than rotator cuff repair, systematic review or case series, used other outcome measures
  Crotherapy- Not relevant to shoulder or ice or non english
- Results
  Therapy- 5 articles
  Cryotherapy- 5 articles

VANDERBILT UNIVERSITY MEDICAL CENTER

Roddey et al. 2002

- 108 patients with full thickness RC tear, underwent arthroscopic repair
- All subjects wore sling 6 weeks
- Group 1- received videotape of exercises by PT at hospital, assessment by PT at 6,12,14 weeks to assess readiness to progress to next phase of exercises only.

VANDERBILT UNIVERSITY MEDICAL CENTER

Roddey et al. 2002

- Group 2- Evaluated by PT at 2,6,12,24 weeks for readiness to progress and taught exercises in person
- Both groups were allowed unlimited phone contact with PT and exercises were the same for both groups.
- Results- No statistical difference between groups in outcome scores (SPADI and UPenn at 12, 24, or 52 weeks), compliance, or number of telephone contacts

VANDERBILT UNIVERSITY MEDICAL CENTER

Roddey et al. 2002

- Concluded no difference between patients that received videotape instruction and patients that received one-on-one therapist directed instruction, videotapes can be an important patient education and instruction tool in this population.

VANDERBILT UNIVERSITY MEDICAL CENTER

Roddey et al. 2002

- 40/108 participants did not complete at least one data collection follow up
- Due to attrition, failed to collect data on required number of participants as determined by priori power analysis
- With unlimited phone contact- are these groups different?
- No comparison to true supervised treatment

VANDERBILT UNIVERSITY MEDICAL CENTER

Hayes et al. 2004

- 58 patients undergoing RC repair
- All participants wore sling one day
- Both groups were given the same 3 phase program of exercises

VANDERBILT UNIVERSITY MEDICAL CENTER

Hayes et al. 2004

- Group 1- Given phase 1 exercises preoperatively by PT, phase 2 and 3 given by surgeon at post op visits at 8 days and 6 weeks.
- Group 2- Given phase 1 preoperatively, attended formal PT average of 16 visits over 17 weeks

VANDERBILT UNIVERSITY MEDICAL CENTER

Hayes et al. 2004

- No differences between groups in postoperative PROM, MMT or Shoulder Service Questionnaire at 6, 12 or 24 weeks
- Conclusions- Outcomes were comparable between individualized, supervised physical therapy and standardized, unsupervised home program after rotator cuff repair

VANDERBILT UNIVERSITY MEDICAL CENTER

Hayes et al. 2004

- Significant loss of follow-up; missing data points of up to 31% in the individualized PT group and 44% in the home program group reducing the likelihood of finding between group differences
- 9 of 32 in home program group crossed over into the PT group- these 9 were significantly older than the rest of the cohort (67 versus 59 years)

VANDERBILT UNIVERSITY MEDICAL CENTER

Buker et al. 2011

- 28 subjects with medium and large RC tears
- All patients performed pendelums and passive exercises 6 weeks while in sling, AROM then performed until full range, then resistance.
- Group 1- seen by PT 1x a week for exercise progression
- Group 2- seen 5 x a week for 20 visits starting at 6 weeks post op

VANDERBILT UNIVERSITY MEDICAL CENTER

Buker et al. 2011

- Significant improvements in both groups in pain scores, Constant shoulder score, SF-36 and BDI
- Longest follow up- 3 months
- Conclusions-No statistical differences between supervised exercise program and standardized home program in pain, functional status, quality of life and depression status following rotator cuff repair and supervised physical therapy has a higher cost.

VANDERBILT UNIVERSITY MEDICAL CENTER

Buker et al. 2011

- Supervised group received US and E-stim as part of every treatment
- Study suggests one time a week for exercise progression may be effective
- Unsupervised group may be closer to what we already do?

