



Clinical Practice Guidelines for the Management of Rotator Cuff Syndrome in the Workplace

Never Stand Still

Medicine

Rural Clinical School

The University of New South Wales, Medicine,
Rural Clinical School, Port Macquarie Campus
2013



The work was initiated and funded by Essential Energy, Australia



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ISBN Number: 978-0-7334-3195-5

Suggested Citation: Hopman K, Krahe L, Lukersmith S, McColl AR, & Vine K. 2013.
Clinical Practice Guidelines for the Management of Rotator Cuff Syndrome in the Workplace.
The University of New South Wales.

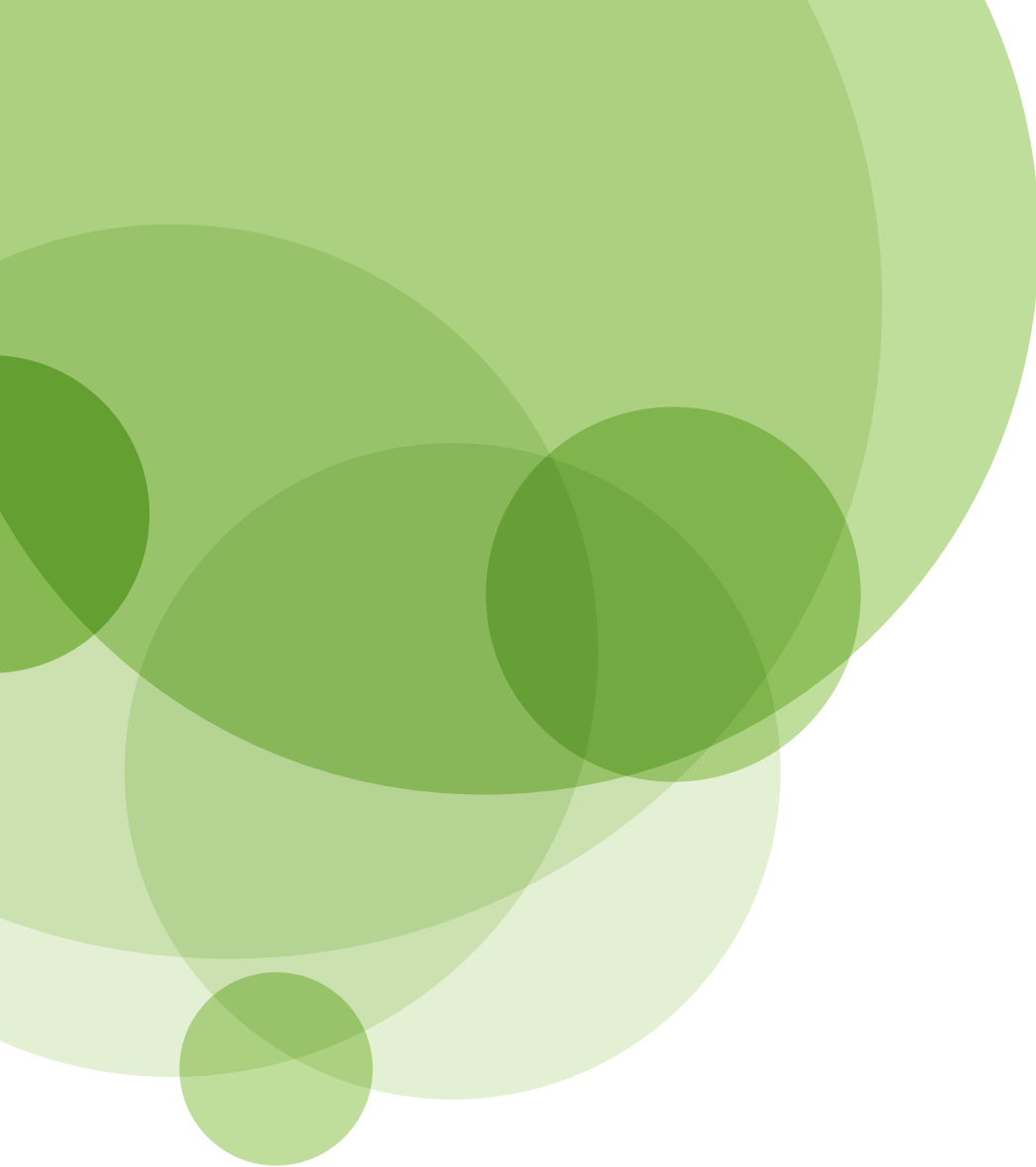
This document is available online at <http://rcs.med.unsw.edu.au/rotatorcuffsyndromeGuidelines>

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Design: Melinda Jenner and Eva Wong, Print Post Plus (P3) Design Studio

Printing: Print Post Plus (P3)



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Rural Clinical School, Port Macquarie Campus

2013

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Conflict of Interest

The funding body for this project, Essential Energy, has not been involved at any stage in the guideline development process, method, writing or review of the guidelines. As the guidelines were developed in complete isolation of the funding body, their views or interests have not influenced the recommendations or the guidelines.

All individuals whose names appear as authors or contributors to these clinical practice guidelines provided full written disclosure of any real or perceived conflict of interest prior to participating in the working party. Each person was obliged to report any real or perceived conflict of interest (should it have arisen) during the guideline development process.

Acknowledgements

We wish to thank the 12 organisations and individuals who reviewed and provided feedback on the guidelines during their development. All comments received were discussed and considered by the research executive and incorporated into the final document where appropriate.

Contents

Foreword	7
1.0 Executive Summary	9
2.0 Flowcharts	10
3.0 Introduction	15
3.1 Background	15
3.2 Scope and Purpose	15
3.3 Framework	15
3.3.1 Bio-psychosocial Perspective of Health and Functioning	15
3.3.2 Approach Used in Guidelines	16
3.4 Intended Users	16
3.5 Related publications	16
4.0 Rotator Cuff Syndrome	17
4.1 Definition	17
4.2 Incidence and Prevalence	18
4.3 Prevention	18
4.4 Prognosis	18
5.0 Guidelines Development	19
5.1 Working Party	19
5.2 Method	19
6.0 Initial Presentation	21
6.1 Clinical History	21
6.2 Physical Examination	25
6.3 Identification of Red Flags	25
6.4 Identification of Yellow Flags	26
6.5 Limitations of Imaging in Early Presentations	28

7.0 Development of a Management Plan	29
7.1 Treatment Principles	29
7.1.1 Maintain Activity and Participation in Life Areas	29
7.1.2 Shared Decision-making	29
7.1.3 Goal Setting	30
7.1.4 Outcome Measurement	30
7.1.5 Collaborative Team Approach	31
7.1.6 Cultural and Language Issues	32
8.0 Treatment	33
8.1 Pain Management	33
8.1.1 Medication	33
8.1.2 Heat/Ice	35
8.2 Return to Work Program	35
8.3 Prescribed Exercise	39
8.4 Manual Therapy	40
8.5 Acupuncture	41
8.6 Electro-physical Agents	41
8.6.1 Transcutaneous Electromagnetic Stimulation (TENS)	42
8.6.2 Bipolar Interferential Current	42
8.6.3 Pulsed Electromagnetic Field Therapy (PEMF)	42
8.6.4 Low Level Laser Therapy (LLLT)	42
8.6.5 Therapeutic Ultrasound	42
8.7 Calcific Tendonitis	43
8.8 Emerging Treatments	43
8.9 Supplements	44
9.0 Review	45
9.1 Recovery	45
9.2 Rotator Cuff Pathology	46
9.3 Patient Experiencing Significant Persisting Pain and/or Activity Restriction	46
9.3.1 Diagnostic Imaging	46
9.3.2 Preferred Imaging for Rotator Cuff Syndrome	48
9.4 Subacromial Injections of Corticosteroids	48
9.5 Referral for Specialist Opinion	49

9.6 Rotator Cuff Tears	49
9.6.1 Rotator Cuff Surgery	50
9.6.2 When should Surgery be Performed for Rotator Cuff Syndrome?	50
9.6.3 Recovery and Outcomes Following Rotator Cuff Surgery	51
Resources	53
Rotator Cuff Syndrome Information Sheet	55
General Practitioner Guide – Return to Work	57
Employer Guide – Return to Work	59
Flowchart: First Presentation – Shoulder Pain	61
Flowchart: Review (Post 4–6 weeks)	63
Flowchart: Red Flags for Rotator Cuff Syndrome	65
Glossary	66
APPENDIX 1 Red and Yellow Flags for Rotator Cuff Syndrome	67
APPENDIX 2 Clinical Questions	68
APPENDIX 3 NHMRC Evidence Hierarchy	70
APPENDIX 4 International Classification of Diseases Codes	73
References	74

Tables

Table 1: NHMRC Grades for Recommendations	20
Table 2: Indicators Identified in the Clinical History to Assist Assessment and Differential Diagnosis	22
Table 3: Personal Factors that may Influence the Development of Shoulder Pain	23
Table 4: Environmental Factors that may Influence the Development of Shoulder Pain	24
Table 5: Yellow Flags that may Influence Recovery and RTW Following Rotator Cuff Syndrome	26
Table 6: Best Practice Standards for Return to Work Approach	36
Table 7: Return To Work Intervention Best Practice Standards	38
Table 8: Factors that may Influence Recovery Following Rotator Cuff Surgery	51

Figures

Figure 1: Red Flags for Rotator Cuff Syndrome	14
Figure 2: The Rotator Cuff – Normal Anatomy (a) and Post-Injury (bursa <u>not</u> shown) (b)	17
Figure 3: Return to Work Hierarchy	36

Text boxes

Text Box 1: Clinical Framework for the Delivery of Health Services	16
Text Box 2: Psychometric and utility properties of outcome measures	31

Foreword

The University of New South Wales Rural Clinical School, Port Macquarie has developed guidelines for the clinical management of rotator cuff syndrome in the workplace. Shoulder pain is a common musculoskeletal presentation in primary care practice – both degenerative and acute. As such, it provides a challenge to all involved in prevention and treatment, from patients to clinicians to employers.

The primary objective of these guidelines is to provide recommendations, based on current evidence, which will hopefully improve clinical outcomes for workers, employers and health care providers.

These guidelines have been developed through a review of previous guidelines for the management of musculoskeletal/rotator cuff syndrome and a systematic review and appraisal of all relevant literature from 2000 to the present. Methodology and tables of evidence may be found in the accompanying technical report.

Clinical practice guidelines are bound by the same limitations as all research. As such, these guidelines are offered to assist health care providers, workers and employers achieve the best outcome from rotator cuff syndrome. Clinical practice guidelines inform and guide but do not replace clinical reasoning or clinical judgment.

These guidelines utilise the framework provided by the International Classification of Functioning, Disability and Health – a biopsychosocial model of health which considers medical, psychosocial and contextual factors with a focus on early return to work (RTW).

These guidelines were made possible by a grant from Essential Energy. It is heartening to see industry as a prime mover in the creation of tools to prevent injury and assist workers return to full health and functional ability.

The executive would like to acknowledge the work of Lukersmith and Associates – Sue Lukersmith and Kate Hopman – for their experience, expertise and guidance in this project. They worked tirelessly to provide up-to-date, evidence-based, well-appraised information which made this project possible.

The executive would also like to acknowledge the valuable input of all members of our working party. Members of the working party gave of their time, clinical experience and personal insight to contribute to this document. We also thank the members of the Expert Advisory Panel and peer reviewers who contributed to this project.

Finally, I must thank the other members of the research executive, Dr Lee Krahe and Ms Kris Vine. In addition to their contribution to the written document, their work behind the scenes to ensure the smooth completion of all technical and logistical hurdles was simply outstanding.

Dr AR (Sandy) McColl

Chairperson

Clinical Practice Guidelines Working Party



1.0 Executive Summary

In developed countries, managing rotator cuff syndrome in the workplace presents significant challenges for health care providers and industry employers. Rotator cuff syndrome can substantially affect a person's health and functioning with pain and/or weakness often restricting a person's ability to carry out their daily activities and to work. Rotator cuff syndrome frequently results in lost productivity and significant financial costs for industry and employers. It is therefore imperative that appropriate evidence-based management of rotator cuff syndrome is adopted to minimise negative outcomes for individuals, their families and the workplace.

The guidelines have been developed using a rigorous methodology for searching, appraising and grading evidence. Recommendations have been developed using recent research evidence in conjunction with a multidisciplinary working party. Flowcharts and resources have been developed to support the use of the guidelines. Resources include: rotator cuff syndrome information sheet (for injured workers) and return to work (RTW) guides for employers and GPs.

The guidelines are applicable to GPs, medical specialists and other health care providers involved in the treatment of people with rotator cuff syndrome such as physiotherapists, occupational therapists, psychologists, ergonomists, chiropractors and osteopaths. The guidelines can also be used by the injured worker and both workplace-based employees and workers compensation insurers involved in coordinating and supporting the RTW for workers with rotator cuff syndrome.

2.0 Flowcharts

First Presentation – Shoulder Pain



Thorough History and Physical Examination

Recommendations 1 - 6

Red Flags

Yes



Onwards referral as appropriate (Figure 1)

No



Yellow Flags

No



Yes



Factors identified which may influence recovery and/or RTW (Appendix 1)

Onwards referral as appropriate



Initial Diagnosis of Rotator Cuff Syndrome

Development of Management Plan Including activity and work participation

Recommendations 7 - 10

Initial Treatment



Paracetamol
For mild to moderate pain and/or **NSAIDs**

Recommendations 11,12



Heat/Cold

Recommendations 13,14



RTW Program

Recommendations 15-20



Prescribed exercise and/or manual therapy and/or acupuncture

Recommendations 21 - 24



Injured Worker to be Reviewed by their Clinician in Two Weeks
Earlier if no response to treatment or adverse treatment side effects

Recommendation 25

Rotator Cuff Syndrome Recommendations

Recommendation 1:

Diagnosis of rotator cuff syndrome requires a thorough history-taking which should include the following factors and consideration of their implications: age, occupation and sports participation, medical history, mechanism of injury, pain symptoms, weakness and/or loss of range of motion (body function impairments), activity limitations and social situation.

Recommendation 2:

Assessment of rotator cuff syndrome requires physical examination which should include the following: direct observation of the shoulder and scapula; assessment of active and passive range of motion; resisted (isometric) strength testing; and evaluation of the cervical and thoracic spine (as indicated). It may also include administration of other clinical tests dependent upon the experience and preference of the clinician.

Recommendation 3:

The clinician must exclude 'red flags' in the diagnosis of rotator cuff syndrome. 'Red flags' are signs and symptoms which suggest serious pathology (see Figure 1).

Recommendation 4:

The clinician should take note of 'yellow flags' discussed or identified during history-taking. 'Yellow flags' are contextual factors such as personal, psychosocial or environmental factors that could impact on recovery and/or RTW following injury (see Appendix 1).

Recommendation 5:

X-rays and imaging are not indicated in the first four to six weeks for an injured worker presenting with suspected rotator cuff syndrome in the absence of 'red flags' (see Figure 1).

Recommendation 6:

Clinicians will educate injured workers with suspected rotator cuff syndrome on the limitations of imaging and the risks of ionising radiation exposure.

Recommendation 7:

In established rotator cuff syndrome, maintaining activity within the limits of pain and function should be recommended. Its reported benefits include: earlier RTW; decreased pain, swelling and stiffness; and greater preserved joint range of motion.

Recommendation 8:

Clinicians should use a shared decision-making process with the injured worker to develop a management plan.

Recommendation 9:

Clinicians should use and document appropriate outcome measures at baseline and at other stages during the recovery process to measure change in the injured worker's impairments, activity limitations and/or participation restrictions.

Recommendation 10:

Health care providers should consider any additional issues, potential disadvantages or need for additional resources (such as an interpreter) for the injured worker and their family if the injured worker identifies as Aboriginal and/or Torres Strait Islander, or is from a culturally and linguistically diverse or non-English speaking background.

Recommendation 11:

Injured workers should be prescribed paracetamol as the initial choice for mild to moderate pain.

Recommendation 12:

Injured workers with acute shoulder pain may be prescribed NSAIDs (either oral or topical) for pain relief. NSAIDs can be prescribed alone or in conjunction with paracetamol.

