Shoulder Stability and Movement Coordination Impairments: Shoulder Instability Clinical Practice Guideline

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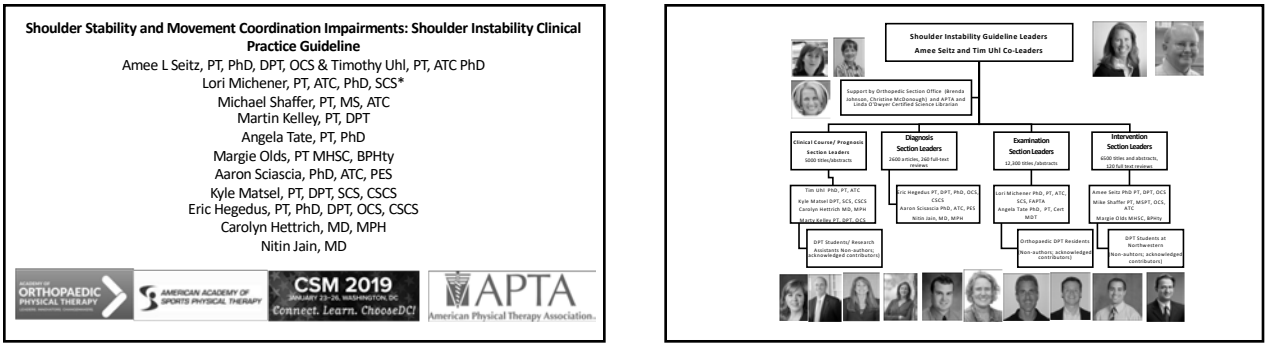

Disclosures

- **All Authors have no conflicts related to development of the CPG**
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Objectives of Session

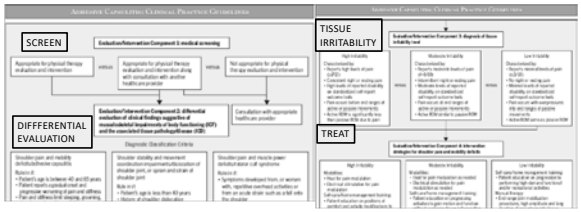
1. **Explain the shoulder pain classification and methods used to categorize patients into shoulder CPG categories, specifically shoulder instability**
2. **Understand the evidence with regard to establishing a prognosis for patients with shoulder instability including pathoanatomic features as well as the limitation of evidence for the risk factors for operative versus non-operative treatment**
3. **Recognize current best practice and recent evidence supporting the physical therapy examination, treatment and outcome assessment in patients with shoulder pain related to shoulder instability and movement coordination deficits**
4. **Recognize the strengths and limitations in CPGs to define best practices that meet the needs of patients under most circumstances but do not replace the need for sound clinical decision making for individual patients**

Outline

- **Staged Algorithm for Rehabilitation of Shoulder Pain – (STAR) Shoulder Movement Diagnosis and Rehabilitation Classification Overview (Tim Uhl)**
- **Clinical Course: Typical outcomes of patients with instability including pathoanatomic diagnoses and other potential clinical factors that may impact prognosis of rehabilitation (Kyle Matsel)**
- **Diagnosis: Best evidence and clinical recommendations for examination procedures to identify patients with shoulder instability (Eric Hegedus)**
- **Intervention: Best evidence and clinical recommendations for physical therapy interventions including immobilization, exercise, neuromuscular retraining, and bracing (Amee Seitz)**
- **Outcome Assessment: What self-reported and performance based measures best capture patient rehabilitation treatment outcomes in patients with shoulder instability (Lori Michener)**
- **Questions**

2013 First Shoulder Clinical Practice Guideline

4 Component Model with Tissue Irritability



Staged Approach for Rehabilitation Classification: Shoulder Disorders (STAR–Shoulder)

Philip W. McClure, Lori A. Michener

Shoulder disorders are a common musculoskeletal problem causing pain and functional loss. Traditionally, diagnostic categories are based on a pathoanatomic medical model aimed at identifying the pathologic tissues. However, the pathoanatomic model may not provide diagnostic categories that effectively guide treatment decision making in rehabilitation. An expanded classification system is proposed that includes the pathoanatomic diagnosis and a rehabilitation classification based on tissue irritability and identified impairments. For the rehabilitation classification, 3 levels of irritability are proposed and defined, with corresponding strategies guiding intensity of treatment based on the physical stress theory. Common impairments are identified and are used to guide specific intervention tactics with varying levels of intensity. The proposed system is conceptual and needs to be tested for reliability and validity. This classification system may be useful clinically for guiding rehabilitation intervention and provides a potential method of identifying relevant subgroups in future research studies. Although the system was developed for and applied to shoulder disorders, it may be applicable to classification and rehabilitation of musculoskeletal disorders in other body regions.

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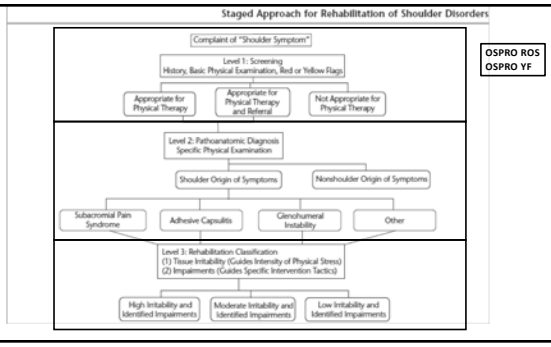
[McClure PW, Michener LA. Staged approach for rehabilitation classification: shoulder disorders (STAR-Shoulder). Phys Ther. 2015;95:791–800.]

-McClure & Michener Phy Ther 2015

Staged Approach for Rehabilitation of Shoulder Disorders



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Pathoanatomic Diagnosis vs. Rehab Classification

- **Level 2 Pathoanatomic Dx**
  - **Primary Tissue Pathology**
  - **Stable over an episode of care**
  - **Guides general Rx strategy**
  - **Informs prognosis**
  - ***Surgical Decisions***
- **Level 3 Rehabilitation Classification**
  - **Irritability / Impairment**
  - **Often changes over episode of care**
  - **Guides specific rehab treatment**
    - **Physical stress dosage**
    - **Specific Impairments**
  - **May inform prognosis**

Level 2 Pathoanatomic Diagnoses

	Subacromial Pain Syndrome Rotator Cuff	Adhesive Capsulitis	Glenohumeral Instability	Other
"Rule in"	Key positive findings •Impingement signs •Painful arc •Pain w/ isom resist •Weakness •Atrophy (tear)	Key positive findings •Spontaneous progressive pain •Loss of motion in multiple planes •Pain at end-range	Key positive findings •Age usu < 40 •Hx disloc / sublux •Apprehension •Generalized laxity	•GH Arthritis •Fractures •AC jt •Neural Entrap •Myofascial •Fibromyalgia •Post-Op
"Rule Out"	Key negative findings • Sig loss of motion • Instability signs	Key negative findings • Normal motion • Age < 40	Key negative findings • No hx disloc • No apprehension	

Pathoanatomic diagnosis based on specific physical examination (+/- imaging). Most diagnostic accuracy studies address this level. As examples, findings are listed for the three most common diagnoses only.