VANDERBILT UNIVERSITY MEDICAL CENTER

Lisinski et al. 2012

- 22 subjects
- All subjects wore sling except during exercises for 40 days
- Group 1- performed AROM flexion in abduction and flexion and adduction for 20 min 3x/day

VANDERBILT UNIVERSITY MEDICAL CENTER

Lisinski et al. 2012

- Group 2- formal PT
- 4 phases: 1-myofascial release/hold-relax, 2-post isometric relaxation and PNF, 3- isotonic, repeated stretches of rotator muscles, rhythmic stabilization, 4- resistive strengthening
- Longest follow up- 40 days

VANDERBILT UNIVERSITY MEDICAL CENTER

Lisinski et al. 2012

- Results- Significant improvements in range of motion, pain levels, EMG and ENG studies in the supervised group, no significant improvements found in the unsupervised exercise group.
- Conclusion- Supervised exercise is more effective that uncontrolled exercise after rotator cuff surgical reconstruction

VANDERBILT UNIVERSITY MEDICAL CENTER

Lisinski et al. 2012

- Absence of reporting effect sizes and little statistical discussion
- Difficult to determine if the differences were clinically meaningful.
- 2 very different programs
- Conclusion may more likely be that these particular active range of motion exercises for an hour/day may not be beneficial and incorporating education about techniques for pain control and decreased muscle spasm could be helpful in a successful program

VANDERBILT UNIVERSITY MEDICAL CENTER

Chou et al. 2016

- 24 subjects undergoing mini-open RCR for crescent shaped tear who had finished one week of bedside PT, diagnostic evidence of medium to large tear, sonography proof of no loosening during the first week of PT

VANDERBILT UNIVERSITY MEDICAL CENTER

Chou et al. 2016

- Group 1- Subjects seen bedside and given rehabilitation protocol, follow up at 2, 6, and 12 weeks. Performed pendulums and exercises on their own. At 3 weeks, PROM; 5 weeks isometrics; 8 weeks progressive resistive; 12 weeks strengthening

VANDERBILT UNIVERSITY MEDICAL CENTER

Chou et al. 2016

- Group 2- Subjects were seen 5 days a week and performed pendulums with accelerometer based device under PT supervision. Subjects did not perform the standardized protocol of unsupervised group until 5 weeks, and at 6 weeks all therapy was moved to aquatic exercises.

VANDERBILT UNIVERSITY MEDICAL CENTER

Chou et al. 2016

- Results- No significant difference between groups in ASES, DASH, Constant-Murley, VAS pain at 12 weeks. 12 week scores in UCLA score was significantly higher in the informed group. There were 12 recurrent tears at 12 weeks, 2 in the supervised group and 10 in the unsupervised group.

VANDERBILT UNIVERSITY MEDICAL CENTER

Chou et al. 2016

- Conclusion- Use of a monitoring device during pendulums during early rehabilitation after RCR is associated with lower retear rates.
- This study was trying to determine if adding the accelerometer to pendulums would reduce previously described retear rates in RCR.

VANDERBILT UNIVERSITY MEDICAL CENTER

Chou et al.

- The additional variables make it difficult to attribute the decreased re-tear rates at 12 weeks to a pendulum monitoring device OR supervision of therapy OR use of aquatics

VANDERBILT UNIVERSITY MEDICAL CENTER

Summary

- Minimal long term follow up
- Low quality evidence to support proper educational materials (i.e. videos) and access to physical therapists for follow up and questions via phone or other telecommunications to decrease overall supervision

VANDERBILT UNIVERSITY MEDICAL CENTER

Summary

- Low quality evidence that supports supervised therapy for elderly patients due to suggested poor result from unsupervised exercise.
- Inconclusive evidence to guide number of prescribed therapy visits- 3 of 4 studies included in this review have differing guidelines or exercises for the control group

VANDERBILT UNIVERSITY MEDICAL CENTER

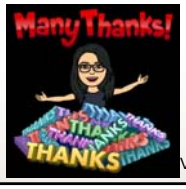
Summary

- Further research needs to be performed to determine the appropriate dosing needed to achieve effective rehabilitation with bundled payment as a future primary reimbursement model.

VANDERBILT UNIVERSITY MEDICAL CENTER

Discussion

- What do you do? How much is too little, too much?
- Given this evidence, or lack of, how do we show value?