Recommendation 13:

To reduce pain and swelling following acute rotator cuff syndrome, injured workers may intermittently apply cold within the first 48 hours.

Recommendation 14:

From 48 hours post-injury, injured workers may intermittently apply either heat or cold for short periods for pain relief.

Recommendations 15:

There must be early contact between the injured worker, workplace and health care provider.

Recommendation 16:

A specific and realistic goal for the RTW of the injured worker, with appropriate time frames, should be established early with outcomes measured and progress monitored.

Recommendation 17:

The RTW program must involve consultation and engagement with a team which includes the injured worker, relevant health care providers and the workplace.

Recommendation 18:

The RTW program should include a workplace assessment and job analysis matching worker capabilities and possible workplace accommodations.

Recommendation 19:

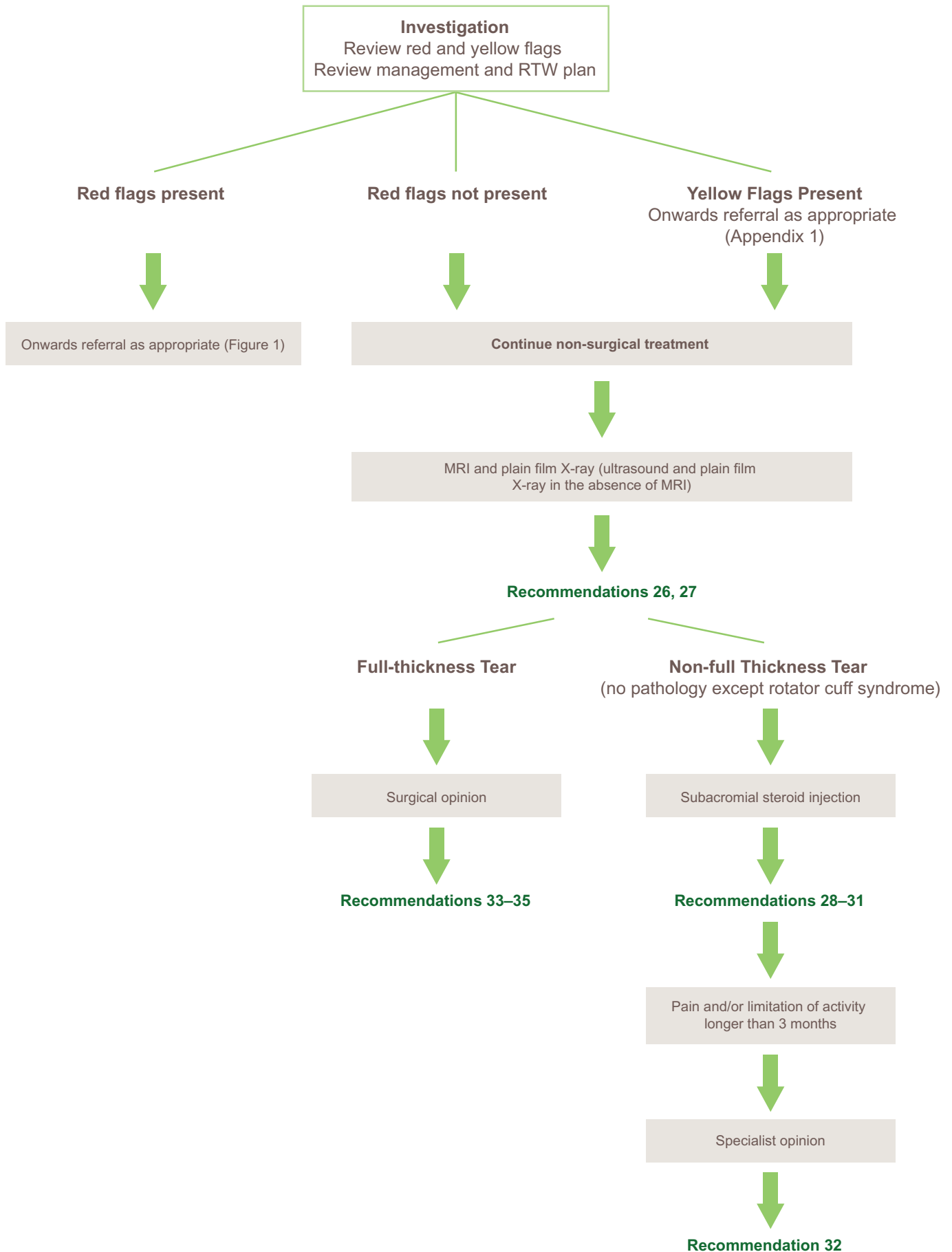
The RTW program, where possible, should be workplace-based. Improved outcomes occur if rehabilitation processes take place within the workplace.

Recommendation 20:

When planning a RTW program, a graded RTW should be considered and adjusted following review of objectively measured outcomes.

Review (Post 4–6 weeks)

Persisting severe pain and/or restriction of activity for more than 4–6 weeks post injury



Initial Management

Recommendation 21:

Injured workers should be initially treated with exercise prescribed and reviewed by a suitably qualified health care provider. There is no evidence of adverse impacts for prescribed exercise programs for patients with rotator cuff syndrome.

Recommendation 22:

Manual therapy may be combined with prescribed exercise by a suitably qualified health care provider*, for additional benefit for patients with rotator cuff syndrome.

** Under the NSW workers compensation system health care providers who are eligible to be paid for this treatment include physiotherapists, chiropractors and osteopaths. These treatment providers are trained in the prescription and modification of exercises consistent with pathology.*

Recommendation 23:

Clinicians may consider acupuncture in conjunction with exercise; both modalities should be provided by suitably qualified health care providers.

Recommendation 24:

The evidence suggests that therapeutic ultrasound does not enhance outcomes compared to exercise alone. The health care provider should refrain from using ultrasound for either pain reduction and/or increased function for injured workers with subacromial impingement syndrome (SAIS).

Review

Recommendation 25:

Injured workers with suspected rotator cuff syndrome should be reviewed by their clinician within two weeks of initial consultation, with the proviso that the injured worker can contact their clinician earlier if they have had no response to their prescribed treatment, or if they have experienced treatment side effects.

Recommendation 26:

Injured workers with suspected rotator cuff syndrome who have experienced significant activity restriction and pain for four to six weeks following initiation of an active, non-surgical treatment program and have had no response to the treatment program should be referred for MRI and plain film X-ray.

Recommendation 27:

In the absence of access to MRI or for those with contraindications for MRI, refer injured workers with suspected rotator cuff syndrome for ultrasound and plain film X-ray. Ultrasound performed by a skilled clinician provides equivalent diagnostic accuracy to MRI for rotator cuff tears (partial- or full-thickness).

Recommendation 28:

For pain reduction in injured workers with persistent pain or who fail to progress following initiation of an active, non-surgical treatment program, the clinician may consider subacromial corticosteroid injection combined with local anaesthetic.

Recommendation 29:

Injured workers should be educated regarding the possible risks and benefits of corticosteroid injections.

Recommendation 30:

Subacromial corticosteroid injections should only be administered by suitably trained and experienced clinicians.

Recommendation 31:

If pain and/or function have not improved following two corticosteroid injections, additional injections should not be used.

Recommendation 32:

Clinicians should refer for specialist opinion if an injured worker experiences significant activity limitation and participation restrictions and/or persistent pain following engagement in an active, non-surgical treatment program for three months.

Surgery

Recommendation 33:

On review, clinicians should refer injured workers for surgical opinion if there is a symptomatic, established small or medium, full-thickness rotator cuff tear.

Recommendation 34:

Clinicians should refer injured workers for surgical opinion if there is a symptomatic, full-thickness rotator cuff tear greater than 3 centimetres.

Recommendation 35:

The clinician should be aware of factors that may influence prognosis post-rotator cuff surgery (see Table 8).

Red Flags for Rotator Cuff Syndrome

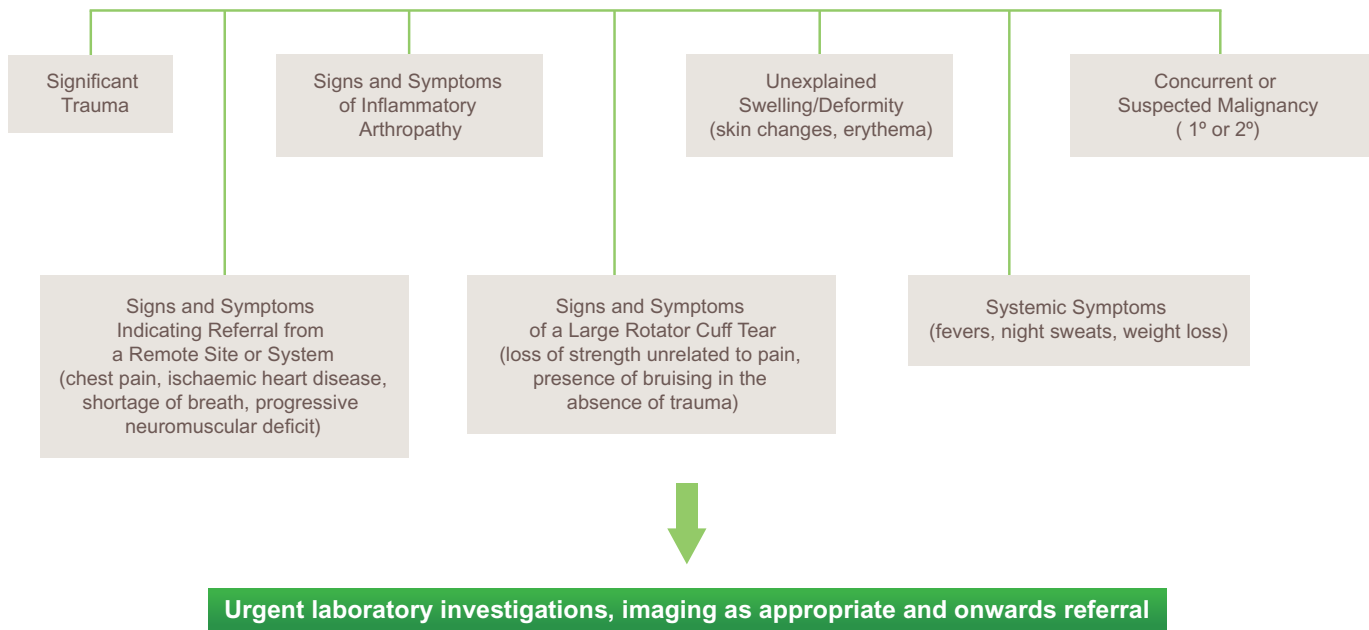


Figure 1: Red Flags for Rotator Cuff Syndrome

3.0 Introduction

3.1 Background

Rotator cuff syndrome can affect a person's quality of life. If left untreated, shoulder problems and pain can lead to significant disability, limitations in activity and restrict participation in major life areas such as work and employment, education, community, social and civic life^{6, 14, 155, 216}.

Rotator cuff syndrome in the workplace presents a number of significant challenges for clinicians and employers. These challenges include: clinical classification/diagnosis, determination of the contribution of physical and psychological working conditions to the development of rotator cuff syndrome and the design of appropriate treatment and prevention programs¹⁸¹. Recovery from rotator cuff syndrome can be slow with the potential for recurrence of shoulder pain^{201, 202}. During recovery from rotator cuff syndrome there will typically be a limited period of time where some activities and participation in home, work and community are restricted. Management of rotator cuff syndrome requires the skilled assessment of each individual person's health status, circumstances and perspectives to help determine the treatments that are relevant and appropriate to that person¹²⁵.

3.2 Scope and Purpose

The guidelines have been developed to provide recommendations on the best practice management of rotator cuff syndrome in working adults (18–65 years)* (refer to rotator cuff syndrome definition in section 4.1). The guidelines specifically examine degenerative rotator cuff syndrome in adults (18–65 years) which has occurred following the performance of work tasks. In the guidelines, the diagnoses of shoulder impingement syndrome (SIS), subacromial impingement syndrome (SAIS), subacromial bursitis, rotator cuff tendonitis and rotator cuff tears (partial- or full-thickness) have been included. A complete list of International Classification of Diseases (ICD) 9 and 10 codes for the conditions included in these guidelines can be found in Appendix 4. The term 'rotator cuff syndrome' is used to encompass these entities. Rotator cuff syndrome refers to the clinical presentation of the injured worker.

The guidelines do not examine acute rotator cuff injury related to a major traumatic event or the diagnoses of osteoarthritis of the glenohumeral joint or acromioclavicular joint, subluxation or dislocation of the aforementioned joints, adhesive capsulitis (frozen shoulder) or fractures.

The guidelines are intended to assist medical practitioners, health care providers, employers and injured workers to make informed decisions with consideration of the injured worker's personal and environmental contexts to optimise recovery and functioning. The guidelines intend to inform and guide, but do not replace clinical reasoning or clinical judgment. Adopting best practice methods to the diagnosis and management of rotator cuff syndrome, including management at the workplace, will assist the injured worker to recover, promote minimal disruption to the injured worker's activities and participation and reduce the potential for longer term disability.

** It is at the discretion of the user of the guidelines whether they apply the guidelines to injured workers aged 16 to 17 and over 65. These age groups are less likely to be represented within the evidence base.*

3.3 Framework

3.3.1 Bio-psychosocial Perspective of Health and Functioning

Previously, the dominant model of disease and injury was the 'medical' model in which the central considerations were the biological and medical aspects of health⁶⁰. Health practitioners focused on the clinical aspects of curing or treating an illness or injury by controlling its course. In the medical model, a person's health and functioning was directly attributed to the individual and their impairments of body functions or structures. In the 1960s and 1970s a different perspective emerged, referred to as the 'social model', which was significantly different from the medical perspective. The 'social' model of disability perceived people being 'disabled' by society rather than by their bodies²¹⁷.

Over time and internationally, there was a transition where both views were balanced, integrated and extended. The result was the bio-psychosocial model of health which acknowledges the importance of both the individual and society in determining

functioning and health. In 2001, the World Health Organization (WHO) developed and published a framework to recognise the dynamic interaction between health conditions and the contextual factors. The WHO International Classification of Functioning, Disability and Health (ICF)²¹⁶ is now widely accepted as the most appropriate framework to understand health, disability and functioning. It is used as a basis for clinical practice, teaching and in many instances research^{66, 72, 119, 163, 193}.

The WHO's ICF framework²¹⁶ incorporates context in terms of both environmental and personal factors. The framework articulates the important role that these factors play in a person's health and functioning. Disability refers to the negative aspects of the interaction between an individual with a health condition and their contextual factors²¹⁶. Contextual factors can be a barrier or facilitator to an injured worker returning to work.

3.3.2 Approach Used in Guidelines

The guidelines are informed by the ICF framework for functioning, disability and health and the principles of patient-centred care and shared decision-making. This is consistent with the health service delivery principles articulated in the Clinical Framework (refer to text box 1). A bio-psychosocial model which incorporates a focus on early return to work is likely to result in better vocational outcomes for persons with shoulder pain¹⁸¹. As this approach requires consideration of everything that influences health, beyond the individual's injury, it requires the active involvement of all key stakeholders working as a team to facilitate recovery. The team includes the health care provider/s, the worker with rotator cuff

syndrome, key people at the workplace (such as the supervisor) and those responsible for managing the injured worker's claim with the workers compensation insurer.

3.4 Intended Users

The intended users of this guideline are:

- health care providers:
 - general practitioners
 - medical specialists
 - health practitioners involved in the treatment of people with rotator cuff syndrome such as physiotherapists, occupational therapists, psychologists, ergonomists, chiropractors, osteopaths
- workplace-based employees and workers compensation insurers involved in coordinating and supporting the RTW for workers with rotator cuff syndrome
- OHS professionals involved in musculoskeletal injury prevention such as ergonomists.