Level 3 Rehabilitation Classification

- ***Tissue Irritability*** *(guides intensity of physical stress)*
- ***Impairments*** *(guides specific intervention tactics)*

	Tissue Irritability: Pain , Motion, Disability		
	High	Moderate	Low
History and Exam	• High Pain (≥ 7/10) • night or rest pain • consistent • Pain before end ROM • AROM < PROM • High Disability •(DASH, ASES)	• Mod Pain (4-6/10) • night or rest pain • intermittent • Pain at end ROM • AROM ~ PROM • Mod Disability •(DASH, ASES)	•Low Pain (≤ 3/10) • night or rest pain • none • Min pain w/overpressure • AROM = PROM • Low Disability •(DASH, ASES)
Intervention Focus	Minimize Physical Stress • Activity modification • Monitor impairments	Mild - Moderate Physical Stress • Address impairments • Basic level functional activity restoration	Mod – High Physical Stress • Address impairments • High demand functional activity restoration

Rehab Classification

- Tissue Irritability *(guides intensity of physical stress)*
- ***Impairments*** *(guides specific intervention tactics)*

Impairment	High Irritability	Moderate Irritability	Low Irritability
Pain: Assoc Local Tissue Injury	Modalities Activity modification	Limited modality use Activity modification	No modalities
Pain: Assoc with Central Sensitization	Progressive exposure to activity Medical Mgmt		
Limited Passive Mobility: joint / muscle / neural	ROM , stretching, manual therapy: Pain-free only, typically non-end range	ROM , stretching, manual therapy: Comfortable end-range stretch, typically intermittent	ROM , stretching, manual therapy: Tolerable stretch sensation at end range. Typically longer duration and frequency
Excessive Passive Mobility	Protect joint or tissue from end-range	Develop active control in mid-range while avoiding end-range in basic activity Address hypomobility of adjacent joints or tissues	Develop active control during full-range during high level functional activity Address hypomobility of adjacent joints or tissues
Neuromuscular Weakness: Assoc with atrophy, disuse, deconditioning	AROM within pain-free ranges	Light → mod resistance to fatigue Mid-ranges	Mod → high resistance to fatigue include End-ranges
Neuromuscular Weakness Assoc with poor motor control or neural activation	AROM within pain-free ranges Consider use of biofeedback, neuromuscular electric stimulation or other activation strategies	Basic movement training with emphasis on quality/precision rather than resistance according to motor learning principles	high demand movement training with emphasis on quality rather than resistance according to motor learning principles
Functional Activity intolerance	Protect joint or tissue from end-range, encourage use of unaffected regions	Progressively engage in basic functional activity	Progressively engage in high demand functional activity
Poor patient understanding leading to inappropriate activity (or avoidance of activity)	Appropriate patient education	Appropriate patient education	Appropriate patient education

CPG for Shoulder Instability

- Systematic Review of Evidence
- Summarize highest level for Diagnosis/Classification, Examination, Intervention
- Make a recommendation

I	Evidence obtained from high-quality randomized controlled trials, prospective studies, or diagnostic studies
II	Evidence obtained from lesser-quality randomized controlled trials, prospective studies, or diagnostic studies (eg, improper randomization, no blinding, <80% follow-up)
III	Case-controlled studies or retrospective studies
IV	Case series
V	Expert opinion

GRADES OF RECOMMENDATION BASED ON	STRENGTH OF EVIDENCE
A	Strong evidence — A preponderance of level I and/or level II studies support the recommendation. This must include at least 1 level I study
B	Moderate evidence — A single high-quality randomized controlled trial or a preponderance of level II studies support the recommendation
C	Weak evidence — A single level II study or a preponderance of level III and IV studies, including statements of consensus by content experts support the recommendation
D	Conflicting evidence — Higher-quality studies conducted on this topic disagree with respect to their conclusions. The recommendation is based on these conflicting studies
E	Theoretical/ foundational evidence — A preponderance of evidence from animal or cadaver studies, from conceptual models/principles, or from basic sciences/ bench research support this conclusion
F	Expert opinion — Best practice based on the clinical experience of the guidelines development team

Thank You

- **Next**
- **Discuss the evidence with regard to establishing a prognosis for patients with shoulder instability**
  - **Classification**
  - **Incidence**
  - **Pathoanatomical features**
  - **Clinical Course**
  - **Risk Factors**

Clinical Practice Guidelines for Shoulder Instability

Prognosis

Kyle Matsel DPT, SCS, CSCS

Defining Shoulder Instability

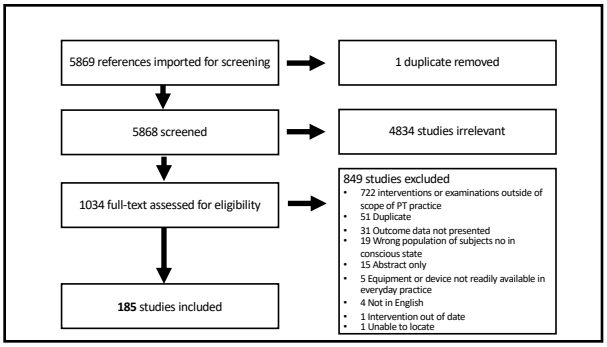
- **Numerous shoulder classifications exist but most are based on expert opinion and lack consistency and widespread acceptance**
  - **Kuhn JSES 2011**
- **Without established, validated, and well defined diagnostic criteria for classifying shoulder instability, comparing studying and compiling data in a systematic manner is difficult**
  - **Kuhn JSES 2011**
- **Shoulder instability = discomfort and a feeling of looseness, slipping, or the shoulder "going out"**
  - **Kuhn JSES 2010**

FEDS Classification System

- Frequency – The patient is asked, "*how many episodes have you had in the last year?*"
  - Solitary – *"1 episode"*
  - Occasional – *"2 to 5 episodes"*
  - Frequent – *"> 5 episodes"*
- Etiology – The patient is asked, *"did you have an injury to cause this?"*
  - Traumatic – *"Yes"*
  - Atraumatic – *"No"*
- Direction – The patient is asked, "*what direction does the shoulder go out most of the time?"*
  - Anterior – *"Out the front"*
  - Posterior – *"Out the back"*
  - Inferior – *"Out the bottom"*
- Severity – The patient is asked, *"have you ever needed help getting the shoulder back in the joint?"*
  - Dislocation – *"Yes"*
  - Subluxation – *"No"*

FEDS Classification System

- This classification system relies on history and the patient's perception, however, a physical exam can be utilized to determine the direction of instability
  - Interobserver reliability: k= 0.69 – 0.87
  - Interobserver reliability: k=0.44 - 0.7
    - Kuhn JSES 2011
- **The categorical definitions prevent ambiguity in classification**
  - **36 possible combinations**
  - **6 categories are most meaningful** - Hettrich JSES 2019
    - **Solitary traumatic anterior dislocation (STAD) – 24.8%**
    - **Occasional traumatic anterior dislocation (OTAD) – 16.4%**
    - **Solitary traumatic anterior subluxation (STAS) – 8.4%**
    - **Frequent traumatic anterior subluxation (FTAS) – 7.6%**
    - **Frequent traumatic anterior dislocation (FTAD) – 8.1%**
    - **Occasional traumatic anterior subluxation (OTAS) – 6.8%**



Incidence

- **Shoulder instability has been classified by several different systems over the years incorporating mechanism, severity (subluxation vs dislocation), frequency, and direction of instability.**
- **The lack of consistent classification system creates a challenge to identify incidence rates for each category of instability.**

Incidence – Primary Traumatic Anterior Dislocations

- **Overall US incidence for traumatic shoulder instability = 0.24 per 1000 exposures (CI_{95} 0.21 – 0.27)**
  - **Zacchilli J Bone Joint Surg. 2010, Nordqvist JSES 1995**
- **The incidence of instability is greater in males over females and tends to be higher in individuals under 30 in high demand activities such as sport or military**
  - **Zacchilli J Bone Joint Surg. 2010, Kardouni Med Sci Sports Exerc. 2016**
  - **Collegiate athletes = 0.12 (CI_{95} 0.12-0.13 per 1000 exposures)**
    - **Owens J Bone Joint Surg. 2009**
  - **Military = 1.69 to 3.13 per 1000 exposures**
    - **Owens J Bone Joint Surg. 2009, Kardouni Med Sci Sports Exerc. 2016**

Incidence – Primary Traumatic/Recurrent Posterior and Inferior Dislocations

- **Rarely studies identify distinct direction of instability or frequency of occurrence**
- **United States Military Academy – Prospective cohort**
  - **117/4141 total traumatic shoulder dislocations (2.8%)**
    - **5/117 first time posterior subluxations (4.2%)**
    - **6/117 recurrent posterior subluxations (5.1%)**
    - **11/117 inferior instabilities (10%)**
      - **Owens Am J Sports Med 2007 (LOE 4)**
- **This area has limited research and is a prime area for PT, ATC to perform epidemiological studies on this population**

Pathoanatomical

What are the associated lesions with shoulder instabilities

Primary Traumatic Anterior Dislocation

Primary Traumatic Anterior Dislocation

- 60% presence of associated lesions following PRIMARY anterior shoulder dislocation in people over the age of 43
  - Atef Int Orthop. 2016 (LOE 4)
- Labral Bankart Lesions
  - In younger individuals < 40 years of age the probability of sustaining an associated labral Bankart lesion following traumatic anterior dislocation ranges from 72 – 97%
    - O'Brien Eur J Radiol. 2012 (LOE 3)
    - Taylor AJSM 1997 (LOE 2)
- Bony Bankart Lesions
  - In younger individuals < 40 years of ago the probability of sustaining a bony Bankart lesion is variable across the literature ranging from 22 – 73% following a traumatic anterior dislocation
    - Widjaja ANZ J Surg. 2006 (LOE 4)
    - Taylor AJSM 1997 (LOE 2)