VANDERBILT UNIVERSITY MEDICAL CENTER

VANDERBILT UNIVERSITY MEDICAL CENTER

Bibliography

1. Büker N, Kitiş A, Akkaya S, Akkaya N. Comparison of the results of supervised physiotherapy program and home-based exercise program in patients treated with arthroscopic-assisted mini-open rotator cuff repair. Eklem Hastalik Cerrahisi. 2011;22(3):134-9.
2. Chou C, Hu W, Wen C, Wang S, Lieu F, Teng J. Efficacy of informed versus uninformed physiotherapy on postoperative retear rates of medium-sized and large rotator cuff tears. Journal of Shoulder and Elbow Surgery. 2015; 24(9):1413-20. doi: 10.1016/j.jse.2015.05.049.
3. CMS. Bundled Payments for Care Improvement (BPCI) Initiative: General Information. 2016. https://innovation.cms.gov/initiatives/bundled-payments/. Accessed February 25, 2016.
4. Colvin A, Egorova N, Harrison A, Moskowitz A, Flatow E. National trends in rotator cuff repair. The Journal of Bone & Joint Surgery. 2012; 94(3):227-233. doi:10.2106/jbjs.j.00739.

VANDERBILT UNIVERSITY MEDICAL CENTER

Bibliography

5. Deke J, Sama-Miller, E, Hershey, A. Addressing attrition bias in randomized controlled trials: considerations for systematic evidence reviews. Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services, 2015.
6. Hayes K, Ginn K, Walton J, Szomor Z, Murrell G. A randomised clinical trial evaluating the efficacy of physiotherapy after rotator cuff repair. Australian Journal of Physiotherapy. 2004;50(2):77-83. doi:10.1016/s0004-9514(14)60099-4.
7. Kraeutler M, Reynolds K, Long C, McCarty E. Compressive cryotherapy versus ice—a prospective, randomized study on postoperative pain in patients undergoing arthroscopic rotator cuff repair or subacromial decompression. Journal of Shoulder and Elbow Surgery. 2015;24(6):854-859. doi:10.1016/j.jse.2015.02.004.
8. Levy A, Kelly B, Lintner S, Speer K. Penetration of cryotherapy in treatment after shoulder arthroscopy. Arthroscopy: The Journal of Arthroscopic & Related Surgery. 1997;13(4):461-464. doi:10.1016/s0749-8063(97)90125-0.

VANDERBILT UNIVERSITY MEDICAL CENTER

Bibliography

9. Lisinski P, Huber J, Wilkosz P et al. Supervised versus uncontrolled rehabilitation of patients after rotator cuff repair-clinical and neurophysiological comparative study. IJAO. 2012;35(1):45-54. doi:10.5301/ijao.5000037.
10. Moher D, Liberati A, Tetzlaff, J, Altman, D. Preferred reporting items for systematic reviews and Meta-Analyses: The PRISMA statement. PLoS Medicine. 2009;6(7), e1000097. doi:10.1371/journal.pmed.1000097
11. Osbahr D, Cawley P, Speer K. The effect of continuous cryotherapy on glenohumeral joint and subacromial space temperatures in the postoperative shoulder. Arthroscopy: The Journal of Arthroscopic & Related Surgery. 2002;18(7):748-754. doi:10.1053/jars.2002.32835.
12. Roddey T, Olson S, Gartsman G, Hanten W, Cook K. A Randomized Controlled Trial Comparing 2 Instructional Approaches to Home Exercise Instruction Following Arthroscopic Full-Thickness Rotator Cuff Repair Surgery. J Orthop Sports Phys Ther. 2002;32(11):548-559. doi:10.2519/jospt.2002.32.11.548.

VANDERBILT UNIVERSITY MEDICAL CENTER

Bibliography

13. Singh H, Osbahr D, Holovacs T, Cawley P, Speer K. The efficacy of continuous cryotherapy on the postoperative shoulder: A prospective, randomized investigation. Journal of Shoulder and Elbow Surgery. 2001;10(6):522-525. doi:10.1067/mse.2001.118415.
14. Speer K, Warren R, Horowitz L. The efficacy of cryotherapy in the postoperative shoulder. Journal of Shoulder and Elbow Surgery. 1996;5(1):62-68. doi:10.1016/s1058-2746(96)80032-2.