3.5 Related publications

The publications in this rotator cuff syndrome in the workplace series include:

1. Overview of Rotator Cuff Injury
2. *Clinical Practice Guidelines for the Management of Rotator Cuff Syndrome in the Workplace*
3. *Technical Report for the Clinical Practice Guidelines for the Management of Rotator Cuff Syndrome in the Workplace.*

Text Box 1: Clinical Framework for the Delivery of Health Services

The clinical framework was developed by the Health Services Group, a collaboration between the Transport Accident Commission (TAC) and WorkSafe (Victoria). The Clinical Framework is a set of principles for the provision of health services to injured people. The principles are:

1. Measure and demonstrate the effectiveness of treatment
2. Adopt a bio-psychosocial approach
3. Empower the injured person to manage their injury
4. Implement goals focused on optimising function, participation and return to work
5. Base treatment on the best available research evidence

Reference: TAC and WorkSafe (2012) *Clinical Framework for the Delivery of Health Services* available from:

<http://www.worksafe.vic.gov.au/forms-and-publications/forms-and-publications/clinical-framework-for-the-delivery-of-health-services>

4.0 Rotator Cuff Syndrome

4.1 Definition

The rotator cuff is comprised of four muscles (supraspinatus, infraspinatus, subscapularis and teres minor) and serves as a dynamic stabiliser of the humerus⁹³ (see Figure 2). Rotator cuff syndrome can be acute or chronic in nature. Injury to the rotator cuff may arise from a single traumatic event (e.g. fall or direct impact trauma), an acute overload incident or develop gradually from degenerative processes. The research suggests that the diagnoses of SIS, subacromial bursitis, rotator cuff tendonitis and

rotator cuff tears (partial- or full-thickness) arise from tendon degeneration and/or the repetitive or excessive contact of the rotator cuff tendons with other anatomic structures in the shoulder, and usually result in functional loss and disability^{35, 186}. In degenerative rotator cuff syndrome, it is possible for the underlying processes to be occurring over time with limited or no symptoms, but an incident (such as a posture which uses the end of range motion of the shoulder or sudden increase in load upon the tendon) can precipitate pain from the degenerative tendon.

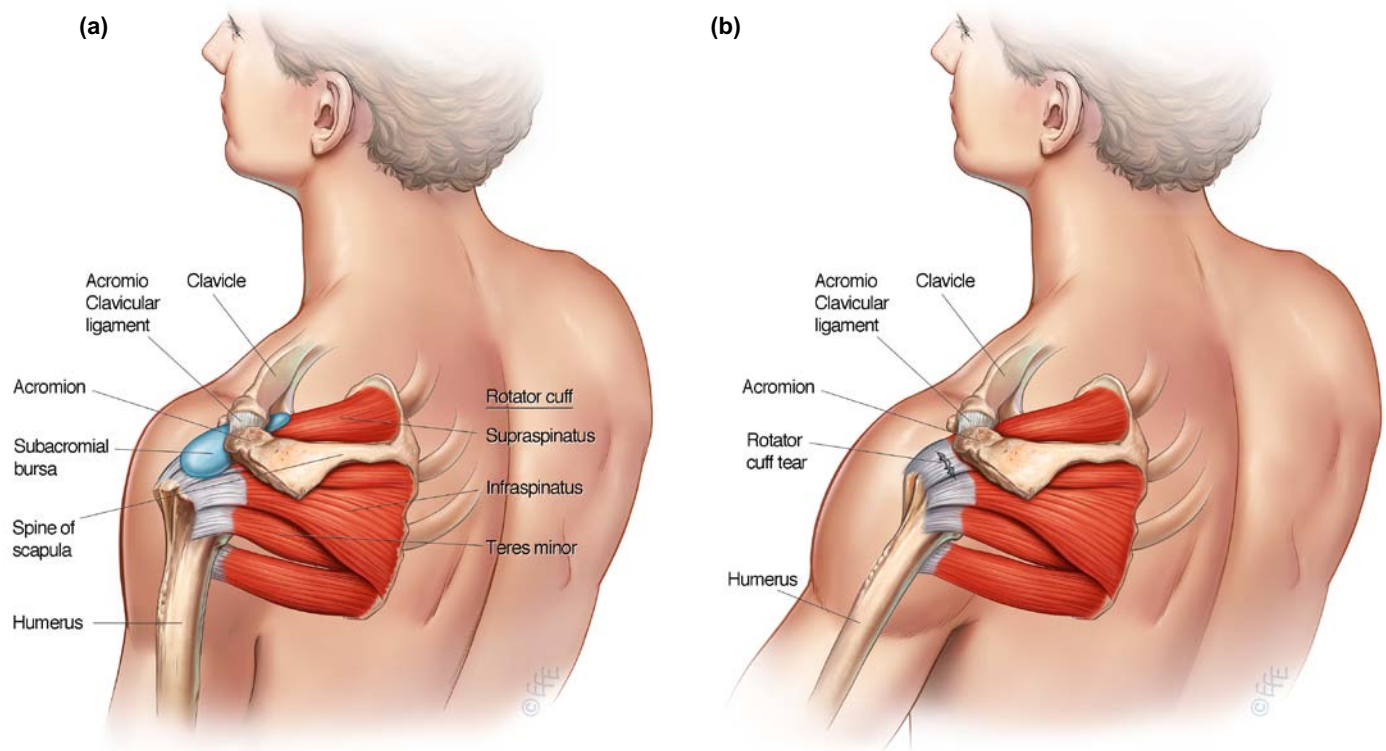


Figure 2: The Rotator Cuff – Normal Anatomy (a) and Post-Injury (bursa not shown) (b)

4.2 Incidence and Prevalence

Shoulder pain is the third most common musculoskeletal complaint reported to general practitioners in primary care settings^{200, 202}. In developed countries, approximately 1% of the adult population is expected to visit a general practitioner annually for shoulder pain and the incidence of reported shoulder complaint is 19.0 per 1000 patients per year³⁶. It has been estimated that 65–70% of all shoulder pain is due to rotator cuff complaints¹⁸¹. On the basis of these figures approximately 13.3 per 1,000 patients per year present to GPs with a rotator cuff syndrome.

In Australia, a recent analysis of work-related shoulder injuries presenting to GPs was conducted by the Australian Institute for Health and Welfare (2008/9). Approximately 13% of all shoulder problems presenting to GPs are considered work-related³¹. Occupations which have a higher incidence of reported rotator cuff syndrome include athletes (especially throwing and swimming), heavy labourers and workers who use their arm repetitively in the horizontal position or above²⁰⁴. Various occupations, such as construction workers, carpenters, slaughterhouse workers, fish and meat processing workers, sewing machine operators and industrial workers have all been noted to have elevated levels of shoulder pain relative to sedentary controls^{79, 121, 204, 208}.

4.3 Prevention

Any discussion of the management of rotator cuff syndrome must recognise the important role of injury prevention as well as the prevention of re-injury in the workplace. It is increasingly recognised that multiple risk factors can contribute to the development of shoulder pain¹⁸¹. Risks are not only limited to adverse anatomical features, degenerative processes and/or musculoskeletal diseases but include a broader range of environmental and psychosocial factors including factors at the workplace. Some of these factors have been studied extensively (e.g. physical demands of work duties and occupational risks), and others are only just emerging (e.g. job satisfaction and individual psychological factors such as anxiety and depression, and personal or relationship factors).

The range of risk factors requires a broad-based prevention approach which incorporate ergonomics to address the full range of physical, organisational and psycho-social risk factors associated with the work role and more general prevention strategies (e.g. to enhance job satisfaction across workplaces, or provision of employee assistance programs to enable workers to confidentially address psychosocial factors). The psychological demands of the tasks, the social environment of the workplace and the degree of job satisfaction the worker experiences are all potentially modifiable factors that, if implemented, may reduce the incidence and prognosis of workplace injury. Further detailed discussion of injury prevention is not within the scope of these clinical guidelines; however, employers are referred to Work Health Safety (WHS) literature which includes OHS, manual and materials handling and ergonomic literature.

4.4 Prognosis

Approximately 50% of new episodes of shoulder pain resolve in eight to twelve weeks, but as many as 40% of cases persist for longer than one year^{36, 202, 212} and recurrence rates are high²⁰¹. In a 2003 study of Danish workers with shoulder tendonitis, Bonde et al. identified average symptom duration of 10 months or less, with 25% of workers continuing to experience symptoms at 22 months²⁶. Recurrence of symptoms has been reported to occur in 40–50% of people. Some authors postulate that symptoms may return as partial rotator cuff tears progress to full-thickness tears¹⁶⁸.

Poor prognosis is associated with increasing age, female sex, severe or recurrent symptoms at presentation and associated neck pain. A favourable prognosis is associated with mild trauma or overuse before onset of pain, early presentation and acute onset^{36, 136}.

5.0 Guidelines Development

5.1 Working Party

A working party consisting of GPs, medical specialists, allied health care providers, consumer representatives and researchers developed the guidelines. Working party meetings were held once a month for 11 months. At each working party meeting, the evidence which addressed specific clinical questions was reviewed and clinical practice recommendations were developed.

5.2 Method

The working party identified 35 clinical questions of concern to health care providers, injured workers and employers regarding the management of rotator cuff syndrome (refer to Appendix 2). The guidelines have been developed on the basis of these questions. A systematic search for research evidence was conducted on each clinical question. Databases searched include Cochrane Library, MEDLINE, Embase, CINAHL, PEDro, OTseeker and where appropriate PsychINFO between January 2000 and April 2012. Literature used in the guidelines includes the following: published clinical guidelines, systematic reviews and research studies (both qualitative and quantitative).

Literature identified in the systematic searches was assessed for relevance and appraised by two reviewers. The following appraisal tools were used:

- Appraisal of Guidelines for Research and Evaluation (AGREE)³²– for appraisal of clinical guidelines
- Critical Appraisal Skills Programme (CASP)¹⁶⁴– for appraisal of systematic reviews and qualitative studies
- expanded National Health and Medical Research Council (NHMRC) checklist – for quantitative studies^{144, 145}
- partitioned PEDro scale¹⁵⁸ for quantitative intervention studies
- Single Case Experimental Design scale (SCED)¹⁹⁶ – for appraisal of single case studies.

Appraised evidence was used to develop clinical recommendations. The strength of the body of evidence for each recommendation was determined using the NHMRC grades for recommendations (see Table 1). The NHMRC grades use a hierarchical model of quantitative research methods where systematic reviews or meta-analysis of randomised controlled trials are considered to be the most robust evidence (see Appendix 3). A detailed explanation of the methods used to develop the guideline recommendations are provided in the *Clinical Practice Guidelines for the Management of Rotator Cuff Syndrome in the Workplace: Technical Report*. All research, on which these recommendations are based, is detailed in the evidence tables in the technical report. Where evidence was lacking or absent, the working party developed recommendations based on a consensus process.

Table 1: NHMRC Grades for Recommendations

Grade of Recommendation	Description
A	<p>Body of evidence can be trusted to guide practice.</p> <ul style="list-style-type: none"> One or more level I or several level II studies with low risk of bias and all studies consistent, or inconsistency can be explained. The clinical impact is very large. The populations studied in the body of evidence are the same as the target population for the guidelines. Directly applicable to the Australian health care context.
B	<p>Body of evidence can be trusted to guide practice in most situations.</p> <ul style="list-style-type: none"> One or two level II studies with a low risk of bias or a systematic review/several level III studies with a low risk of bias with most studies consistent or inconsistencies can be explained. Clinical impact is substantial. Population studied in the body of evidence is similar to the guideline population. Applicable to Australian health care context with few caveats.
C	<p>Body of evidence provides some support for recommendation but care should be taken in its application to individual clinical and organisational circumstances.</p> <ul style="list-style-type: none"> One or two level III studies with low risk of bias or level I or II studies with a moderate risk of bias. Some inconsistency reflecting some uncertainty. Clinical impact is moderate. Population studied in the body of evidence differs from the guideline population but it is sensible to apply it to target population. Applicable to Australian health care context with some caveats.
D	<p>Body of evidence is weak and recommendation must be applied with caution.</p> <ul style="list-style-type: none"> Level IV studies or level I to II studies/systematic reviews with a high risk of bias. Evidence is inconsistent. The clinical impact is slight. Population studies in the body of evidence differ to target population and hard to judge whether it is sensible to apply it to the target population.
Consensus	<p>Consensus-based recommendation.</p> <p>A systematic review of the evidence was conducted as part of the guideline research strategy. In the absence of high quality evidence, the working party utilised the literature available in combination with the best available clinical expertise and practices to reach a consensus on the recommendation.</p>

Adapted from The Guidelines for the prescription of a seated wheelchair or mobility scooter for people with a traumatic brain injury or spinal cord (2011)⁵⁸.

Mandatory	This recommendation is guided by a regulatory requirement established by a statutory authority (e.g. WorkCover NSW).
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6.0 Initial Presentation

Diagnosis of rotator cuff syndrome is challenging because of the complex anatomy of the shoulder and the variety of possible causes for shoulder pain⁵¹. The location of the pain symptoms may not always correspond to the tissue causing the pain. In addition there are differences in shoulder pathologies and associated symptoms between individuals¹⁷⁰. For example, some rotator cuff tears may be asymptomatic.

To further complicate rotator cuff syndrome diagnosis, there is a lack of consistent approach worldwide to the nomenclature and classification of shoulder conditions^{51, 181}. In the case of rotator cuff syndrome, terms that are frequently cited and used interchangeably within the research literature include the following: shoulder impingement syndrome (SIS), subacromial impingement syndrome (SAIS), subacromial bursitis, rotator cuff tendonitis and rotator cuff tendinopathy. The terminology creates an impression of discrete diagnostic entities which can be distinguished from each other¹². However, in reality chronic bursitis, partial-thickness rotator cuff tear and complete tear of the rotator cuff are not readily distinguished by physical findings^{146, 156}.

Underlying causes of shoulder pain can be difficult to identify. The literature strongly indicates that the diagnosis of rotator cuff syndrome requires a thorough clinical history-taking and physical examination with appropriate referral for imaging and/or laboratory tests where there is evidence of serious damage/disease^{147, 181}. For the clinician it is important to differentiate rotator cuff syndrome from other disorders that have the potential to cause shoulder pain such as glenohumeral osteoarthritis, instability, adhesive capsulitis, acromioclavicular joint lesions, cervical radicular symptoms and peripheral neuropathies¹⁶². It is also necessary to exclude other serious conditions such as fracture, malignancy, infection and/or systemic illness.

6.1 Clinical History

Numerous articles have been published outlining the processes for evaluation and assessment of shoulder pain^{12, 35, 136}. The common recommendation is to complete a comprehensive clinical history. Although clinical history-taking for persons with rotator cuff syndrome is widely relied upon, the diagnostic utility of clinical history remains unclear, with research indicating that no single aspect of clinical history is reliable or valid for the diagnosis of shoulder disorders^{51, 122, 150}. Nevertheless, the goal of history-taking is to assist with determining the possible causes of shoulder pain and whether problems are acute or chronic (long term)^{93, 213}.

The literature was searched for prognostic studies which examined specific medical history, signs or symptoms that reliably diagnose rotator cuff syndrome. Only two studies were identified. The first was a prognostic study completed by Litaker et al. (2000)¹²⁰. In this study the medical charts of 448 patients diagnosed with rotator cuff syndrome (subsequently confirmed by arthrography) were retrospectively reviewed. Three factors best predicted the presence of rotator cuff syndrome. These were: weakness with external rotation; aged over 65; and night pain (inability to sleep on affected side)¹²⁰. These findings may assist with the clinical history aspect of diagnosis; however, the study findings were based on an 'older' population and thus may not be directly applicable to those with rotator cuff syndrome in the workplace.

In the second study an inter-rater agreement between two health care providers administering a standardised clinical history interview to patients with shoulder pain was examined. Results of the study showed that there were low levels of agreement between raters, indicating that health care providers differ in their interpretation of clinical signs and symptoms related to shoulder pain. This difference may then impact on shoulder pain diagnosis¹⁵⁰.

In order to provide further guidance, research literature was reviewed for indicators and associated diagnosis which may assist the health care provider to assess for rotator cuff syndrome. These indications and differential diagnostic factors are presented in Table 2.