Primary Traumatic Anterior Dislocation

- Hill Sachs Lesions
  - Hill Sachs lesions are common following traumatic anterior shoulder dislocation ranging from 13 – 90%
    - O'Brien Eur J Radiol. 2012 (LOE 3)
    - Simank Arch Orthop Trauma Surg. 2006 (LOE 2)
    - Spatschil Arch Orthop Trauma Surg. 2006 (LOE 3)
    - Taylor AJSM 1997 (LOE 2)
    - Widjaja ANZ J Surg. 2006 (LOE 4)
  - 76% (48/63) had an associated Hill Sachs lesion
    - Perron J Emerg Med. 2003 (LOE 4)

Primary Traumatic Anterior Dislocation

- Rotator Cuff Lesions
  - The probability of an associated rotator cuff tear following traumatic anterior dislocation appears to increase with age
    - 54% of the patients over the age of 40 have an associated cuff tear; the frequency increases with advancing age to 100% in patients over the age of 70.
      - Simank Arch Orthop Trauma Surg. 2006 (LOE 2)
  - The presence of rotator cuff lesions with PRIMARY traumatic anterior dislocation ranges from 4 – 38%
    - Atef Int Orthop. 2016 (LOE 4)
    - Davy Injury 2002 (LOE 3)
    - Spatschil Arch Orthop Trauma Surg. 2006 (LOE 3)
    - Tollanen Acta Orthop Scand 1993 (LOE 4)
  - Rotator cuff lesions can occur in addition to other pathologies
    - Rotator cuff tear with axillary nerve injury – 6%
    - Rotator cuff tear with Bankart lesion – 7.5%
      - Atef Int Orthop. 2016 (LOE 4)

Primary Traumatic Anterior Dislocation

- Nerve Lesions
  - Axillary nerve lesions are most common following traumatic anterior dislocation
    - Axillary – 6 - 73%
      - Davy Injury 2002 (LOE 3)
      - Yeap Med J Malaysia. 2004 (LOE 3)
    - Ulnar – 10%
    - Radial – 1.4%
    - Musculocutaneous – <1%
    - Median – 3.8%
      - Robinson JBJS 2012 (LOE 2)

Primary Traumatic Anterior Dislocation

- Greater Tuberosity Fracture
  - The presence of greater tuberosity fractures following traumatic anterior shoulder dislocation is 15-16%
    - Simank Arch Orthop Trauma Surg. 2006 (LOE 2)
    - Perron J Emerg Med 2003 (LOE 4)
    - Robinson JBJS 2012 (LOE 2)

Associated Lesions

- **Pediatric patients (age 11-18) with anterior shoulder dislocations**
  - **Plain radiography identified a lower incidence of fractures than those reported from adult studies.**
    - **3% associated fractures**
    - **4% associated Hill Sach lesions**
      - **Reid Pediatr Emerg Care 2013 (LOE 4)**

Primary Traumatic Anterior Subluxation

Primary Traumatic Anterior Subluxation

- **In younger individuals age 18-24 who had a first time, traumatic subluxation event results in a high rate of labral and Hill Sachs lesions.**
  - **Labral Bankart**
    - **74% (20/27) had an associated labral Bankart**
      - **Owens JBJS 2010 (LOE 2)**
  - **Bony Bankart**
    - **22% (6/27) had an associated labral Bankart**
      - **Owens JBJS 2010 (LOE 2)**
  - **Hill Sachs Lesion**
    - **93% (25/27) had an associated Hill Sachs lesion**
      - **Owens JBJS 2010 (LOE 2)**

Recurrent Traumatic Anterior Subluxation

Recurrent Traumatic Anterior Subluxation

- **Younger individuals (18-35) who present with recurrent traumatic anterior subluxations appear to be at greater risk for labral Bankart lesions compared to other bony pathologies**
  - **Shin Arthroscopy 2016 (LOE 4)**
  - **Labral Bankart lesion**
    - **39% (11/28) had an associated labral Bankart lesion**
  - **Isolated rotator cuff tear**
    - **3.5% (1/28) had an associated rotator cuff lesion**
  - **Bony Bankart lesion**
    - **2% (6/28) had an associated bony Bankart lesion**
  - **Glenoid chondral injury**
    - **7% (2/28) had erosion of the glenoid**
  - **Hill Sachs**
    - **2% (6/28) had an associated Hill Sachs defect**

Recurrent Traumatic Anterior Dislocation

Recurrent Traumatic Anterior Dislocation

- **Labral Bankart**
  - **Labral Bankart lesions are common following RECURENT traumatic anterior dislocation ranging from 45% - 97%**
    - **97% (101/104) associated labral Bankart or Alspsa lesions**
      - **Yiannakopoulos Arthroscopy 2007 (LOE 4)**
    - **45% (38/84) had an associated labral Bankart lesion**
      - **Shin Arthroscopy 2016 (LOE 4)**
- **SLAP Lesions – 20% (21/104)**
  - **Yiannakopoulos Arthroscopy. 2007 (LOE 4)**
- **Hill Sach lesion**
  - **The presence of a Hill Sachs lesion following a RECURRENT traumatic Anterior dislocation is high ranging from 80% - 93%.**
    - **93% (97/104) had and associated Hill Sach lesion**
      - **Yiannakopoulos Arthroscopy. 2007 (LOE 4)**
    - **80% (67/84) had an associated Hill Sach lesion**
      - **Shin Arthroscopy 2016 (LOE 4)**

Recurrent Traumatic Anterior Dislocation

- **The correlation between labral Bankart and Hill Sachs showed that if one of the lesions was identified, the chance of the other being present was more than 2.5 times as likely (OR = 2.67 (0.83-8.61). P=0.10)**
  - **79% of those with a labral Bankart lesion also had a Hill Sachs lesion**
  - **81% of those with a Hill Sachs lesion also had a labral Bankart lesion**
    - **Widjaja ANZ J Surg. 2006 (LOE 4)**

Recurrent Traumatic Anterior Dislocation

- **Glenoid bone loss seen in 48% (55/114)**
  - **13% (15/114) had critical glenoid bone loss.**
  - **Average age of patients with no glenoid bone loss was 14.7 years (range 6.5-18.1)**
  - **Average age of 15.6 years (11.4-18) male can expect more glenoid bone loss than females - Male to female ratio 6:1**
    - **Ellis J Pediatr Orthop. 2017 (LOE 3)**

Recurrent Traumatic Anterior Dislocation

- **Bony Bankart Lesion**
  - **The presence of a bony Bankart lesion following a RECURRENT traumatic anterior dislocation ranges from 10.5% - 72%**
    - **10.5% (11/104) had an associated bony Bankart lesion**
      - **Yiannakopoulos Arthroscopy. 2007 (LOE 4)**
    - **29% (24/84) had an associated bony Bankart lesion**
      - **Shin Arthroscopy 2016 (LOE 4)**
    - **72% (33/46) had an associated bony Bankart lesion**
      - **Widjaja ANZ J Surg. 2006**

Recurrent Traumatic Anterior Dislocation

- **Rotator cuff lesion**
  - **Associated rotator cuff lesions ranges from 4.7% - 11.5%**
    - **11.5% (12/104) hand an associated rotator cuff lesion**
      - **Yiannakopoulos Arthroscopy. 2007 (LOE 4)**
    - **4.7% (4/84) had an associated rotator cuff lesion**
      - **Shin Arthroscopy 2016 (LOE 4)**
- **Nerve Lesions (age 16-86)**
  - **1.3% (1/75) associated neuropraxia of the axillary and radial nerve**
  - **4% (3/75) associated neuropraxia of only the axillary nerve**
    - **Gumina Chir Organi Mov. 2005 (LOE 2)**

Primary and Recurrent Inferior Dislocations

- **Rotator cuff lesions (ages 14-78)**
  - **6.3% (19/303) had an associated rotator cuff lesion**
    - **PRIMARY inferior dislocations 20% (12/61) were more common to have associated rotator cuff lesion than RECURRENT interior dislocations 11% (27/242)**
      - **Spatschil Arch Orthop Trauma Surg. 2006 (LOE 2)**
- **Hill Sachs Lesion (ages 14-78)**
  - **80.5% (244/303) had an associated Hill Sachs lesion**
    - **PRIMARY inferior dislocations made up 67% (41/61) of the Hill Sachs lesions where as RECURRENT inferior dislocations made up 84%**
    - **RECURRENT inferior dislocations = more associated Hill Sachs lesions compared to PRIMARY events**
      - **Spatschil Arch Orthop Trauma Surg. 2006 (LOE 2)**
- **MGHL, IGHL, and Hill Sachs lesions were all more common in RECURRENT inferior dislocations**
  - **Spatschil Arch Orthop Trauma Surg. 2006 (LOE 2)**

- **Associated, secondary intra-articular lesions are more frequent in patients with chronic compared with acute shoulder instability, probably as a result of the repeated dislocation or subluxation episodes.**

FEDS Classification	Labral Bankart	Rotator Cuff	Bony Bankart	Nerve Lesion	Great Tuberosity Fracture	Hill Sachs Lesion	IGHL Lesion	MGHL Lesion
Primary Traumatic Anterior Dislocation	72-97%	4-38%	22-73%	1-73%	15-16%	13-93%		
Primary Traumatic Anterior Subluxation	74% (20/27)		22% (6/27)			93% (25/25)		
Recurrent Traumatic Anterior Subluxation	39% (11/28)	3.5% (1/28)	2% (6/28)			2% (2/28)		
Recurrent Traumatic Anterior Dislocation	45-97% (101/104)	4.7 - 11.5% (12/104)	10.5 - 72% (11/104)	4% (3/75)		80-93% (97/104)		
Primary Traumatic Inferior Dislocations		20% (12/60)				67% (41/61)	60.7% (37/61)	50.8% (31/61)
Recurrent Traumatic Inferior Dislocations		11% (27/242)				84% (203/242)	75.2% (182/242)	71.1% (172/242)

Risk Factors

Primary Traumatic Anterior Dislocation/Subluxation – Age Children

- **Age**
  - **92.9% (79/85) of children aged 14 years and older experienced an instability event following first time anterior dislocation**
  - **40.4% (21/52) of children aged 13 years or younger experience recurrent instability**
  - **Children aged 14-18 years are 24.14 times more likely to experience recurrent instability compared to those <13 years of age (OR = 24.14, CI_{95} 3.71 to 156.99)**
    - **Olds BJSM 2016 (LOE 1)**

Primary Traumatic Anterior Dislocation/Subluxation – Age Children

- **Sex**
  - **Males - 83.4% (57/66) had at least one recurrent episode of shoulder instability**
  - **Females – 51.6% (16/31) had at least one recurrent episode of shoulder instability**
  - **Male children are 3.44 times (OR=3.44, CI_{95} 0.98 to 12.06) more likely to experience a recurrence**
    - **Olds BJSM 2016 (LOE 1)**

Primary Traumatic Anterior Dislocation/Subluxation – Age < Children

- **Mechanism of primary shoulder dislocation**
  - **Primary mechanism due to sports**
    - **89.2% (33/37) had a recurrent episode of shoulder instability**
  - **Primary mechanics not due to sports**
    - **76% (19/25) experienced a recurrent episode of shoulder instability**
  - **Children were 2.85 times (OR=2.85, CI_{95} 0.64 to 12.62) more likely to experience recurrence when the primary mechanism was sports compared to non-sports**
    - **Olds BJSM 2016 (LOE 1)**

Primary Traumatic Anterior Dislocation/Subluxation – Age < Children

- **Open/closed proximal humeral physis**
  - **Open physis – 61.1% (39/59) had at least one recurrent episode of shoulder instability**
  - **Closed physis – 94.1% (16/17) had at least one recurrent episode of shoulder instability**
  - **Children with a closed physis are 14 times (OR=14.0, CI_{95} 1.46 to 134.25) more likely to experience recurrent instability compared to those with open physis**
    - **Olds BJSM 2016 (LOE 1)**

Primary Traumatic Anterior Dislocation/Subluxation – Age < Children

- **Hill Sachs Lesion**
  - **100% (13/13) of subjects with a Hill Sachs lesion had at least one recurrent episode of shoulder instability**
  - **72% (13/18) of subjects without a Hill Sachs lesion had at least one recurrent episode of shoulder instability**
  - **Individuals under the age of 18 years with a Hill Sachs lesion were 17.18 times (OR=17.18, CI_{95} 0.76 to 390.92) more likely to experience recurrence**
    - **Olds BJSM 2016 (LOE 1)**

Primary Traumatic Anterior Dislocation/Subluxation – Adults

- **Age**
  - **< 40 years of age had a 44% increased risk for an recurrence of instability compared to those > 40 years (11%)**
  - **Individuals who are < 40 years of age are 13.46 times (OR=13.46, CI95 (5.25 to 34.49) more likely to have a recurrent instability compared to those > 40 years**
    - **Olds BJSM 2015 (LOE 1)**

Primary Traumatic Anterior Dislocation/Subluxation – Adults

- **Sex**
  - **Men are 3.18 times (OR=3.18, CI_{95} (1.28 to 7.89) more likely to have a recurrent instability compared women**
    - **Olds BJSM 2015 (LOE 1)**

Primary Traumatic Anterior Dislocation/Subluxation – Adults

- **Greater Tuberosity Fractures**
  - **Individuals with a greater tuberosity fracture were over 7 times less likely to have a recurrence (OR=0.13 CI_{95} 0.06 to 0.30)**
    - **Olds BJSM 2015 (LOE 1)**
- **Hyperlaxity**
  - **Individuals with hyperlaxity are 2.68 times (OR=2.68, CI_{95} (1.33 to 5.39) more likely to have a recurrent instability compared to those who don't.**
    - **Olds BJSM 2015 (LOE 1)**

Primary Traumatic Posterior Dislocation

- **Glenoid retroversion**
  - **Increased glenoid retroversion was associated with increased risk for posterior instability**
  - **HR= 1.17 CI_{95} 1.03 to 1.34 for every 1 degree of increased retroversion there was a 17% increased risk of posterior shoulder instability.**
    - **Owens AJSM 2013 (LOE 2)**
- **Strength**
  - **Increased external rotation strength in adduction (HR =1.06, CI95 1.01 to 1.12) and at 45 degrees of abduction (HR=1.07, CI95 1.01 to 1.13) was associated with those who had a posterior dislocation**
  - **Increased internal rotation strength in adduction (HR= 1.05 CI95 1.00 to 1.11) was associated with those who had a posterior dislocation**
    - **Owens AJSM 2013 (LOE 2)**

Outcomes for Primary Traumatic Anterior Instabilities

- Level 1 and 2 limited information on Patient self-reported function (n = 22 articles)
- Rowe Scores in RCT
  - 1 year follow up 12/30 good to excellent (>70)
    - Wintzell et al., KSSTA 1999 (LOE 2)
  - 2 year follow up 4/15 good to excellent (>70)
    - Wintzell et al., JSES 1999 (LOE 2)
- Most recovery occurs in 1st year
  - Repeated follows ups with prospective cohort non-operative care in teenagers
    - Gigis et al., J Ped Ortho (LOE 3)

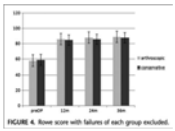


FIGURE 4. Rowe score with failures of each group excluded.