Table 2: Indicators Identified in the Clinical History to Assist Assessment and Differential Diagnosis

Factor	Indications	Study and Level of Evidence
Age	<35 years – instability or rotator cuff tendinopathy. >35 years – rotator cuff tears, adhesive capsulitis, osteoarthritis.	Murrell & Watson, 2001 (level III) ¹⁴⁰ ; Yamaguchi et al. 2006 (level III) ²¹⁹ .
Occupational and sports participation	Highly repetitive work, forceful exertion in work, awkward postures, overhead work and high psychosocial job demands are associated with the occurrence of rotator cuff syndrome.	Van Rijn et al. 2010 (level I) ²⁰⁴
	Collision sports or weightlifting may indicate instability or acromioclavicular osteoarthritis.	Expert Opinion Burbank et al. (2008) ³⁵
Medical history	Diabetes or thyroid disorders may predispose an individual to adhesive capsulitis.	Cakir et al. 2003 (level IV) ³⁷
	Autoimmune disorders may be predictive of inflammatory arthritis.	Smith et al. 2003 (level IV) ¹⁹⁰
	Prior or coexisting pain conditions may predict poorer treatment outcomes.	Expert Opinion New Zealand Guideline Group (NZGG-2004) ¹⁴⁷
Mechanism of injury	Trauma, such as falling on an outstretched arm, may indicate fracture, dislocation and/or rotator cuff tear. Gradual onset may indicate rotator cuff syndrome.	Expert Opinion Mitchell et al. (2005) ¹³⁶ ; NZGG, (2004) ¹⁴⁷ ; Australian Acute Musculoskeletal Pain Guidelines Group, (2003) ¹² .
Pain symptoms	Night pain may indicate rotator cuff syndrome.	Litaker et al. 2000 (level III-2) ¹²⁰
	Location and nature of pain: pain with overhead activity may indicate rotator cuff syndrome. referred pain from cervical spine is common and characterised by sharp pain originating from the neck and radiating down the arm. Movement of the neck may reproduce symptoms.	Expert Opinion House & Mooradian, (2010) ⁹³ ; Mitchell et al. (2005) ¹³⁶ ; NZGG, (2004) ¹⁴⁷ ; Australian Acute Musculoskeletal Pain Guidelines Group, (2003) ¹² .
Loss of ROM*	Restriction in active but not passive ROM may indicate rotator cuff syndrome.	Litaker et al. 2000 (level III-2) ¹²⁰

*ROM – range of motion

Additional searches were also conducted on factors reported to influence the development of rotator cuff syndrome and shoulder pain. These have been grouped according to the ICF contextual factors of the environment and personal. Personal factors include: age, gender, occupational and sports participation, medical history, mechanism of injury, pain symptoms and social situation. These are detailed in Table 3. Table 4 presents environmental factors.

Table 3: Personal Factors that may Influence the Development of Shoulder Pain

Factor	Detail	Study and level of evidence
Age	Prevalence of rotator cuff syndrome increases with age.	D'Onise et al. 2010 (level IV) ⁴⁷ Leclerc et al. 2004 (level II) ¹¹⁶ ; Miranda et al. 2008 (level II) ¹³⁵ ; Roquelare et al. 2011 (level III-3) ¹⁷¹ ; Silverstein et al. 2008 (level IV) ¹⁸⁷ .
Gender	Studies have identified that the predictors of shoulder disorder differed for men and women. In men, work involving vibration and repetitive movements significantly increased the risk of a shoulder disorder at follow-up, whereas in women, an increase in the risk was seen for lifting heavy loads and working in awkward postures. Women with several of the above physical exposures had considerably higher risk for developing a chronic shoulder disorder than similarly exposed men.	Miranda et al. 2008 (level II) ¹³⁵
Health status	Individuals with diabetes mellitus are found to have an increased risk of developing rotator cuff syndrome.	Roquelare et al. 2011 (level III-3) ¹⁷¹ ; Rechardt et al. 2010 (level IV) ¹⁶⁷ .
Depression	Shoulder pain has been found to be associated with depression.	D'Onise et al. 2010 (level IV) ⁴⁷ ; Leclerc et al. 2004 (level II) ¹¹⁶ .
Body mass index (BMI)	Inconsistent evidence. In one study BMI appears to modify the effect of working in awkward postures and work involving repetitive movements. These exposures had a strong increasing effect on the risk of a shoulder disorder, but only among those with BMI lower than 25.* In contrast to this finding, four studies have found that high BMI was associated with the development of rotator cuff syndrome.	*Miranda et al. 2008 (level II) ¹³⁵ ; Silverstein et al. 2008 (level IV) ¹⁸⁷ ; Bonde et al. 2003 (level IV) ²⁶ ; D'Onise et al. 2010 (level IV) ⁴⁷ ; Rechardt et al. 2010 (level IV) ¹⁶⁷ .
Subject stature	Short stature increased the likelihood of developing shoulder pain among trade apprentices and was hypothesised as one of the factors that contributed to higher rates of shoulder pain in Asian/Pacific Islander workers in health care and manufacturing industries in the US.	Borstad et al. 2009 (level II) ²⁸ ; Smith et al. 2009 (level II) ¹⁸⁹ .
Previous persistent pain	Pain in one region is strongly correlated with pain in other regions. There is an increased likelihood of development of new-onset shoulder pain if there was previous neck pain.	Andersen et al. 2007 (level II) ⁷ ; Borstad et al. 2009 (level II) ²⁸ .

Table 4: Environmental Factors that may Influence the Development of Shoulder Pain

Factor	Detail	Study and Level of Evidence
Repetitive work	Repetitive work particularly in awkward or constrained postures (e.g. neck flexed more than 20° for more than 2/3 of working time) or if associated with force requirements were found to be significantly associated with the development of rotator cuff syndrome.	Alipour et al. 2009 (level IV) ³ ; Andersen et al. 2007 (level II) ⁷ ; Frost et al. 2002 (level IV) ⁷⁰ ; Miranda et al. 2008 (level II) ¹³⁵ ; Nordander et al. 2009 (level III-3) ¹⁴⁸ ; Roquelaure et al. 2011 (level III-3) ¹⁷¹ ; Van Rijn et al. 2010 (level I) ²⁰⁴ .
Working with hands above shoulder level or in awkward arm postures	The occurrence of rotator cuff syndrome was associated with working in the following postures: upper arm flexion >45° >15% of the time sustained and repetitive arm abduction (>90° for men, >60°–90° for women)* increased percentage of time upper arm flexion >45° and greater percentage of time in high pinch force.	Grooten et al. 2007 (level II) ⁸⁰ ; Seidler et al. 2011 (level III-3) ¹⁷⁸ ; Silverstein et al. 2008 (level IV) ¹⁸⁷ ; Svendsen et al. 2004 (level IV) ¹⁹⁴ ; Van Rijn et al. 2010 (level I) ²⁰⁴ . Roquelaure et al. 2011 (level III-3) ¹⁷¹ ; Svendsen & Gelineck et al. 2004 (level IV) ¹⁹⁵ . <i>*Silverstein et al. 2008 (level IV)¹⁸⁷ did not find an association between arm abduction and rotator cuff syndrome.</i>
Heavy lifting or high physical workload or high hand force (>1 hour per day)	The occurrence of rotator cuff syndrome was associated with heavy lifting and force greater than 10% of maximal voluntary contraction. Specific associations identified: lifting >20kg >10 times/day. lifting >50 kg per hour at or above shoulder level was associated with neck/shoulder pain for a cumulative duration of heavy lifting (>20kg) of greater than 77 hours. A strong relationship was also found between jobs which required pushing and pulling with shoulder pain and disability.	Miranda et al. 2008 (Level II) ¹³⁵ ; Silverstein et al. 2008 (level IV) ¹⁸⁷ ; Wang et al. 2010 (level II) ²⁰⁸ ; Roquelaure et al. 2011 (level III-3) ¹⁷¹ . Van Rijn et al. 2010 (level I) ²⁰⁴ ; Andersen et al. 2007 (level II) ⁷ . Seidler et al. 2011 (level III-3) ¹⁷⁸ Hoozemans et al. 2002 (level III-3) ⁹²
Working with vibrating tools	The development of rotator cuff syndrome in men was found to be significantly associated with working with vibrating tools in combination with repetitive work. This association was not so pronounced in women however very few were exposed to this condition**.	Grooten et al. 2007 (level II) ⁸⁰ ; Leclerc et al. 2004 (level II) ¹¹⁶ ; Miranda et al. 2008 (level II) ¹³⁵ ; Seidler et al. 2011 (level III-3) ¹⁷⁸ . <i>** No association in Roquelaure et al. 2011 (level III-3)¹⁷¹</i>
Combination of the above factors	The combination of biomechanical variables demonstrated a greater association with rotator cuff syndrome than single exposure variables alone.	Grooten et al. 2007 (level II) ⁸⁰ ; Miranda et al. 2008 (level II) ¹³⁵ ; Silverstein et al. 2008 (level IV) ¹⁸⁷ .
Type of work	In an occupational group analysis, the risk for developing a supraspinatus lesion was found among construction workers and interior workers (plasterers, insulators, glaziers, construction carpenters, roofers and upholsterers). A high incidence of shoulder injury has also been found in the abattoir and fish processing industries and onerous human service jobs.	Seidler et al. 2011 (level III-3) ¹⁷⁸ ; Frost et al. 2002 (level IV) ⁷⁰ ; Leijon et al. 2007 (level II) ¹¹⁷ ; Van Rijn et al. 2010 (level I) ²⁰⁴ .
Duration of employment/exposure	There is evidence for development of supraspinatus tendon lesions for cumulative heavy lifting (>20kg) of greater than 77 hours.	Seidler et al. 2011 (level III-3) ¹⁷⁸
Perceived high or low job demands	High job demands include physical and/or psychological demands. Low job demands include monotonous work with insufficient use of skills.	Andersen et al. 2003 (level II) ⁸ ; Smith et al. 2009 (level II) ¹⁸⁹ ; MacFarlane et al. 2009 (level-I) ¹²⁴ ; Van Rijn et al. 2010 (level I) ²⁰⁴ .
Low levels of job control	Characteristics of low job control include repetitive work of limited variety, and limited decision freedom. In a single study ^a low levels of job control were predictive of shoulder pain only in women.	^a Leclerc et al. 2009 (level II) ¹¹⁶ ; Silverstein et al. 2008 (level IV) ¹⁸⁷ ; Smith et al. 2009 (level II) ¹⁸⁹ .
Poor social support	Increased risk for persistent neck/shoulder and/or lower back disorders for those with family burden, low levels of social support.	Leijon et al. 2007 (level II) ¹¹⁷ ; Keijsers et al. 2010 (level II) ¹⁰⁵ ; Bonde et al. 2003 (level IV) ²⁶ .
Working in a cold or humid environment	Two small studies identified that working in cold or humid conditions increased the likelihood of developing shoulder pain.	Borstad et al. 2009 (level II) ²⁸ ; Pope et al. 2001 (level IV) ¹⁶⁰ .

The research evidence outlined above was grouped and a recommendation developed on history-taking to assist with the diagnosis of rotator cuff syndrome.

RECOMMENDATION 1 Grade: Consensus

Diagnosis of rotator cuff syndrome requires a thorough history-taking which should include the following factors and consideration of their implications (refer to Table 2):

- age
- occupation and sports participation
- medical history
- mechanism of injury
- pain symptoms
- weakness and/or loss of range of motion (body function impairments)
- activity limitations
- social situation.

6.2 Physical Examination

In addition to a clinical history, a differential diagnosis of rotator cuff syndrome requires the health care provider to complete a thorough physical examination of the worker presenting with shoulder pain^{93, 147}.

Physical examination is used to discriminate between tendon and articular involvement as well as referred pain. Rotator cuff pain may be referred to the sub-deltoid region. Examination should include the cervical spine, chest wall and elbow joint³⁶. Physical examination should include the simple components of inspection, and passive and active range of motion (ROM). Inspection of the shoulder should include assessing for asymmetry, muscle atrophy and obvious joint deformity. This should be complemented with resisted movements and specific provocation testing⁹³.

There are a range of signs on physical examination to help diagnose rotator cuff syndrome. Commonly listed signs include: painful arc; Neer sign; Hawkins-Kennedy sign; and the empty can test. Studies which have examined these signs/tests have concluded that no single clinical test for rotator cuff syndrome has significant diagnostic accuracy. Hughes et al. (2008)⁹⁵ found that most physical examination tests could not accurately diagnose rotator cuff syndrome. In addition the inter-observer reliability of physical tests for rotator cuff syndrome have been found to have only moderate levels of agreement between raters¹⁴¹.

In recognition of the diagnostic limitations of individual physical tests for rotator cuff syndrome, recent research has examined the efficacy of using a combination of physical tests for diagnosis. In one study, results indicated that a maximum of three or more positive test results out of five tests were used to accurately confirm rotator cuff syndrome (tests examined were the Neer sign, the Hawkins-Kennedy sign, painful arc, empty can, and external rotation resistance)¹³³. In a second study the combination of the Hawkins-Kennedy impingement sign, the painful arc sign, and the infraspinatus muscle test yielded the best post-test probability (95%) for any degree of rotator cuff syndrome. The combination of the painful arc sign, drop-arm sign and infraspinatus muscle test produced the best post-test probability (91%) for full-thickness rotator cuff tears¹⁵⁷.

Diagnosis of rotator cuff syndrome may also include injection of a local anaesthetic with/without corticosteroid into the subacromial space. If the rotator cuff is intact, strength should improve after a pain-relieving injection of anaesthetic²¹. See section 9.4 for further details.

RECOMMENDATION 2 Grade: Consensus

Assessment of rotator cuff syndrome requires physical examination which should include: direct observation of the shoulder and scapula; assessment of active and passive range of motion; resisted (isometric) strength testing; and evaluation of the cervical and thoracic spine (as indicated). It may also include administration of other clinical tests but these are dependent upon the experience and preference of the clinician.

6.3 Identification of Red Flags

At the initial presentation, a critical role for the health care provider is to screen for red flags. Red flags are signs or symptoms that may indicate serious disease (the symptoms are not always confined to the shoulder). Information obtained from the clinical history and physical assessment may alert to the presence of a serious condition. Systemic symptoms include fever, weight loss, new respiratory complaints¹³⁶ or significant unexplained sensory/ motor deficits (see Figure 1).

RECOMMENDATION 3 Grade: Consensus

The clinician must exclude 'red flags' in the diagnosis of rotator cuff syndrome. 'Red flags' are signs and symptoms which suggest serious pathology (see Figure 1).

The following 'red flags' may present as shoulder pain and/or loss of function:

- unexplained deformity or swelling or erythema of the skin
- significant weakness not due to pain
- past history of malignancy
- suspected malignancy (e.g. weight loss or loss of appetite)
- fevers/chills/malaise
- significant unexplained sensory/motor deficits
- pulmonary or vascular compromise.

6.4 Identification of Yellow Flags

Yellow flags include psychosocial, personal or environmental factors, which may be barriers to recovery and that may increase the risk of long-term disability¹⁴⁷. Studies that have examined outcome following rotator cuff syndrome have identified a subgroup of injured workers who continue to experience persistent problems and are unable to RTW^{26, 151}. Prognostic studies which have examined this subgroup report a number of personal, psychosocial and environmental factors that appear to influence severity of symptoms and recovery. Yellow flags identified in the research are presented below in Table 5.