Outcomes for Primary Traumatic Anterior Instabilities

- 79 mos F/U following Non-op management(n=15) vs. surgical care (n=16) (33/original 40)
  - ASES 93.5 vs 94.7%
  - DASH 94 vs. 96%
  - WOSI 75 vs. 86%
  - 7 of the traditional group went to surgery but due to intention to treat analysis were kept in the non-operative group
    - Kirkley et al., Arthroscopy 2005 (LOE 2)

Outcomes of Inferior/MDI Instabilities

- One pre – post cohort study of 46 patients over 2 month window
  - Pre Rowe Score 52 (17) vs Post Rowe Score 75 (14)
  - Increased strength 25-33%
    - Ide et al., JSES 2003 (LOE 2)
- 46 month F/U of MDI Involuntary and Voluntary Subluxations
  - Involuntary 29/33 Good to Excellent on Rowe score (>70)
  - Voluntary 6/6 Good to Excellent on Rowe score
    - Burkhead & Rockwood JBJS 1992 (LOE 4)
- 44 month F/U of 59 MDI patients of which 62 shoulders not received surgery
  - Rowe Score 50 (29) Constant score 76 (16)
  - 38/62 satisfied with shoulder following exercise
    - Kiss et al., Int Orthop 2001

Outcomes of Inferior/MDI Instabilities

- F/U at 24 and 84 months in 64 patients undergoing exercise intervention with MDI
  - At 24 months (20 had gone to surgery & 5 lost) leaving 39 patients
    - 20/39 were good or excellent on modified Rowe Score (>75 good)
    - 19/39 continued to have pain
    - 18/39 continued to have instability
  - AT 84 months (8 years) 36 (1 had gone to surgery & 2 lost) leaving 36 patients
    - 5/36 excellent (>90) on modified Rowe score
    - 12/36 good on modified Rowe score
    - 28/36 reported persistent problems
      - Missamore et al., JSES 2005 (LOE 4)

Outcomes of Posterior Instability Extremely Limited

- 46 month F/U of Posterior Involuntary and Voluntary Subluxations
  - Involuntary 8/8 Good to Excellent on Rowe score (>70)
  - Voluntary 6/6 Good to Excellent on Rowe score (>70)
    - Burkhead & Rockwood JBJS 1992 (LOE 4)
- No other studies used PRO to describe outcomes

Outcome Summary

- Patients self-report level of function improves
- Patient with level of self-report of function rarely recovers to 90% or greater from rehabilitation

Thank You

- **Up next…. Diagnosis of shoulder instability**

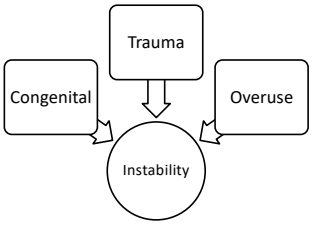
Diagnosis

Clinical examination to identify patients with shoulder instability

ERIC HEGEDUS, PT, PhD, DPT, OCS, CSCS

History

V- Expert Opinion



Tests & Measures- Motion Testing

- **Motion testing**
  - **AROM may be painful**
  - **PROM may be excessive with reports of apprehension at end range**
  - **Accessory motions likely show greater excursion and maybe subluxation**

V- Expert Opinion

Tests & Measures- Muscle Testing

- **Muscle testing**
  - **Often no issue as MMT**
  - **Performance tests may show decreased function, pain, apprehension**

V- Expert Opinion

Tests & Measures- Palpation

- **Palpation is often unremarkable**
- **Unique tests as follows**

V- Expert Opinion

Unique Tests
Anterior Instability

Level II- Lesser Quality Diagnostic Studies
Grade- A

TEST NAME(S)	Pathology	Lead Author	LR+	LR-	Risk of Bias from QUADAS 2
Apprehension	Anterior Instability	Jia	20	0.29	Unclear
		VanKampen	3.5	0.02	Low
		Farber	20	0.29	Low
		Lo	48	0.48	High
		Hegedus	17	0.39	Systematic Review
Relocation	Anterior Instability	Farber	10	0.20	Low
		Lo	1	1	High
		Speer	67	0.33	High
		VanKampen	4	0.04	Low
		Hegedus	5.5	0.55	Systematic Review
Surprise	Anterior Instability	Lo	59	0.37	High
		Gross	8	0.09	High
		VanKampen	6	0.10	Low
		Hegedus	5	0.45	Systematic Review
Anterior Drawer	Anterior Instability	Farber	4	0.56	Low
		VanKampen	8	0.45	Low

Apprehension LR+ = 17

GRADE A

Relocation LR+ = 5.5

GRADE A

Surprise LR+ = 5.0

GRADE B

Anterior Drawer LR+ = 4-8

GRADES OF RECOMMENDATION BASED ON		STRENGTH OF EVIDENCE
A	Strong evidence	A preponderance of level I and/or level II studies support the recommendation. This must include at least 1 level I study
B	Moderate evidence	A single high-quality randomized controlled trial or a preponderance of level II studies support the recommendation
C	Weak evidence	A single level II study or a preponderance of level III and IV studies, including statements of consensus by content experts support the recommendation
D	Conflicting evidence	Higher-quality studies conducted on this topic disagree with respect to their conclusions. The recommendation is based on these conflicting studies
E	Theoretical/ foundational evidence	A preponderance of evidence from animal or cadaver studies, from conceptual models/principles, or from basic sciences/ bench research support this conclusion
F	Expert opinion	Best practice based on the clinical experience of the guidelines development team

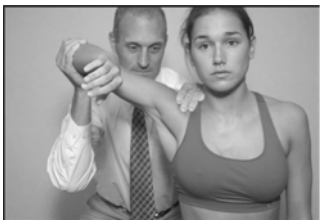
GRADE A

Load and Shift LR+ = 7

Pathology	Lead Author	LR+	LR-	Risk of Bias from QUADAS 2
Anterior Instability	VanKampen	7.0	0.32	Low

GRADE B

Hyperabduction Test LR+ = 6



Pathology	Lead Author	LR+	LR-	Risk of Bias from QUADAS 2
Anterior Instability	VanKampen	6.0	0.37	Low

GRADE B

Unique Tests
Posterior Instability

II- 1 Lesser Quality Diagnostic Study

Posterior Apprehension Test LR+= 19

- **Shoot a photo**

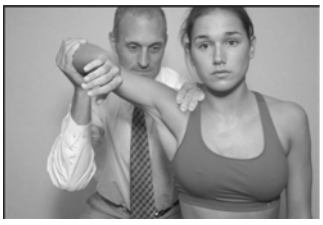
Pathology	Lead Author	LR+	LR-	Risk of Bias from QUADAS 2
Posterior Instability	Jia	19.0	0.82	High

GRADE C

Unique Tests
Inferior Instability

Level V- Expert Opinion

Hyperabduction Test LR+ = 6



Pathology	Lead Author	LR+	LR-	Risk of Bias from QUADAS 2
Inferior Instability	Gagey	?	?	NA

GRADE E- Cadaver study

Unique Tests Multidirectional Instability

V- Expert Opinion

In My Opinion- Grade F

- Beighton index 5/9 or greater
- Almost always congenital
- Comparisons to opposite shoulder largely meaningless
- Best tests for anterior, inferior, and posterior instability to rule in

Diagnosis and Classification- Summary

- Diagnosis of specific shoulder pathology is not easy
- In other areas of the body where diagnosis is also challenging, classification systems are developed
- Many classification systems have been developed for the shoulder and are based often on etiology (ex: trauma) and direction (ex: anterior)
  - Recent classification systems have added frequency and severity
- No classification system has the requisite proven psychometric properties (ex: validity)

Diagnosis and Classification- Summary

- Traumatic instability is often suspected from patient history and confirmed by imaging
- Non-traumatic instability is more difficult but there are physical examination tests that can help
- Research on physical examination tests is primarily focused on anterior instability and secondarily on posterior instability while inferior and multidirectional instability are largely ignored

Other Considerations

Traumatic Dislocation & Hypermobility

Trauma

- X-ray for bony lesions
- MRI for soft tissue lesions
- MR arthrography for labral tear

Hypermobility Syndrome– Beighton Score

The ability to:	Right	Yes/No	Left
Passively extend the 5th MCP to > 90 degrees	1		1
Passively oppose the thumb to the ipsilateral forearm	1		1
Elbow hyperextension of ≥ 10 degrees	1		1
Knee hyperextension of ≥ 10 degrees	1		1
Hands flat on floor without bending knees		1	
Total Possible Score = 9	Note: 5/9 + HMS		

Marfan Syndrome- 2010 Nosology

- *Points for systemic score
- Wrist AND thumb sign = 3 (wrist OR thumb sign = 1)
- Pectus carinatum deformity = 2 (pectus excavatum or chest asymmetry = 1)
- Hindfoot deformity = 2 (plain pes planus = 1)
- Dural ectasia = 2
- Protrusio acetabula = 2
- Reduced upper segment/lower segment ratio AND increased arm/height AND no severe scoliosis = 1
- Scoliosis or thoracolumbar kyphosis = 1
- Reduced elbow extension = 1
- Facial features (3/5) = 1 (dolichocephaly, enophthalmos, downslanting palpebral fissures, malar hypoplasia, retrognathia)
- Skin striae = 1
- Myopia > 3 diopters = 1
- Mitral valve prolapse = 1

Ehlers Danlos Syndrome

- **Requires genetic testing**

Thank You

- **Up next…..Intervention:**
- **physical therapy interventions including**
  - **immobilization**
  - **exercise**
  - **motor control/neuromuscular retraining**
  - **bracing**

Intervention

Evidence Based Recommendations for Treatment of Patients with Shoulder Instability

Amee L. Seitz, PT, PhD, DPT, OCS

Interventions

1. **Immobilization (following Dislocation)**
   - **Duration**
   - **Position**
2. **Exercise**
   - **Strengthening**
   - **Motor Control/ Neuromuscular Retraining**
3. **Bracing for return to high demand activity/sport**

Terminology for population not consistent

- Atraumatic/Multidirectional Instability
- Anterior Dislocation (traumatic / atraumatic)

Interventions Immobilization Duration & Position

- 1 week vs 3-4 weeks duration
- ER vs IR position

Population
- 1st Time Anterior Dislocation

Immobilization Duration (1 week vs. 3 or 4 weeks)

Level 3 Studies

Paterson et al **J Bone Joint Surg Am.** 2010;92:2924-33

TABLE II Rates of Recurrent Instability After Immobilization in Internal Rotation for One Week Compared with Three or Four Weeks

Study	Duration of Follow-up (yr)	Duration of Immobilization in Internal Rotation (wk)	Rate of Recurrence	P Value
Hovelius et al.[9] (1983)	2			0.88
		1	31% (32 of 104)	
		3	29% (33 of 112)	
Hovelius et al.[10] (1987)	5			0.89
		1	45% (47 of 104)	
		3	44% (49 of 112)	
Hovelius et al.[11] (1996)	10			0.89
		1	49% (49 of 99)	
		3	48% (54 of 112)	
Hovelius et al.[12] (2008)	25			0.88
		1	54% (48 of 89)	
		3	52% (47 of 90)	
Kiviluoto et al.[13] (1980)	1			0.34
		1	12% (22 of 180)	
		3	17% (8 of 46)	
Robinson et al.[24] (2006)	4.3 to 9.4	4	60% (150 of 252)	NA*

Level of Evidence... Careful review

- **No level I/II studies on duration of immobilization**
- **Excluded Hovelius 1983:** allocation to group at 6/27 centers was based on date of shoulder dislocation. At 21/27 centers treatment was given according to customary practice= Not randomized/quasi (prospective observational study)
- **Excluded Kiviluto 1980:** of 99 patients, 53 immobilized for 1 week and 46 for 3 weeks. No indication of method of allocation. No response from study authors.
- **Robinson 2006 was not included**. it is a prospective cohort examining factors associated with recurrent instability. No formal statistics were conducted to compare recurrence as it related to duration of immobilization. Level I prognosis but not level I intervention study

Conservative management following closed reduction of traumatic anterior dislocation of the shoulder (Review)

Hanchard 2014

Cochrane Library

Results: Recurrence

Pooled meta-analysis

Patients younger <30 yo rate of recurrence:

41% (40/97) in patients immobilized for one week or less

37% (34/93) in patients immobilized for three weeks or longer

(p = 0.52). bottom Line.....

Paterson et al **J Bone Joint Surg Am.** 2010;92:2924-33

Guideline Recommendation: Immobilization Duration

- **No randomized clinical trials (Level I /II evidence) for duration of immobilization**
- **High risk of bias or confounding in currently published observational study results**

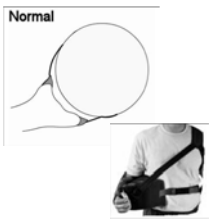
C

There is no harm in immobilizing a patient for 1 week instead of 3 weeks following a first time anterior dislocation

Immobilization: Position

What is best position to immobilize shoulder s/p traumatic dislocation?

- Itoi et al [2001]
  - MRI study 19 patients
  - IR vs ER position
  - Separation and displacement of the labrum were both significantly less
- Miller et al 2004 Hart 2005
  - Cadeveric and arthroscopic observations supports ER optimal healing position that approximates labrum to bone



Randomized Trials Immobilization Position

Itoi 2007
- N=198 participants
- 3 weeks immobilization
- Randomized IR vs ER (10°)

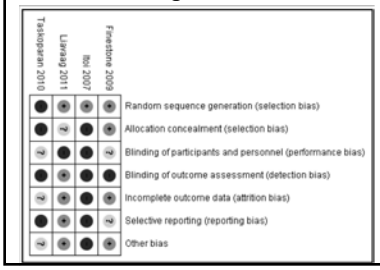
Taskoparan 2010 (level 2)
- N=188 participants
- 3 week immobilization
- Randomized IR vs ER (10°)

Liavaag 2011
- N=51 participants
- 3 weeks immobilization
- Randomized IR vs ER (15°)

Finestone 2009
- N=33 participants
- 4 weeks immobilization
- Randomized IR vs ER (15°-20°)

N= 470 total; 371 (79%) males

Quality Assessment: Bias Risk High & Overall "low" grading



Hanchard 2014

N= 6 Randomized Trials Immobilization Position (Level 1-2 evidence)

Whelan 2014
- N=60 participants
- 4 weeks immobilization
- Randomized IR vs ER (10°)

Heidari 2014
- N= 102 participants
- 3 week immobilization
- Randomized IR vs ER (10°)

Pooled DATA
N= 632 total patients; 517 (82%) males
Mean age= 30 years

Immobilization in External Rotation Versus Internal Rotation After Primary Anterior Shoulder Dislocation: A Meta-analysis of Randomized Controlled Trials
Daniel B. Whelan, Stephanie N. Kletke, Geoffrey Schemitsch and Jaskarndip Chahal
Am J Sports Med 2016 44: 521 originally published online June 26, 2015

Whelan 2016

Summary Evidence Immobilization Position

Recurrence (2yr f/u) 6 studies
- No significant difference between positions in low and high risk groups

Patient Reported Outcomes
WOSI lower is better (3 studies)
- Mean WOSI 83 (ER) vs. 89 (IR)
- No significant difference between groups

Return Pre-Injury Activities (Itoi 2007 & Liavaag 2011)
- No significant difference (p>0.05)

Adherence

5 studies
- No significant difference in self-reported adherence (p>0.05)

Whelan 2016 AJSM

Recommendation Immobilization: Position

- **Evidence for superiority of immobilization in ER over traditional sling in IR is lacking**

A	Strong evidence	**There is no justification for change in current clinical practice**

Interventions

1. Immobilization (following Dislocation)
   - Duration
   - Position

Terminology for population not consistent
- Anterior Dislocation (traumatic / atraumatic)

2. **Exercise**
   - **Strengthening**
   - **Motor Control/ Neuromuscular Retraining**
3. Bracing for return to high demand activity/sport

4 Randomized Trials Surgery vs Non-surgical 1st anterior dislocation

Bottoni et al. 2002
- N=24 male active military
- Mean age 22yrs
- 4 weeks immobilization + rehabilitation vs Bankart repair

Wintz[illegible]t al[illegible]99
- N=30 [illegible]ales)
- Mea[illegible]e[illegible] years
- 1 week immobilization + normal use vs Arthroscopic lavage

Kirkley et al. 1999
N=40 participants (35 males)
Mean age 22yrs
- 3 week immobilization + rehabilitation vs Bankart repair

Sando[illegible]t al[illegible]bstract only)
- N=39 [illegible]ear old
- 4 we[illegible]obilization + reh[illegible]ilitati[illegible]vs Bankart repair

N= 143 total; >80% males Handoll 2004

Rehabilitation Protocol

Bottoni et al.
1. **4 weeks sling immobilization,** limited active ROM and "some exercises" under physiotherapist supervision;
2. **4 weeks of progressive passive motion** exercises followed by active-assisted ROM exercises without resistance
3. **4 weeks of progressively greater resistance exercises**
4. Return to full active duty, contact sports and activities requiring over-head or heavy lifting restricted until 4 months

Kirkley et al.
1. **3 Weeks immobilization,** then both groups had the same staged (4 to 6 weeks; 7 to 8 weeks; 9 to 12 weeks) rehabilitation protocol of progressive exercises, including easing of the restrictions in ER ROM
2. 3 month for return to non-contact or non-overhead sports;
3. 4 months for contact sports

Wintzel et al.
- **1 week immobilization** + normal use

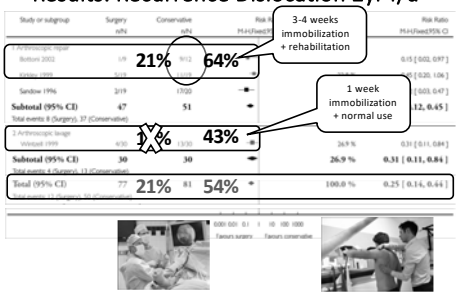
Which is the most effective treatment for instability, surgery vs rehabilitation?