Table 5: Yellow Flags that may Influence Recovery and RTW Following Rotator Cuff Syndrome

Factor	Detail	Study and Level of Evidence
Age	Higher age was found to be related to slower recovery. Age was also found to be a barrier to RTW if over 50 or 60 years of age.	Bonde et al. 2003 (level III-3) ²⁶ ; Keijsers et al. 2010 (level II) ¹⁰⁵ ; Selander et al. 2002 (level IV) ¹⁷⁹ .
Gender	Inconsistent evidence that the risk for disability pension was higher for women with greater than 28 days of sick leave due to neck, shoulder or back pain. Other studies however have not found a gender difference.	Borg et al. 2001 (level II) ²⁷ ; Nove-Jesserand et al. 2011 (level IV) ¹⁵¹ .
Pain intensity	More likely to RTW if have nil or low levels of pain. One study found that Short Form-36 (SF-36 – see 'Outcome Measurement' in section 7.0) bodily pain score was a predictor of one-year work disability.	Keijsers et al. 2010 (level II) ¹⁰⁵ ; Atroshi et al. 2002 (level IV) ¹¹ .
Fear avoidance	Shoulder pain was associated with fear-avoidance beliefs such as 'physical activity should be avoided as it might harm the arm'.	Hoe et al. 2012 (level IV) ⁸⁹
Duration of symptoms	Longer duration of symptoms associated with slow, nil or limited recovery following rotator cuff syndrome. High relative risk for receiving a disability pension if a person has taken prior sick leave (greater than 14 days) in the 3 years prior to injury.	Henn et al. 2008 (level II) ⁸⁷ ; Atroshi et al. 2002 (level IV) ¹¹ ; Keijsers et al. 2010 (level II) ¹⁰⁵ ; Borg et al. 2001 (level II) ²⁷ .
Unemployment	Unemployment at the time of developing rotator cuff syndrome has been found to be a predictor of non-recovery.	Keijsers et al. 2010 (level II) ¹⁰⁵ ; Engebretsen et al. 2010 (level II) ⁵⁹ .
Level of education	People with a higher level of education are more likely to RTW following the development of rotator cuff syndrome.	Engebretsen et al. 2010 (level II) ⁵⁹ ; Selander et al. 2002 (level IV) ¹⁷⁹ ; Henn et al. 2008 (level IV) ⁸⁷ .

Factor	Detail	Study and Level of Evidence
Workers compensation	<p>Inconsistent evidence.</p> <p>A number of studies have identified that workers compensation status can have a negative impact on recovery from rotator cuff syndrome (all studies completed post-surgery).</p> <p>One study identified that when adjustments were made for confounding variables there were limited differences in recovery for those with a workers compensation claim compared to those without a claim following surgery.</p>	<p>Didde et al. 2010 (level III-3)⁵⁰; Henn et al. 2008 (level II)⁸⁷; Koljonen et al. 2009 (level IV)¹⁰⁸.</p> <p>Balyk et al. 2008 (level II)¹³</p>
Health status	Non-recovery more likely if you have poor perceived general health, multiple-region complaints or previous shoulder pain.	<p>Engelbrechtsen et al. 2010 (level II)⁵⁹; Keijsers et al. 2010 (level II)¹⁰⁵; Selander et al. 2002 (level IV)¹⁷⁹.</p>
Perceived level of job demands/ control	Delayed recovery/RTW found to be related to the injured person's perception of work demands and work control.	Bonde et al. 2003 (level III-3) ²⁶
Body mass index (BMI)	A high body mass index predicted non-recovery in patients with specific arm/neck or shoulder diagnosis.	Keijsers et al. 2010 (level II) ¹⁰⁵
Culture	In a single study (Sweden), persons with foreign citizenship had a greater risk for disability pension following the development of musculoskeletal pain. Direct generalisation to the Australian context cannot be made.	Borg et al. 2001 (level II) ²⁷
Poor social support	Increased risk for persistent neck/shoulder and/or lower back disorders for those with family burden and low levels of social support.	<p>Leijon et al. 2007 (level II)¹¹⁷; Keijsers et al. 2010 (level II)¹⁰⁵; Bonde et al. 2003 (level IV)²⁶.</p>

Appreciation of the injured worker's psychosocial and individual response to their condition assists the health care provider to determine whether a more detailed assessment of psycho-social factors or specific interventions are indicated (e.g. adjustment or supportive counselling). The clinician's assessment needs to include a review of the person's affect, their understanding of, and reaction to, their injury, and identification of any coping strategies that the injured worker may or may not be using¹⁰⁷. Psycho-education around shoulder injuries and the course of treatment and recovery are essential to facilitate clear and realistic patient expectations.

Yellow flags include:

- older age (50 + years for RTW)
- higher perceived pain intensity
- longer duration of symptoms
- previous injury
- extensive sick leave taken over the previous three years prior to injury
- unemployment
- co-morbidities, previous shoulder pain or poor perceived general health
- avoidance of activity for fear of pain and harm

- perceived high job demands and low control at work (job satisfaction)
- higher body mass index
- poor social support.

There is inconsistent evidence on the influence of the following yellow flags:

- being female with more than 28 days of sick leave due to pain
- having a workers compensation claim.

RECOMMENDATION 4 Grade: Consensus

The clinician should take note of 'yellow flags' discussed or identified during history-taking. Yellow flags are contextual factors such as personal, psychosocial or environmental factors that could impact on recovery and/or RTW following injury (see Appendix 1).

6.5 Limitations of Imaging in Early Presentations

Recent guidelines have suggested that diagnosis of rotator cuff syndrome can usually be made on the basis of clinical and physical features alone, and that imaging is not necessary unless there are features of serious conditions (red flags)^{36, 125, 169}. Imaging studies should only be considered if they are likely to provide additional clinical information beyond that obtained from the clinical history and physical examination, and which could potentially alter treatment approaches³⁶.

Radiography (plain film X-ray), ultrasound (US) and magnetic resonance imaging (MRI) are imaging procedures that are commonly used in the diagnosis of rotator cuff syndrome. Plain film X-ray is not considered by the research to be useful for soft tissue shoulder disorders such as bursitis, tendonitis, capsulitis, glenoid cartilage tear, myofascial pain syndrome, polymyalgia rheumatica or referred pain³⁶. However, plain film X-ray is used to exclude bone conditions such as fractures and calcium deposits. In comparison US and MRI are better able to image the rotator cuff, the biceps tendon and labral structures.

With increasing use of MRI, there has been a growing awareness of the high prevalence of partial- and full-thickness rotator cuff tears in the general population. In a study completed by Sher et al. (1995)¹⁸³, the prevalence of asymptomatic tears in patients was 54% in those older than 60 years of age, 28% in those between 40 and 60 years of age, and 4% in those younger than 40 years of age. Treatment of injured workers should therefore be primarily based on clinical findings¹³⁴.

When an injured worker continues to experience significant pain and functional limitations after four weeks of active treatment, an MRI may be indicated. MRI will identify signs of chronicity/degenerative change such as fatty infiltration and wasting of infraspinatus. Absence of chronicity/degenerative change suggests acute injury which may prompt early surgical referral.

Clinicians referring for diagnostic imaging should consider the safety and economic implications of individual imaging procedures. Plain film X-rays use low levels of ionising radiation and although controversial, it is important to remember that health hazards of all forms of radiation are cumulative. The Biological Effects of Ionizing Radiation (BEIR VII) 2005 report released by the United States National Academy of Sciences concludes that ionising radiation is dangerous even at low doses and that there are no safe limits³⁶. The potentially serious consequences of radiation should be considered and the injured worker advised of the risks to allow educated and informed consent before radiography is undertaken.

There may be special circumstances in which radiographic and/or imaging studies are indicated. The guidelines are to be used in conjunction with clinical judgment. The circumstances where radiographic imaging may be required include: when an injured worker is unable to give a reliable history; when there is a need for an immediate decision about career or athletic future or legal evaluation; or when there has been a history of significant radiographic abnormalities elsewhere reported³⁶.

RECOMMENDATION 5 Grade: C

X-rays and imaging are not indicated in the first four to six weeks for an injured worker presenting with suspected rotator cuff syndrome in the absence of 'red flags' (see Figure 1).

RECOMMENDATION 6 Grade: Consensus

Clinicians will educate injured workers with suspected rotator cuff syndrome on the limitations of imaging and the risks of ionising radiation exposure.

7.0 Development of a Management Plan

Before initiating a treatment program the clinician should develop a management plan with the injured worker comprising of the elements of assessment, goal-setting, treatment and review. A management plan ensures a patient-centred approach, in which the injured worker becomes an active participant in their treatment, RTW and therefore recovery. A patient-centred approach has been shown to improve patient satisfaction, motivation and adherence to treatments and has the potential to improve health outcomes⁸⁵.

Management plans are designed to enhance a person's knowledge of what to expect and assists their understanding of their role and responsibilities in the recovery process¹². The management plan should then be tailored to the needs of the injured worker, taking their preferences and abilities into account. In this way the management plan can facilitate a person's active participation in their own recovery (refer to principle 3 text box 1). The management plan should also describe actions that the injured worker and clinician may take in the event of an exacerbation or recurrence of pain or slow progress to recovery¹².

The following are essential components for the development of a management plan.

7.1 Treatment Principles

7.1.1 Maintain Activity and Participation in Life Areas

One of the first priorities for the clinician is to provide information and reassurance to the injured worker presenting with rotator cuff syndrome. The natural history of shoulder pain is generally favourable with epidemiological data serving as a basis for assurance that recovery can be expected.

The bio-psychosocial model highlights the link between activity and participation in contributing to an individual's overall health²¹⁶. At the initial presentation, the clinician should encourage the injured worker to resume their usual activities as soon as possible, **within the limits of their pain**¹³⁶. Resuming normal activities is essential for restoring function and avoiding disability¹²⁵. Sick leave is not

only costly for the injured worker and their employer but it also has the potential to produce consequences such as depression and increased anxiety (e.g. fear avoidance), and disruption to career opportunities and social relationships⁶⁴. **For this reason it is important for the clinician to facilitate the injured worker to remain at work where possible.**

In contradiction to the bio-psychosocial informed approach of maintaining activity, rest is often prescribed for injured workers presenting with musculoskeletal pain. This prescription is based on the premise that rest should theoretically reduce further tissue damage by limiting movement and decreasing pain and swelling. A systematic review examining the benefits of rest in adults with acute limb injuries, reported mixed outcomes between prescribed rest and those who remained active. The reported benefits of early activity included: earlier RTW; decreased pain, swelling and stiffness; and a greater preserved joint ROM¹⁴³. Although maintenance of activity appears to be supported by the evidence, the research acknowledges that early activity may not be better in all circumstances and suggest that harm might occur at unrestricted activity. In the case of rotator cuff syndrome it is well demonstrated that activities performed above shoulder height (particularly repetitive work) can influence the development of symptoms. Avoidance of these types of activities is supported in early recovery from rotator cuff syndrome^{35, 68}.

RECOMMENDATION 7 Grade: Consensus

In established rotator cuff syndrome, maintaining activity within the limits of pain and function should be recommended. Its reported benefits include: earlier RTW; decreased pain, swelling and stiffness; and greater preserved joint range of motion.

7.1.2 Shared Decision-making

Shared decision-making is a critical component of patient-centred care⁹⁴ and is defined as a decision-making process jointly shared by patients and their health care providers³⁰. Shared decision-making is advocated because of its potential to improve the

quality of the decision-making process for patients and ultimately, patient outcomes. Shared decision-making programs have been shown to: increase knowledge; produce more realistic expectations, reduced decisional conflict, reduce the number of people who remained undecided and produce greater agreement between values and choice compared to usual care¹⁵².

To facilitate shared decision-making the health care provider needs to establish an environment and approach whereby the injured worker's views about treatment options are valued⁵⁷. In this context injured workers are provided with accurate, unbiased and up-to-date information, including risks and likely outcomes of all treatment options⁵³, and are assisted to understand this information. The process of shared decision-making then involves sharing treatment preferences and making explicit the uncertainty in the clinical decision-making process⁵⁷. Sharing of this information then assists the injured worker to be an active member in goal setting and treatment selection, empowering them to take responsibility in their care and thus enabling a degree of self-management²¹⁷(refer to principle 3 text box 1).

RECOMMENDATION 8 Grade: Consensus

Clinicians should use a shared decision-making process with the injured worker to develop a management plan.

7.1.3 Goal Setting

An essential component within the management plan is the establishment of injured worker goals. Goals will relate to improving or maintaining functioning within one or more domains of health including body function and structure, activity and participation. The process of establishing and articulating goals can take time as it involves discussion with a number of people and obtaining agreement with the injured worker. However, setting goals will positively influence the outcomes. Goals need to be established with the injured worker as early as possible and prior to initiating specific treatments⁴⁵. Patient goals need to be SMART; that is: Specific to what the patient wants to achieve; Measurable; Achievable; Realistic; and set within a Timeframe.

There will be a number of treatment goals which should be developed with active participation from the injured worker (refer to principle 3 and 4 text box 1). The injured worker will have work participation

goal/s; for example, to resume their pre-injury duties and hours safely within three months. It is important that the individual treatment goal/s be known to all team members and be reviewed on a regular basis. All modifications to the treatment goals/plan must be communicated to all team members.

7.1.4 Outcome Measurement

A further critical component of the management plan is measuring the outcomes. The measurement of outcomes facilitates the following processes:

- evaluation of intervention efficacy
- determination of the need for continuation or cessation of treatments
- assist to identify factors that may compromise treatment outcomes or predict poor outcomes.

Taking measures at appropriately frequent intervals is critical to evaluation of any intervention program (refer to principle 1 text box 1). In the case of individuals with rotator cuff syndrome in the workplace, outcomes can be measured at the body structure function level (e.g. pain and ROM) and/or at the activity/participation level (e.g. if the injured worker has been able to return to their previous work role). Within the Australian workers compensation system it is expected that all health care providers use objective outcome measures to measure treatment outcomes, thereby justifying the provision of treatment and the costs. At a minimum, measures of progress should be taken at the initial presentation and the completion of treatment*.

**The Transport Accident Commission, WorkCover, Victoria nominates an appropriate time frame to be every 4–6 weeks.*

RECOMMENDATION 9 Grade: Mandatory

Clinicians should use and document appropriate outcome measures at baseline and at other stages during the recovery process to measure change in the injured worker's impairments, activity limitations and/or participation restrictions.

Outcome Measures for Rotator Cuff Syndrome in the Workplace

When selecting outcome measures, the health care provider needs to identify measures which are appropriate to the injured worker's goals. Developmental, cognitive, emotional, language and cultural factors should be considered when selecting outcome measures¹²⁵. Multiple outcome measures are often required to capture the complexity of the

recovery and individual circumstances¹²⁵. Outcomes need to be measured with respect to all domains of health including body function and structure (e.g. pain, psychological status and range of motion), activities (e.g. self-care tasks) and participation (e.g. routine domestic duties, RTW and leisure activities).

Text Box 2: Psychometric and utility properties of outcome measures

When selecting outcome measures, the clinician needs to consider the following psychometric and utility properties:

- Reliability: Is the test reliable because it can be repeated and the results are consistent?
- Validity: Does the tool measure what it purports to measure and on a relevant population?
- Responsiveness: Is the tool sensitive to patient changes?
- Interpretability: Are the scores meaningful?
- Applicability: Is the measure culturally appropriate and relevant for your patient?
- Feasibility: Is the measurement tool readily available? Do you require training to administer it? What is the tool cost? How long does the tool take to administer? What is the burden on the patient?

Adapted from The Guidelines for the prescription of a seated wheelchair or mobility scooter for people with a traumatic brain injury or spinal cord (2011)⁵⁸.

There are a large number of outcome measures in the literature that have been developed for use with patients with musculoskeletal pain. There are also measures that have been specifically designed for patients with shoulder pain and activity limitation. Examples of some of these outcome measures are listed below (this is not an exhaustive list):

- American Shoulder and Elbow Surgeons Standardized Shoulder Assessment (ASES)
- Constant Murley Score (CMS or Constant Score)
- Disabilities of the Arm, Shoulder and Hand (DASH)
- Fear Avoidance Belief Questionnaire
- Functional Assessment Questionnaire
- Patient-Specific Functional Scale
- Medical Outcome Study Short Form (SF-36)
- Oxford Shoulder Score (OSS)
- Pain Beliefs Perception Inventory
- Pain Catastrophising Scale (PCS)
- Pain Self-Efficacy Questionnaire (PSEQ)
- Rotator Cuff Quality of Life Measure (RC-QOL)
- Shoulder Disability Questionnaire (SDQ)
- Shoulder Pain and Disability Index (SPADI)
- Shoulder Rating Questionnaire – L'insalata (SRQ)
- Simple Shoulder Test (SST)
- UCLA Shoulder Score
- Visual Analogue Scale
- Western Ontario Rotator Cuff Index (WORC).