Randomized trials compare *surgical intervention to non-surgical management:*
- **Bottoni et al. 2002* 24 males in military**
- **Kirkley et al. 1999 * 40 patients**
- **Wintzell et al. 1999*→ lavage vs no rehab**
- **Sandow et al 1996* → abstract only**

"limited evidence supporting primary surgery for young adults, usually male, engaged in high demand physical activities following their 1st acute traumatic shoulder dislocation"

"There is no evidence for other patient groups" Handoll, *Cochrane Review 2004*

Results: Recurrence Dislocation 2yr f/u



Summary Evidence: Surgery vs. PT for 1st Dislocation

- First time only dislocation: Rehab vs Bankart
  - 2 published randomized trials - 1999
  - 59/64 total patients males, 24 military population
  - Mean age 22 years
  - Greater likelihood of recurrence with rehab (64% recurrence vs 33%)
- Both are successful at improving patient rated outcomes and return to activity
- The rehabilitation program in these studies (strengthening initiated at 8 weeks) is not current evidence-based standard of care
- Immobilization time (3-4 weeks versus shorter duration) is not standard of care for non-operative treatment of acute shoulder dislocation

Surgery first in high demand patient?

- A key area of controversy
- Limited evidence with 2 randomized control trials recruited the population at highest risk of recurrence Level 2
- Shoulder instability also occurred in the surgical treatment group- pooled data 6/28 =21% (versus rehabilitation 43%)
- Only 50% of patients with recurrence in the conservative treatment group chose subsequent surgery

Guideline Recommendation: Progressive Exercise

B	Moderate evidence	**Following first time dislocation PT consisting of graded exercise improves pain, function, and allows for return to activity**

- GAP: More aggressive non-operative treatment rehabilitation program → neuromuscular control / strengthening started < one week with is warranted (Prior recommendation Grade C)
- GAP: proprioception and motor control exercises

Interventions

1. Immobilization (following Dislocation)
   - Duration
   - Position
2. **Exercise**
   - **Strengthening**
   - **Motor Control/ Neuromuscular Retraining**
3. Bracing for return to high demand activity/sport

- Atraumatic/Multidirectional Instability

Exercise-based management versus surgery for multidirectional instability of the glenohumeral joint: a systematic review Warby SA, *et al. Br J Sports Med* 2016;**50**:1115–1123.

Sarah A Warby, Tania Pizzari, Jon J Ford, Andrew J Hahne, Lyn Watson

4 studies: No RCTs, 2 retrospective cohorts, 2 pre/post cohorts

III

IV

Low quality evidence exercise better than surgery
- Satisfaction
- Self-report outcome measures

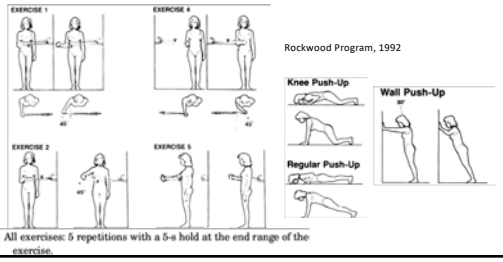
Low quality evidence surgery better than exercise
- Shoulder kinematics
- Likelihood return to sport

Both treatments improve pain, function, and activity participation

Comparison of 2 Exercise Rehabilitation Programs for Multidirectional Instability of the Glenohumeral Joint

Warby S, et al. The American Journal of Sports Medicine 2018;46(1):87–97

I

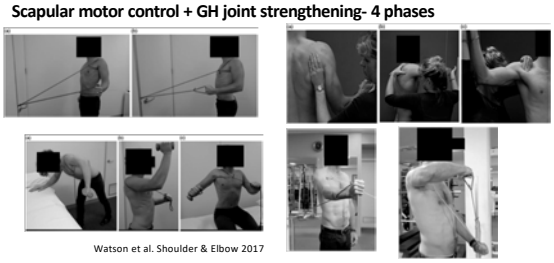


All exercises: 5 repetitions with a 5-s hold at the end range of the exercise.

Rockwood Program, 1992

"Motor Control + Strengthening" program

Scapular motor control + GH joint strengthening- 4 phases



Watson et al. Shoulder & Elbow 2017

Comparison of 2 Exercise Rehabilitation Programs for Multidirectional Instability of the Glenohumeral Joint

The American Journal of Sports Medicine 2018;46(1):87–97

- **Greater improvements in motor control /strengthening program (Watson)**
  - **WOSI total score 12 weeks and 24 (>MCID) weeks (difference 11-12%)**
  - **Melbourne Instability Shoulder Score at 24 weeks (15% difference)**
- **Not included in rehabilitation program**
  - **Proprioceptive training- joint repositioning activities**
  - **Closed chain exercises**
  - **Kinetic Chain/ trunk/ core/ LE strengthening**

Guideline Recommendation: Motor Control + Strengthening

B	Moderate evidence	**In patients with multi-directional instability, clinicians should consider progressive motor control and strengthening exercises to improve pain, function, and ABDuction ROM**

- GAP: More aggressive non-operative treatment rehabilitation program → neuromuscular control / strengthening started < one week with is warranted (Prior recommendation Grade C)

Interventions

1. Immobilization (following Dislocation)
   - Duration
   - Position
2. Exercise
   - Strengthening
   - Motor Control/ Neuromuscular Retraining

- Anterior Dislocation

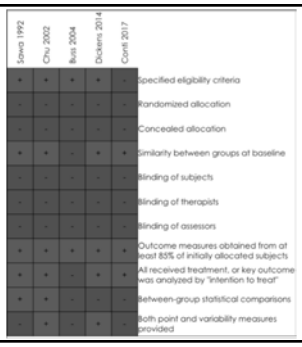
3. **Bracing for return to high demand activity/sport**

Bracing for return to sport/high demand activity following dislocation/subluxation

III
IV

- **5 studies including patients ages 17-31 years**
  - **2 prospective cohort studies**
  - **1 prospective case series**
  - **1 retrospective study**
  - **1 cross-sectional study (joint reposition sense with/without brace)**
- **All subjects were managed nonoperatively and treated with a brace during return to activity or sport.**
- **Bracing allowed for early RTS, 10 to 40 days, but recurrence rate is higher with an earlier return:**
  - **73% with 10 days RTS (n=45);**
  - **53% with 11.7 days RTS (n=19);**
  - **10% at 40 days RTS (n=20).**
- **90% of athletes (n=27/30) RTS without pain within 40 days- 10 had recurrence (37%)**
- **Joint reposition sense improves with use of brace near end range (10 degrees from full) shoulder external rotation.**

Risk of Bias



Guideline Recommendation: Rehabilitation + Bracing for Return to Activity/Sport

C	Weak evidence	**In patients who experienced a dislocation /subluxation, clinicians may consider recommending a brace for return to sport or high demand activity although the risk of recurrence increases with earlier return**

- GAP: no comparative studies have been conducted examining the use of a brace for return to sport activities

Thank You

- **Up next…..Examination:**
  - **Key impairments**
  - **Self-reported outcome tools**

Examination

Evidence Based Recommendations for Examination of Patients with Shoulder Instability

Lori A Michener, PT, PhD, ATC, SCS

Examination

- Examination - Impairments
  - Deficits related to prognosis and risk factors
  - Functional requirements
- Examination – Outcomes Measures - Patient-Reported
  - Disease-Specific, Shoulder-Specific, and Patient-Specific Measures
  - Anchoring the scores

Examination: Impairments

Muscle Performance - Strength
- ER, IR, Elevation (abd, scaption, flexion)
- *Methods: MMT*
  - 0 – 5 grades; limited reliability and validity
  - Alternative:
    3 grades: markedly reduced, reduced, or normal
    Reliable (Wainner, 2003)
  - Used to determine impairments
  - Limited ability to assess change over time