Freely available outcome measures that may be helpful include the following:

- Disabilities of the Arm, Shoulder and Hand (DASH) <http://www.maa.nsw.gov.au/default.aspx?MenuID=376>
- Patient-Specific Functional Scale <http://www.tac.vic.gov.au/upload/Patient-specific.pdf>
- Shoulder Pain and Disability Index (SPADI) <http://www.tac.vic.gov.au/upload/SPI.pdf>
- Visual Analogue Scale (VAS) <http://www.maa.nsw.gov.au/default.aspx?MenuID=376>

7.1.5 Collaborative Team Approach

The bio-psychosocial framework of health posits that biological, psychological, environmental, social and personal factors all play a role in determining an individual's functioning and health. In recognition of this, a range of health care providers may be needed to assist the injured worker to achieve their goals. Examples of these providers include physiotherapist, occupational therapist, psychologist and GP. Successful management of acute pain requires close liaison between all health care providers involved with the injured worker's treatment, RTW and management plan¹²⁵. The employer, their RTW coordinator (or equivalent) and the injured worker's supervisor are integral to an effective recovery and RTW. This might involve periodic team meetings either face-to-face or by teleconference, and where there are complex issues, more regular team meetings where progress or concerns can be shared and the barriers and facilitators for progress discussed.

7.1.6 Cultural and Language Issues

The delivery of health services most often occurs as an interaction between a health care provider and an injured worker. Therefore, the effectiveness of this communication has direct impacts on the quality of service delivery and individual health outcomes. Within Australia there exists a broad range of culturally and linguistically diverse populations. It is therefore important that health care providers use appropriate and non-offensive language to ensure effective and culturally appropriate communication with patients.

The use of accurate and appropriate language between health care providers and injured workers from culturally and linguistically diverse backgrounds is vital to encourage culturally appropriate work practices and to value the cultural diversity that exists within Australia today.

RECOMMENDATION 10 Grade: Consensus

Health care providers should consider any additional issues, potential disadvantages or need for additional resources (such as an interpreter) for the injured worker and their family if the injured worker identifies as Aboriginal and/or Torres Strait Islander, or is from a culturally and linguistically diverse or non-English speaking background.

There are many useful online resources developed to assist health care providers in their culturally appropriate communications and interactions with injured workers from culturally and linguistically diverse backgrounds. A selection of relevant resources includes the following:

General Resources

- Australian Indigenous Health/*InfoNet*, Cultural Practice Resources, <http://www.healthinonet.ecu.edu.au/cultural-ways-home/resources/practice-resources>
- Queensland Health, Multicultural Health: Resources for Health Workers, http://www.health.qld.gov.au/multicultural/health_workers/support_tools.asp
- Byalawa Project Team, The University of Sydney and James Cook University, 'Byalawa – a learning and teaching resource for working with Indigenous patients and clients', <http://www.byalawa.com/>

Communication

- Cooperative Research Centre for Aboriginal and Tropical Health, 'Sharing the True Stories: Improving Communication in Indigenous Health Care', 2005, <http://www.cdu.edu.au/centres/stts/home.html>
- Centre for Culture, Ethnicity and Health, 'Speaking with Clients who have Low English Proficiency' Tip Sheet, 2011, http://www.ceh.org.au/downloads/CEH_TipSheet1_Mar2011_Web.pdf

Culturally Appropriate Practice

- Centre for Culture, Ethnicity and Health, 'Where Do I Find Information on Cultural Competence in Health' Resource List, 2010, http://www.ceh.org.au/downloads/Cultural_Competence_Tipsheet_2.doc
- Queensland Health, 'Providing Care to Patients from Culturally and Linguistically Diverse Backgrounds: Guidelines to Practice', 1998, http://www.health.qld.gov.au/multicultural/health_workers/guide_pract.asp

8.0 Treatment

There are many commonly employed treatments for rotator cuff syndrome. The guidelines have classified these treatments under two broad categories: non-surgical treatments and surgical treatments. Non-surgical treatments include: medications such as non-steroidal anti-inflammatory drugs (NSAIDs), hot and cold packs, prescribed exercise, manual therapy, acupuncture, electro-physical agents such as transcutaneous electromagnetic stimulation (TENS), subacromial corticosteroid injections and nutritional supplements. Surgical treatments include repair of rotator cuff tears and/or subacromial decompression. Non-surgical treatments are generally non-invasive and have demonstrated efficacy in improving pain and function in 40 to 80% of patients^{5, 16}.

Non-surgical treatments for rotator cuff syndrome are rarely used in isolation and are often prescribed in combination. For this reason it is difficult to research and isolate the impact of each treatment. Therefore, establishing the efficacy of non-surgical treatments for rotator cuff syndrome is challenging⁹⁶. The following sections review the evidence base for individual non-surgical treatment approaches commonly used for rotator cuff syndrome.

8.1 Pain Management

For many people, the cornerstone of treatment for rotator cuff syndrome is achieving pain control to allow them to resume usual activity and participation levels, and to engage in appropriate physiotherapy as required¹⁹². Unrelieved severe pain has adverse psychological and physiological effects and if prolonged can have adverse effects on an individual's health and functioning¹²⁵. Even 'simple' techniques of pain relief can be more effective if attention is given to education, documentation and regular assessment¹²⁵.

The bio-psychosocial model recognises that an individual's perception of pain is influenced by their social environment (work, family, and community and compensation systems) and their thoughts, beliefs, attitudes and emotions²¹⁵. The degree of disability experienced by each individual, in relation to the experience of pain varies; and similarly there is individual variation in response to methods to alleviate pain⁵⁴. For these reasons pain management needs to be tailored to the individual and regularly reviewed.

8.1.1 Medication

Paracetamol

The literature search did not find any studies that specifically examined the effectiveness of oral paracetamol with relation to pain relief following rotator cuff syndrome. However, systematic reviews examining paracetamol efficacy for relief of more general musculoskeletal pain, have consistently recommended this medication as the initial choice for mild to moderate pain relief^{12, 125, 173}.

Adverse Effects: In a Cochrane review¹⁹⁷, the rate of adverse effects from a single dose of paracetamol was found to be comparable to placebo. Paracetamol is widely considered to have fewer side effects than other analgesic medication, for example non-steroidal anti-inflammatory drugs and can be used when the latter are contraindicated (e.g. patients with a history of asthma, renal disease, hypertension or peptic ulcers)¹²⁵. Aspirin has also been found to be an effective analgesic for acute pain, but has not been shown to be more effective than paracetamol in equivalent doses. Paracetamol has an overall safer side-effect profile than aspirin⁵⁵.

Recommendation 11 Grade: C

Injured workers should be prescribed paracetamol as the initial choice for mild to moderate pain.

Oral NSAIDs

The term 'non-steroidal anti-inflammatory drugs' (NSAIDs) encompass both cyclooxygenase selective (Cox-2) and non-selective (Cox-1) inhibitors. NSAIDs have a spectrum of analgesic, anti-inflammatory and antipyretic effects and are effective analgesics in a variety of acute pain states. Direct comparative studies of paracetamol and NSAIDs have shown that NSAIDs are more effective in specific situations (e.g. dental and menstrual pain), but provide equivalent analgesia in others¹⁷³. No direct studies have been identified which compare paracetamol and NSAIDs for pain relief for individuals with rotator cuff syndrome.

Two systematic reviews with low risk of bias^{125, 192} found better results with NSAIDs than with placebo in the treatment of rotator cuff-related symptoms. These findings were based on three trials which compared oral diclofenac and oral naproxen (and both) to a placebo. All three trials found significant improvement in shoulder pain and function with NSAID medication following injury presentation. Authors of the systematic reviews, however, acknowledged the evidence base for the efficacy of NSAIDs in the treatment of rotator cuff syndrome was limited. Limitations included the following: different types/doses of NSAIDs trialled in studies, different outcome measures and different follow-up periods¹⁹². No additional trials (other than those included in the systematic reviews) were identified.

Adverse Effects: There are documented adverse effects associated with NSAIDs such as gastrointestinal symptoms, exacerbation of chronic renal impairment, inhibition of platelet function, skin rash, headache and possible cardiovascular effects^{125, 192}. These side effects are more common with long-term use¹³⁸. Cox-1 and Cox-2 NSAIDs have been associated with similar rates of adverse cardiovascular effects, although gastrointestinal complications have been found to be less likely with Cox-2 drugs¹²⁵.

Topical NSAIDs

Topical NSAIDs are applied to the skin in the form of a cream, gel, patch or spray in the region where pain is experienced. They are typically used for strains or sprains. The attraction of topical application of NSAIDs is that blood concentrations are typically less than 1/20th of those found with oral NSAIDs, minimising the risk of adverse effects¹²⁵.

A Cochrane systematic review with meta-analysis completed by Massey et al. (2010)¹²⁹ examined studies which had compared topical NSAIDs with a similar placebo for acute musculoskeletal pain. Included conditions treated with topical NSAIDs were sprains, strains and contusions, mainly resulting from sports injuries, and overuse injuries such as tendonitis. Authors noted that there may be potential differences in response to treatment between strains and sprains and overuse-type injuries like tendonitis; however, there were too few existing trials to adequately explore any differences¹²⁹. Treatment success in this study was considered to be 50% pain reduction for treatment periods of six to fourteen days. Topical diclofenac, ibuprofen, ketoprofen, and piroxicam were of similar efficacy, but indomethacin

and benzydamine were not significantly more effective than placebo. The review concluded that topical NSAIDs can provide good levels of pain relief, without the systemic adverse events associated with oral NSAIDs, when used to treat acute musculoskeletal conditions¹²⁹. There was insufficient data to reliably compare individual topical NSAIDs with each other or the same oral NSAID.

Adverse Effects: Reported adverse effects have included local skin reactions which were generally mild and transient, and did not differ from placebo. There were very few systemic adverse events compared to oral NSAIDs¹²⁹.

RECOMMENDATION 12 Grade: B

Injured workers with acute shoulder pain may be prescribed NSAIDs (either oral or topical) for pain relief. NSAIDs may be prescribed alone or in conjunction with paracetamol.

Oral Opioids

A systematic review¹⁹² found that there was no direct information about the effects of opioid analgesics in people with shoulder pain. Research studies examining severe musculoskeletal pain have recommended oral opioids (preferably short-acting agents at regular intervals). If these medications are to be used then the initial management plan must include the expected response and specific timeframe for the use of opiates with early and regular reassessment¹²⁵.

A range of patient fact sheets on the safe use and possible side effects of analgesic medications are available from the Australian Rheumatology Association including:

Patient Information on Paracetamol:

<http://www.rheumatology.org.au/downloads/paracetamol230811.pdf>

Patient Information on non-steroidal anti-inflammatory drugs (NSAIDs):

http://www.rheumatology.org.au/downloads/NSAIDS230811_002.pdf

8.1.2 Heat/Ice

Cold Therapy

Ice is commonly used in clinical practice in the treatment of acute soft tissue injuries. Superficial cold induces vasoconstriction and reduces local blood flow leading to decreased tissue swelling, inflammation and pain severity⁶¹. No systematic reviews or research studies were identified which had examined ice in the treatment of rotator cuff syndrome. A systematic review completed by MacAuley (2001)¹²³ reported that the optimal method of ice application is wet ice applied directly to the skin through a wet towel.

As with other researchers, MacAuley (2001)¹²³ concluded that there is no evidence from the literature suggesting an optimal frequency of application, duration of treatment or the length for a program although consensus appears to be that repeated applications of 10 minutes duration are effective^{25, 123}.

Ice taken from the domestic freezer may be below freezing point and if applied directly to the skin may cause tissue damage and frostbite. Reflex activity and motor function are also thought to be impaired following icing, so patients may be more susceptible to injury for up to 30 minutes following treatment¹²³.

RECOMMENDATION 13 Grade: Consensus

To reduce pain and swelling following acute rotator cuff syndrome, injured workers may intermittently apply cold within the first 48 hours.

Heat

The use of hot packs for musculoskeletal pain is commonly reported in the literature. There were no clinical trials identified which examined the single treatment of thermal therapy for rotator cuff syndrome or shoulder pain (a few trials have used heat in combination with prescribed exercise). However, it is well established that locally applied heat (e.g. hot packs) causes vasodilation, an increase in oxygen supply and increased metabolism. The increased blood flow to an injured area may help remove cellular debris increase nutrient delivery and hence tissue repair. Heat may also increase pain threshold, relieve muscle spasm and decrease muscle spindle activity and sensitivity to stretch¹²³.

RECOMMENDATION 14 Grade: Consensus

From 48 hours post-injury, injured workers may intermittently apply either heat or cold for short periods for pain relief.

8.2 Return to Work Program

Injury (health condition) and impairments of body function and structure are not the only factors involved in determining the RTW outcome. The context of a RTW intervention significantly affects the progress and the RTW outcome for an injured worker and their employer. The context refers to both the workplace and personal factors and which are related to all the stakeholders involved (injured worker, employer, health care professionals, workers compensation insurer, work colleagues, family and friends). There are contextual factors that may act as a barrier or a facilitator to an RTW program. For example, an employer who has supportive and well-organised RTW systems at the workplace will be a facilitator. A barrier is a negative attitude of the health care professional or the employer towards the injured worker.

The environmental factors that can be barriers or facilitators include:

- services and systems policies: at the workplace, health services, workers compensation
- support and relationships: co-workers, people in positions of authority, health professionals, family and friends
- attitudes: those people listed above in 'support and relationships'
- products and technology: for communication, or at the workplace (including workplace accommodations)
- natural and the built environment: includes a broad range of issues such as physical geography, the climate, or the workplace building and structures that may influence the RTW intervention.

The personal factors may include:

- personality and coping style of any and all of the stakeholders
- injured workers pre-injury medical history
- education, understanding and skill of the health professionals and the key personnel involved at the workplace
- attitude of injured worker
- education and understanding of the injured worker
- cultural issues
- the evidence confirms best practice system standards for some of the contextual factors in RTW programs.

The research evidence for RTW programs are synthesised in Tables 6 and 7.

Table 6: Best Practice Standards for Return to Work Approach

Standard	Detail	Level of Evidence
A team approach (multidisciplinary/ multimodal rehabilitation)	A combined physical, psychosocial and organisational approach to prevention has been shown to decrease the risk of disability pension/duration.	Kuoppala & Lamminpaa 2008 (level I) ¹¹² ; Westman et al. 2006 (level IV) ²¹⁰ .
Patient-centred, patient involved	Patients who were able to influence their own rehabilitation processes were more likely to RTW.	Arnetz et al. 2003 (level III-I) ¹⁰ ; Feuerstein et al. 2003 (level II) ⁶⁷ ; Shaw et al. 2008 (level IV) ¹⁸² .
Provision of income support	Loss of income affects the injured worker and their dependants. Concerns regarding loss of income following injury will result in additional stress and likely complicate injury recovery. Income support should be provided under workers compensation for work-related injuries.	Hogelund et al. 2010 (level III-3) ⁹⁰
Workplace-based	Involving patients in suitable and meaningful tasks at the workplace is central to the work rehabilitation process and is more effective in facilitating RTW of the injured worker than usual care.**	Cheng et al. 2007 (level II) ⁴¹ ; Franche et al. 2005 (Level I) ⁶⁹ .
Role of supervisor	The process by which supervisors implement RTW interventions is considered a determining factor of optimal RTW trajectories and can be enhanced through management-supported training programs.	Nordqvist et al. 2003-qualitative study ¹⁴⁹ ; Shaw et al. 2008 (level IV) ¹⁸² .
Employer policies and systems	Attitude of the employer towards injured workers and the policies of the company. Standardisation, systematisation and formalisation of RTW processes have been found to facilitate communication and decrease misinformation among stakeholder groups.	Shaw et al. 2008 (level IV) ¹⁸²

***Usual care – includes monitoring of the claims process and monitoring of the medical treatment or outpatient treatment or GP monitoring only.*

The best practice standard for a RTW is that it is patient-centred and occurs at work with a team approach. RTW programs are more likely to succeed when supported by the injured worker's supervisor and employer and when they are workplace-based^{182 41, 69}. In the first instance, the RTW goal should be for the person injured to RTW in the same workplace and working in their pre-injury job. If this is not possible then the RTW hierarchy should be applied (refer to Figure 3). It is recognised that there will be a subset of workers with rotator cuff syndrome that will be unable to return to their previous job.

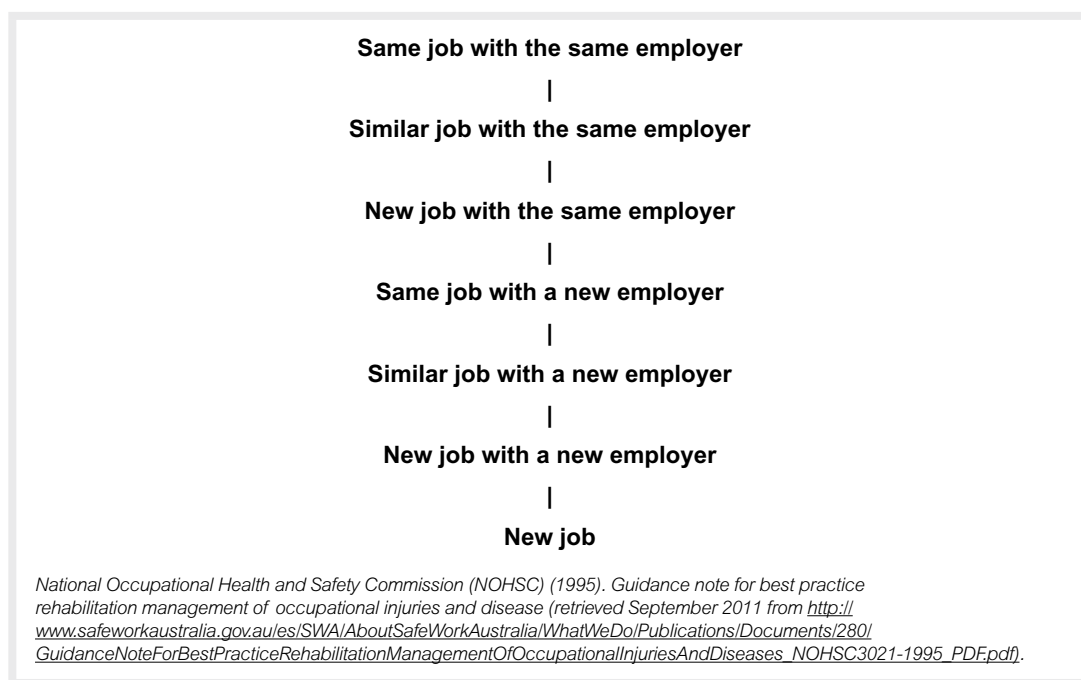


Figure 3: Return to Work Hierarchy

The RTW program is therapeutic if carefully planned and upgraded. Time is wasted in a RTW program when best practice standards are not met. The outcomes are more likely to be negative for all stakeholders including the injured worker and employers. A 'time-waster' RTW program refers to a program where the injured worker is placed on an RTW program to 'pass the time' until the situation is resolved positively or negatively, or where the goals are not established early and so time is wasted with performance of inappropriate and unhelpful duties⁴⁵.

Example of a poorly developed, time-waster, RTW program:

David is an electricity meter reader. He has worked for the electricity company for 10 years. He injures his shoulder at work while lifting the cover of domestic electricity meter boxes to read the meter. David sees his doctor and he is referred to physiotherapy for an exercise program and manual therapy. His doctor and physiotherapist both think there might be a rotator cuff tear. David continues with physiotherapy for six weeks but he does not return to work as his doctor wants to wait until he has an MRI scan. The diagnosis of partial-thickness rotator cuff tear of his dominant right arm is confirmed. His doctor says his injury will resolve and he will be able to return to his pre-injury duties as a meter reader, with changes to his work method and some equipment, although it will take up to one year for full recovery.

David becomes bored during the initial six weeks. He tends to sit around at home and has put on weight since the injury. When at work he is usually quite active walking from property to property to read the meters, and inspect meters and connections for defects, damage or irregularities. At the end of the day he returns the meter readings to accounts for processing. He likes his work, the solitude of being outside most of the day, but enjoys the contact with his co-workers at the beginning and end of each shift. He occasionally has a brief talk with the customers if they are home when he visits. David also works in the meter reader job because he starts and finishes his work day early. It means he can pick up his seven-year-old son from school as there is no school bus close to his home.

After eight weeks, David is certified fit for suitable duties for three days per week. He goes to his supervisor who says he has to go and see someone else. After one week of delays, David is told he can return to work and that he will be in administration. When he arrives at work he is told his duties will be answering telephone enquiries in the customer service and complaints section on the afternoon shift. He is placed on these duties for two months before he will be reviewed again.

Note: In this example time has been wasted immediately after the injury waiting for the MRI. It would have been appropriate for David to have remained at work performing suitable duties including the period while he waited for the MRI results. David was not involved in identifying suitable alternative duties. The RTW duties in customer service and complaints has different personal and psycho-social demands on David compared to his usual duties. Working on the afternoon shift also means he cannot continue to meet his family obligations to pick up his son. David had identified that there might be suitable duties in the accounts section processing accounts. He was familiar with accounts processes, knew some of the people who worked there and he could have worked a morning shift.

Some of the factors in this example which impact on recovery:

- **Yellow flags:** promoted by inappropriate suitable duties which he was required to perform for a protracted period of time (see section 6.4), such as a perceived higher level of job demands and feelings of a loss of control at the workplace.
- **Environmental barriers:** health care provider's attitude and approach to time off work, employer's approach, and management which did not proactively engage the injured worker.
- **Personal factors:** David's personality and coping style. Possible development of psychological symptoms due to weight gain and feelings of helplessness.

The research evidence demonstrates standards for the key elements of workplace-based RTW interventions. The evidence is summarised in Table 7. Where there was no evidence located, the working party reached a consensus on the best practice standards.

Table 7: Return To Work Intervention Best Practice Standards

Standard	Detail	Level of Evidence
Contact between the health care provider and the workplace	Contact between these stakeholders significantly reduced work disability duration for workers with musculoskeletal conditions.	Franché et al. 2005 (level I) ⁶⁹
Early contact with the injured worker	The goal of early contact is to return the individual to meaningful work as soon as possible ⁴⁵ . There is moderate evidence that early contact can reduce disability duration for those with musculoskeletal conditions.	Franché et al. 2005 (level I) ⁶⁹ ; Arnetz et al. 2003 (level III-I) ¹⁰ ; Westman et al. 2006 (level IV) ²¹⁰ ; Shaw et al. 2008 (level IV) ¹⁸² .
Workplace assessment	There is moderate evidence that ergonomic assessment of the workplace can reduce disability duration/ sickness absence for those with musculoskeletal conditions/upper extremity disorders.	Franché et al. 2005 (level I) ⁶⁹ ; Martimo et al. 2010 (level II) ¹²⁸ ; Shiri et al. 2011 (level II); Shaw et al. 2008 (level IV) ¹⁸² .
Job analysis	Matching worker capabilities [#] , diagnosis and prognosis with work tasks, work demands, workplace systems, the environment and people.	Expert opinion Ergonomics
RTW goal and timeframes are established early	A specific, measurable, realistic RTW goal with timeframes to which the worker, treating practitioners and employer have agreed should be developed with consideration of the RTW hierarchy [*] . It may involve time-specified short-term goals which logically and practically build towards the patient's capacity for the longer term goal.	Expert opinion WorkCover requirement
Graded RTW	Participation in a graded RTW program significantly increased the probability of sick-listed workers returning to regular working hours. Work can be graded in the following ways: task exposure, task intensity, time/hours, task order, work pacing, work hours and work organisation (e.g. shifts and cycles of work).	Hogelund et al. 2010 (level III-3) ⁹⁰
Duties are 'value added'+	Duties that are productive and purposeful will be perceived by the injured worker and the workplace as positive. A positive attitude towards the RTW intervention and the injured worker's progress is a facilitator to an RTW program.	Expert opinion Sager & James (2005) ¹⁷⁴
Coordination through case management/ RTW coordinator	Case managers can facilitate RTW by striking a balance between the employer's focus on work productivity and health care providers' focus on protecting their patients. There is moderate evidence that case management with active stakeholder involvement reduces disability duration for those with musculoskeletal disability.	Franché et al. 2005 (level I) ⁶⁹ ; van Oostrom et al. 2009 (level I) ²⁰³ ; Feuerstein et al. 2003 (level II) ⁶⁷ ; Arnetz et al. 2003 (level III-3) ¹⁰ .
Workplace accommodations	There is moderate evidence to support that workplace accommodations reduce sickness absence among workers with musculoskeletal disorders. Accommodation can include: suitable duties, modified work, task re-design, task modification and ergonomic modifications.	Franché et al. 2005 (level I) ⁶⁹ ; van Oostrom et al. 2009 (level I) ²⁰³ ; Martimo et al. 2010 (level II) ¹²⁸ ; Shiri et al. 2011 (level II) ¹⁸⁵ ; Shaw et al. 2008 (level IV) ¹⁸² .
Outcomes measured, intervention progress monitored and intervention reviewed		See goal-setting literature.
Education and training	Mixed findings – one study found educational interventions had a negative effect on pain-related disability, and another found that educational interventions decreased perceived pain for participants.	Grooten et al. 2007 (level III-2) ⁸¹ ; Landstad et al. 2001 (level III-2) ¹¹⁵ .
Physical conditioning	A high-dose medical exercise group significantly reduced costs for sick leave in patients with longstanding shoulder impingement syndrome. Cleaners with chronic neck/shoulder pain were more frequently non-chronic after physical coordination training	Osteras et al. 2008 (level II) ¹⁵⁴ Jorgensen et al. 2011 (level II) ¹⁰²

Standard	Detail	Level of Evidence
Psychological Treatment	Mixed findings – one study found an early activation program (cognitive program) for patients with chronic shoulder complaints was not cost-effective while another intervention program, which included cognitive components, found participants reporting lower pain intensity at follow-up.	De Bruijn 2007 (level II) ⁴⁹ ; Landstad et al. 2001 (level III-2) ¹¹⁵ ;
Communication	Providing information to the key stakeholders on their role, responsibility, expectations, legislation, costs (as appropriate) and the details of the program ensures commitment and cooperation (SL). Improved communication led to greater patient satisfaction with the RTW process for patients with WRUED*.	Feuerstein et al. 2003 (level II) ⁶⁷ ; Shaw et al. 2008 (level IV) ¹⁸² .

Capabilities describes the individual's abilities to execute a task or action at a given time, in a standardised environment.

^ Return to work hierarchy – refer to Figure 3

+ The duties performed are considered by the worker and the employer to add value, be productive and contribute to the purposes of the workplace.

* Work-related upper extremity disorder.

The following recommendations have been developed from a synthesis of the research evidence detailed in Tables 6 and 7 above.

RECOMMENDATIONS 15 Grade: C

There must be early contact between the injured worker, workplace and health care provider.

RECOMMENDATION 16 Grade: Consensus

A specific and realistic goal for the RTW of the injured worker, with appropriate time frames, should be established early with outcomes measured and progress monitored.

RECOMMENDATION 17 Grade: B

The RTW program must involve consultation and engagement with a team which includes: the injured worker, relevant health care providers and the workplace.

RECOMMENDATION 18 Grade: B

The RTW program should include a workplace assessment and job analysis matching worker capabilities and possible workplace accommodations.

RECOMMENDATION 19 Grade: C

The RTW program, where possible, should be workplace-based. Improved outcomes occur if rehabilitation processes take place within the workplace.

RECOMMENDATION 20 Grade: Consensus

When planning a RTW program, a graded RTW should be considered and adjusted following review of objectively measured outcomes.

8.3 Prescribed Exercise

Prescribed exercise, with or without analgesic medication, is consistently recommended as the preferred initial treatment for rotator cuff syndrome. Prescribed exercises aim to improve range of movement and muscle function by restoring shoulder mobility and stability⁷⁸. Prescribed exercise protocols prioritise the restoration of scapular control and 'normal' muscle activity patterns and focus on strengthening of shoulder muscles¹⁰⁴. Exercises typically include: range of motion, stretching and flexibility, and strengthening techniques such as eccentric strength training and progressive resistance training^{106, 110, 111}. Exercise programs can be prescribed by many different health care providers including the following: chiropractors, exercise physiologists, medical practitioners, osteopaths and physiotherapists. The majority of research examining the efficacy of prescribed exercise for rotator cuff syndrome has examined physiotherapist-prescribed programs.

Nine systematic reviews have examined the efficacy of prescribed exercises for the treatment of rotator cuff syndrome. Significant heterogeneity of studies was acknowledged in all of the nine reviews with only two reviews completing a meta-analysis of study results. All nine reviews concluded that there was evidence that exercise programs were effective in reducing pain and increasing function for persons with rotator cuff syndrome. All reviews, however, stated that the evidence-base was weak and recognised that their conclusions were limited by the following factors: considerable clinical heterogeneity regarding study populations; interventions and outcome measures; limited numbers of good-quality studies (with many studies lacking an appropriate

placebo control); and missing or incomplete data within studies which made it difficult to pool study results or to confidently calculate an effect size for this treatment¹¹⁰. All review authors identified that more good quality research is needed before any strong conclusions regarding the efficacy of prescribed exercise for rotator cuff syndrome can be made.

An additional seven studies were found in our literature search. Three of these studies were randomised controlled trials^{9, 17, 221} (RCTs), one used single case design²⁰ and two were case series^{118, 207}. Six of the seven studies reported a significant improvement in pain and/or function for participants with rotator cuff syndrome following completion of a prescribed exercise program. A single RCT, with low levels of bias, found no additional benefit of a prescribed exercise and manual therapy program when compared to a placebo. This study did, however, note differences at follow-up (22 weeks) leading authors to suggest that benefits with active treatment take longer to manifest. All studies used different exercise protocols over different durations. Duration of programs ranged from four weeks to six months with the majority of programs prescribing daily exercises to be performed at home.

The research reports differences in prescribed exercise programs and the level of supervision required for those with rotator cuff syndrome. Three studies compared a physiotherapy- supervised program with a standardised home-based exercise program. In two of the studies participants were initially instructed on how to perform the standardised exercises (and were provided with a written information sheet), and in the third the standardised home program was supervised and adapted once a week by a physiotherapist. In all three studies, no difference in outcomes was found between the individualised physiotherapy sessions and the standardised exercise groups. However, the instructions for physiotherapy sessions in two of the studies were quite similar to the standardised exercise protocol and therefore similar results would be expected.

Although current evidence appears to indicate that similar outcomes can be obtained from an individualised, physiotherapy-prescribed exercise program and a standardised home-based exercise program, there is a consensus of expert clinical opinion supporting a minimum level of supervision required for exercise program efficacy. Supervision is acutely important at the inception of a program, to

insure that exercises are being performed correctly. Supervision is also often required intermittently over the duration of the program to upgrade exercises and to provide reassurance, ongoing support and monitoring of progress. These can assist to stimulate and maintain the injured worker's motivation, particularly in the light of the long-term nature of rotator cuff syndrome recovery. Future research needs to include more concise description of exercise protocols including type of exercise, frequency, duration, and intensity and amount of supervision so that programs can be replicated in clinical practice¹²⁷.

Adverse Effects: Recent literature has confirmed that there is no evidence of adverse effects for prescribed exercise programs and rotator cuff syndrome⁶.

RECOMMENDATION 21 Grade: B

Injured workers should be initially treated with exercise prescribed and reviewed by a suitably qualified health care provider. There is no evidence of adverse impacts for prescribed exercise programs for patients with rotator cuff syndrome.

8.4 Manual Therapy

The guidelines define manual therapy as an approach which uses skilled and specific hands-on techniques including manipulation and mobilisation but excludes massage-only techniques, and which is used by suitably qualified health care providers such as physiotherapists, chiropractors and osteopaths. The hands-on technique of manipulation uses controlled force, leverage, direction, amplitude and velocity directed at specific anatomical joints or regions. In comparison, mobilisations are slow passive hands-on movements, which aim to produce a slide or glide. Mobilisations may be completed with a 'hold' or stretch to produce a desirable amount of deformation of the targeted joint connective tissues, and a relative displacement of the bones at either end of the joint¹⁶¹.