Grade: B

Examination: Impairments

Muscle Performance - Strength
- ER, IR, Elevation (abd, scaption, flexion)
- *Methods: HHD or Isokinetic*
  - Used to determine impairments
  - Reliable in athletes, patients, & healthy
  - Improved ability to assess change over time
  - Isokinetic – concentric and eccentric

Grade: B

Examination: Impairments

Range of Motion
- ER, IR, Elevation
- *Methods: goniometer, inclinometer - bubble, digital, smartphone*
  - Used to determine impairments
  - Reliability for all
  - Good ability to assess change over time
- *Methods: IR by vertebral level*
  - Limited reliability
- Additional- horizontal add or low flexion
  - Posterior shoulder tightness
  - Inclinometer as above

Grade: B

Examination: Impairments

Additional Measures

1- Joint Position Sense

2- Pain Pressure

3- Scapular position and motion

4- Pectoralis minor length

- Limited evidence for clinical utility

Grade: C/ D

Examination: Patient-reported Outcome Measures

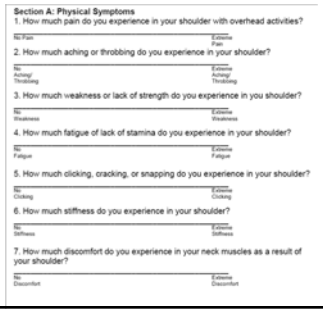
Disease Specific Measures

- **Western Ontario Shoulder Instability Index (WOSI)**
- **Oxford Shoulder Instability (OSSI)**

- **Shoulder Specific Measures**
  - **ASES**
  - **PENN**
  - **DASH**

Grade: B

WOSI



Section A: Physical Symptoms

1. How much pain do you experience in your shoulder with overhead activities?

No Pain ____ Extreme Pain

2. How much aching or throbbing do you experience in your shoulder?

No Aching/Throbbing ____ Extreme Aching/Throbbing

3. How much weakness or lack of strength do you experience in your shoulder?

No Weakness ____ Extreme Weakness

4. How much fatigue of lack of stamina do you experience in your shoulder?

No Fatigue ____ Extreme Fatigue

5. How much clicking, cracking, or snapping do you experience in your shoulder?

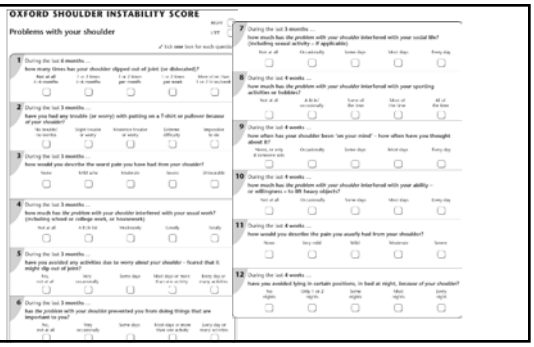
No Clicking ____ Extreme Clicking

6. How much stiffness do you experience in your shoulder?

No Stiffness ____ Extreme Stiffness

7. How much discomfort do you experience in your neck muscles as a result of your shoulder?

No Discomfort ____ Extreme Discomfort



OXFORD SHOULDER INSTABILITY SCORE

Problems with your shoulder

Examination: Patient-reported Outcome Measures

Disease Specific Measures

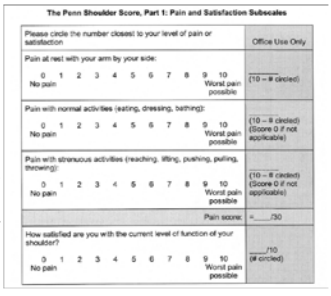
- **Western Ontario Shoulder Instability Index (WOSI)**
- **Oxford Shoulder Instability (OSSI)**

- **Shoulder Specific Measures**
  - **ASES**
  - **PENN**
  - **DASH / QuickDASH**

Grade: B

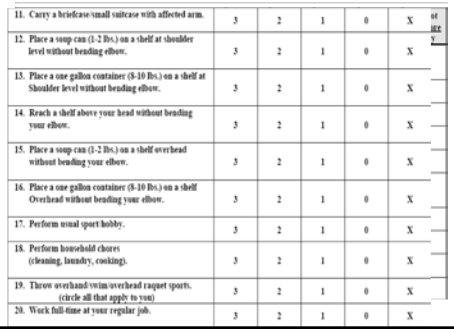
Penn Shoulder Score

- **Pain (0–30 pts)**
  - **Rest**
  - **Normal ADL**
  - **Strenuous**
- **Satisfaction – shoulder use (0-10 pts)**



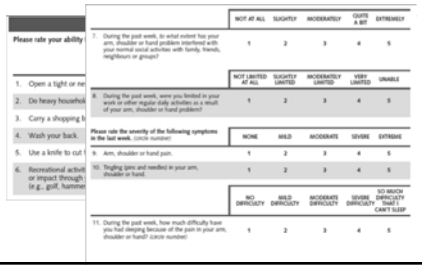
The Penn Shoulder Score, Part 1: Pain and Satisfaction Subscales

Please circle the number closest to your level of pain or satisfaction	Office Use Only
Pain at rest with your arm by your side: 0 1 2 3 4 5 6 7 8 9 10 (No pain … Worst pain possible)	____ (10 – # circled)
Pain with normal activities (eating, dressing, bathing): 0 1 2 3 4 5 6 7 8 9 10 (No pain … Worst pain possible)	(10 – # circled) (Score 0 if not applicable)
Pain with strenuous activities (reaching, lifting, pushing, pulling, throwing): 0 1 2 3 4 5 6 7 8 9 10 (No pain … Worst pain possible)	(10 – # circled) (Score 0 if not applicable)
	Pain score: =____/30
How satisfied are you with the current level of function of your shoulder? 0 1 2 3 4 5 6 7 8 9 10 (No pain … Worst pain possible)	____/10 (# circled)



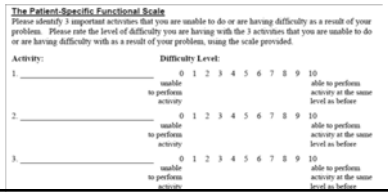
11. Carry a briefcase/small suitcase with affected arm.	3	2	1	0	X
12. Place a soup can (1-2 lbs.) on a shelf at shoulder level without bending elbow.	3	2	1	0	X
13. Place a one gallon container (8-10 lbs.) on a shelf at Shoulder level without bending elbow.	3	2	1	0	X
14. Reach a shelf above your head without bending your elbow.	3	2	1	0	X
15. Place a soup can (1-2 lbs.) on a shelf overhead without bending your elbow.	3	2	1	0	X
16. Place a one gallon container (8-10 lbs.) on a shelf Overhead without bending your elbow.	3	2	1	0	X
17. Perform usual sport/hobby.	3	2	1	0	X
18. Perform household chores (cleaning, laundry, cooking).	3	2	1	0	X
19. Throw overhand/swim/overhead raquet sports. (circle all that apply to you)	3	2	1	0	X
20. Work full-time at your regular job.	3	2	1	0	X

QuickDASH



Examination: Patient-reported Outcome Measures

- **Patient-Specific Measure**
  - **Patient Specific Functional Scale (PSFS)** **Grade C**



Examination: Patient-reported Outcome Measures

- **Anchor Measures**
  - **To determine if the patient's level of function is 'acceptable' or 'satisfactory', defined by the patient**
  - **Patient satisfaction with use of their shoulder**
    - **PENN shoulder scale**
  - **Patient Acceptable Symptom State**

Grade: C

Feeling Good Rather Than Feeling Better Matters More to Patients

FLORENCE TUBACH,[1] MAXIME DOUGADOS,[2] BRUNO FALISSARD,[3] GABRIEL BARON,[1] ISABELLE LOGEART,[4] AND PHILIPPE RAVAUD[1]

- **Feeling good – Patient Acceptable Symptom State (PASS)**
  - **PASS: "Taking into account your level of pain and also your functional impairment, if you were to remain for the next few months as you are today, would you consider that your current state is satisfactory?"**
    "Yes" or "No"
- **Feeling better – clinically important change (MCID)**

Conclusion. Patients consider that they experienced an important improvement only if this improvement allowed them to achieve a state they consider satisfactory. The most appropriate means to assess the response to therapy seems to be to assess whether patients feel good (i.e., achieve the patient acceptable symptom state).

Thank You….

Questions?