Four systematic reviews have concluded that the combination of manual therapy and prescribed exercises, results in additional benefit with regards to pain reduction and increased function for people with rotator cuff syndrome^{78, 111, 136} and more general shoulder pain²⁰⁶. Two further systematic reviews in which a broader range of studies (e.g. single case designs, case series and case reports)

found that manual therapy alone or in combination with prescribed exercise produced significant decreases in pain and increases in function for those with shoulder pain¹⁶¹ or for rotator cuff syndrome specifically²⁹.

RECOMMENDATION 22 Grade: B

Manual therapy may be combined with prescribed exercise by a suitably qualified health care provider*, for additional benefit for patients with rotator cuff syndrome.

**Under the NSW workers compensation system, health care providers who are eligible to be paid for this treatment are physiotherapists, chiropractors and osteopaths. These treatment providers are trained in the prescription and modification of exercises consistent with pathology.*

8.5 Acupuncture

Acupuncture is traditionally defined as the practice of inserting needles into the body at specific points to reduce pain or induce anaesthesia. No particular acupuncture procedure has been found to be more effective than another and the mode of action is not completely understood²¹⁴.

Two important distinctions between Western medical acupuncture and Chinese acupuncture are that Western medical acupuncture does not involve the traditional concepts of Yin and Yang and the circulation of Qi, and it is not considered an alternative medical system but rather an adjunct intervention. A number of variations of Western medical acupuncture are practised including²¹¹:

- minimal needling of a restricted number of points
- identification of acupuncture treatment areas
- subcutaneous needling over muscle trigger points
- matching of points to neurophysiological concepts.

The vast majority of clinical trials (published in English) examining acupuncture have explored the efficacy of Western medical acupuncture. This is a therapeutic modality involving the insertion of fine needles and is an adaptation of Chinese acupuncture using current knowledge of anatomy, physiology and pathology and the principles of evidence-based medicine²¹¹. Western medical acupuncture is practised by medical practitioners, physiotherapists, nurses and other health care providers.

The current evidence base for western medical acupuncture consists of a Cochrane systematic review⁷⁷ and three level II studies with low- moderate risk of bias. The systematic review, published in

2008 (literature examined up to 2005) examined the efficacy of acupuncture for the treatment of shoulder pain and concluded that, at this time there, was limited evidence to support or refute its efficacy. The three level II studies^{100, 101, 205} published following this review provide evidence that acupuncture and supervised exercise can together result in significant pain reduction and increased function for patients with rotator cuff syndrome.

A single RCT with a low level of bias and a larger sample size provided evidence that a course of 15 Chinese acupuncture sessions over six weeks resulted in significantly greater pain reduction than conventional conservative treatment for patients with shoulder pain¹³⁷.

RECOMMENDATION 23 Grade: C

Clinicians may consider acupuncture in conjunction with exercise; both modalities should be provided by suitably qualified health care providers.

8.6 Electro-physical Agents

Electro-physical agents are used by some health care providers as part of a multi-modal treatment program for rotator cuff syndrome. Electro-physical modalities include: transcutaneous electromagnetic stimulation (TENS); bipolar interferential current; pulsed electromagnetic field therapy (PEMF); low level laser therapy (LLLT); and therapeutic ultrasound. These therapeutic modalities are rarely used in isolation and are most commonly used in combination with supervised exercises and/or manual therapy.

Evidence for the efficacy of the majority of electro-physical agents used in the treatment of rotator cuff syndrome is conflicting. Most studies in this area are limited by small sample sizes, study populations with mixed aetiologies, the multimodal nature of the treatments (i.e. often used in combination with other treatments), and substantial differences in the dosages of agents. Questions have also been raised as to whether the dosages trialled in some studies are of an adequate therapeutic level to demonstrate efficacy. A brief description of individual electro-physical agents is provided below. Included with this description is a summary of the current evidence for their efficacy in the treatment of rotator cuff syndrome.

8.6.1 Transcutaneous Electromagnetic Stimulation (TENS)

TENS uses electrical transmission/current to decrease pain. Electrodes are applied to an affected area and when turned on a tingling sensation is felt in the underlying skin and muscle. The mechanism of action is not completely understood. It is thought that the electrical impulses precipitate a release of endorphins in specific areas of the central nervous system⁸⁸. These peptides may disrupt pain signals, resulting in a decreased perception of pain. There is currently conflicting evidence about the efficacy of TENS as a treatment modality for rotator cuff syndrome. In two RCTs, of sound methodological quality, the use of TENS was found to decrease pain scores for patients with rotator cuff tendonitis/shoulder pain at one, four and twelve weeks^{63, 109}. In both studies however the comparator was also found to be effective and there was no placebo/control group. In a single RCT, TENS treatment was found to be as effective as hot packs in decreasing pain scores immediately after treatment¹⁵.

8.6.2 Bipolar Interferential Current

Interferential treatments use a mid-frequency electrical signal to treat muscular spasms and strains. It is believed that the electrical signals stimulate endorphin release. Interferential treatments are used in a variety of musculoskeletal conditions. In a systematic review in 2010, two studies were located examining interferential efficacy for shoulder pain. In meta-analysis, interferential treatments were no better than other conventional interventions such as exercise and hot packs at decreasing pain intensity at discharge⁷¹.

8.6.3 Pulsed Electromagnetic Field Therapy (PEMF)

PEMF uses electrical energy to direct a series of magnetic pulses through injured tissues. It is thought that these pulses improve vascularisation and stimulate cellular repair⁷⁸. Only a single study was identified which examined the efficacy of PEMF for the treatment of rotator cuff syndrome². The results from this study indicated that PEMF was not more effective than a placebo for improving pain and function for those with rotator cuff syndrome. In an earlier systematic review it was also noted that PEMF resulted in more post-treatment pain than the placebo, but was not associated with increased adverse effects in the longer term⁷⁸.

8.6.4 Low Level Laser Therapy (LLLT)

Low level laser therapy (LLLT) is a relatively new therapeutic modality and is not commonly used for the treatment of rotator cuff syndrome in Australia. Laser therapy is the amplification of light by stimulated emission of radiation. Theoretically, laser energy is transmitted to induce cell proliferation¹³². In studies that have examined LLLT, the average intensity and duration of treatment programs appears to be 20–30 minutes of LLLT five times a week for two to three weeks.

There is conflicting evidence with regards to the efficacy of LLLT in the treatment of rotator cuff syndrome. Some of this may be due to the differences in dosage parameters used within trials. Researchers have reported limited effects of LLLT to a specified set of wavelengths of laser. There may be a dose relationship where higher doses produce greater clinical changes^{23, 175}. One systematic review found that LLLT did not appear to provide additional benefit when combined with prescribed exercises, although it may be effective in reducing pain for those patients unable to perform prescribed exercise¹³².

The evidence for the efficacy of the electro-physical agents is limited and marred by studies with conflicting results. For this reason no clinical recommendations for any of the electro-physical modalities outlined above were made for the guidelines. Further clinical trials involving the use of electro-physical agents within multimodal therapy programs are needed for evidence-based recommendations to be developed.

8.6.5 Therapeutic Ultrasound

Therapeutic ultrasound (US) uses a method of stimulating the tissue beneath the skin's surface via very high frequency sound waves, between 800,000 Hz and 2,000,000 Hz. Ultrasound is used as a physiotherapy treatment for its physiological effects which include augmentation of blood flow, increased capillary permeability and tissue metabolism, enhancement of tissue extensibility, elevation of pain threshold and alteration of neuromuscular activity leading to muscle relaxation⁵². Current studies suggest that therapeutic ultrasound has a minimum effective dosage greater than 1W/cm², which should be applied continuously^{38, 175}.

One systematic review was identified¹¹⁰ and two RCTs with moderate risk of bias^{38, 113} and adequate US dosage (greater than 1W/cm², continuous) which provide evidence that therapeutic US delivers no

additional efficacy for pain reduction or increased function than exercise alone in the treatment of rotator cuff syndrome.

Three further RCTs (ranging from moderate to high quality) support the finding that US offers no additional efficacy for pain reduction than exercise alone^{1, 76, 176}. However, the US dosage within these studies is either not clearly specified or is potentially inadequate (too low intensity and/or inadequate frequency).

A single RCT provides evidence for the efficacy of US for the treatment of rotator cuff syndrome when used in isolation¹⁷⁵. In this study, US was provided five times a week for two weeks with no additional therapies. Patients demonstrated significant pain reduction and increase in function (short-term). However, US was not as effective as the comparator – high level laser therapy.

RECOMMENDATION 24 Grade: C

The evidence suggests that therapeutic ultrasound does not enhance outcomes compared to exercise alone. The health care provider should refrain from using ultrasound for either pain reduction and/or increased function for injured workers with subacromial impingement syndrome (SAIS).

Although evidence for the efficacy of therapeutic ultrasound and PEMF in the treatment of shoulder impingement syndrome is lacking, there does appear to be limited evidence which suggests that these modalities may be effective in the treatment of calcific tendonitis. In a Cochrane systematic review⁷⁸ both modalities resulted in significant improvement compared to placebo in pain in calcific tendonitis.

8.7 Calcific Tendonitis

Calcific tendonitis of the shoulder is an acute or chronically painful condition that is caused by inflammation around calcium deposits located in or around the rotator cuff tendons. The cause of calcium deposition in the rotator cuff is unknown⁹⁷.

Calcific tendonitis is usually found in individuals between 30 to 50 years of age¹⁹⁹. It usually has an abrupt onset and can severely limit activity even though it is not necessarily activity-dependent. Subacromial calcific bursitis may complicate a pre-existing calcific tendonitis leading to further acute pain. It is believed that the condition only becomes

acutely painful when the calcium is undergoing resorption¹⁹⁹.

Non-surgical management of calcific tendonitis and bursitis is generally the treatment of choice and is reported to be successful in up to 90% of patients⁹⁷. Treatment usually consists of NSAID with/without gentle exercises to help maintain range of motion. Calcific tendonitis is also occasionally treated with corticosteroid injections, needling under anaesthetic (performed by a radiologist), therapeutic ultrasound or PEMF.

When non-surgical measures fail and pain continues to significantly restrict routine activities, needle aspiration, surgical removal or extracorporeal shockwave therapy (ESWT) may be indicated. Over the last decade, several studies indicate the use of extracorporeal shockwave therapy can successfully treat chronic calcific tendonitis^{65, 96}. Most of the shock wave therapy studies originate in Europe where there is widespread use of this technique. In Australia, the technology is only available in a limited number of sports medicine clinics. ESWT is also used for other conditions such as heel pain.

EWST produces pressure waves which are believed to induce fragmentation of calcium deposits and stimulate their re-absorption⁴⁸. The low energy form of these waves is believed to relieve pain while high-energy waves have been found to increase regional blood flow, produce capillary lesions and growth of new capillaries³⁹. This treatment of calcific tendonitis can be painful, and usually requires local anaesthesia in order for it to be tolerated by the patient. Contraindications for this therapy include pregnancy, cardiac pacemakers or anticoagulant medications¹⁴.

Surgery is indicated for injured workers who have constant pain that interferes with activities of daily living, and who fail to improve following non-surgical treatment. Surgical excision of the lesions can be completed as either an open procedure or arthroscopically (keyhole surgery).

8.8 Emerging Treatments

Plasma injections were not initially included as a treatment modality that the current guidelines would consider. Platelet-rich plasma injections have, however, recently received significant attention as a new treatment modality for orthopaedic injuries. Only a brief description of this modality is provided.

Platelets participate in the body's natural response to injury and once activated by mediators at the site of injury, the platelets undergo degranulation and release bioactive proteins or growth factors that aid in wound-healing. There is currently a growing debate regarding the clinical efficacy of plasma injections with several uncontrolled studies showing benefit for a variety of indications²¹. The current literature is complicated by a lack of standardisation of study protocols, platelet-separation techniques and outcome measures. As a result, there is uncertainty about the evidence to support the increasing clinical use of platelet-rich plasma as a treatment modality for orthopaedic bone and soft-tissue injuries¹⁸⁴. Further research is required in order to support or refute the efficacy of this treatment.

Radiofrequency-based plasma microtenotomy (microdebridement) of the supraspinatus tendon and stem cell therapy are also emerging treatments for rotator cuff syndrome. Both treatments require further clinical trials to support or refute their efficacy.

8.9 Supplements

Two supplements readily used for arthritic joint pain include glucosamine and omega-3 fatty acids. Oral glucosamine has been widely studied for its use in alleviating pain and disability for persons with mild to moderate osteoarthritis of the knee and its efficacy has been inconsistently supported^{198, 222}. Inconsistency in the evidence base is related to variation between brands and differences in reported effect sizes. A more substantial body of evidence supports the use of omega-3 fatty acids as an adjunct to treatment for rheumatoid arthritis with efficacy in both pain relief and reducing disability. No consistent evidence was found for the efficacy of these two supplements in the treatment of rotator cuff syndrome specifically or for more generalised shoulder pain.

Nutritional supplements, while generally safer than pharmaceuticals can have adverse side effects and may interact with some prescribed medications¹⁵⁹. It is important for health care providers to enquire and record any supplements that an injured worker may be using to manage their injury.

9.0 Review

An essential component of the management plan for a worker with rotator cuff syndrome is regular medical review. An early review is particularly important when an injured worker reports intense pain and distress at the initial presentation. An early review demonstrates concern to achieve early progress and allows for further explanation and reassurance to the injured worker if required¹². Unrelieved pain may develop into persistent or chronic pain over time. It is therefore important that adequate pain control is established early within the management plan. Uncontrolled or unexpected pain requires a review of the initial diagnosis and consideration of alternative causes for the pain (e.g. new surgical/medical diagnosis, neuropathic pain)¹²⁵.

As the management of rotator cuff syndrome rarely involves a single treatment approach, ongoing regular reviews are important. At follow-up reviews there needs to be discussion about whether there is progress and measurable outcomes from the treatments, or whether adjustment or amendments to the management plan are required to address any further questions or concerns from the injured worker. Reviews also provide an opportunity to reassess for the presence or early development of serious conditions (red flags) and/or psychosocial factors (yellow flags) that may not have been evident on earlier visits¹²⁵. Often yellow flags will only become more evident over the course of time. Proactive changes can be made to the management plan and actions taken to resolve the issues early¹².

RECOMMENDATION 25 Grade: Consensus

Injured workers with suspected rotator cuff syndrome should be reviewed by their clinician within two weeks of initial consultation, with the proviso that the injured worker can contact their clinician earlier if they have had no response to their prescribed treatment, or if they have experienced treatment side effects.

9.1 Recovery

The bio-psychosocial model recognises that an injured worker's health is influenced by a combination of personal and environmental factors. This conceptualisation of health and functioning reinforces the fact that there are unique determinants of health and recovery for each injured worker. It is important to the injured worker's recovery that the contextual factors are considered. Environmental facilitators at home and work and the injured worker's personal strengths and protective factors (i.e. resilience, family support) need to be recognised and promoted. It is also critical that the environmental and personal barriers are recognised early so that these can be appropriately managed where possible. Reference should be made to recommendations 3 and 4, and Appendix 1.

Although injured workers have individual treatment and RTW goals, it is important for the health care provider to have an understanding of the 'usual' recovery path for persons with rotator cuff syndrome. This information assists the injured worker and health care provider to identify when recovery is not progressing as expected and whether the management plan needs to be amended/or adjusted. Studies have examined recovery rates of injured workers with rotator cuff syndrome using the outcome measure of return to pre-injury occupation. The time taken to RTW ranges from 7.6 (+/- 2.6) to 10 months^{22, 26}. These timeframes have been found across groups of workers who have had surgery and those who have not, respectively, and represent time taken to return to pre-injury levels and hours of occupation. They do not necessarily reflect total time 'off work' during recovery from rotator cuff syndrome.

9.2 Rotator Cuff Pathology

Rotator cuff syndrome can be classified by pathology, mechanism of injury and by aetiology (e.g. work-related shoulder pain). The Neer classification describes rotator cuff syndrome according to progressive pathology. The three stages include³³:

- stage 1 – acute inflammation
- stage 2 – degeneration/chronic inflammation
- stage 3 – rupture and arthritis.

Current opinion suggests that injured workers who present with clinical features of stage 1 or 2 should achieve outcomes from active, non-surgical treatment programs. In the absence of full-thickness rotator cuff tears it is recommended that a non-surgical treatment program be continued⁶. Although evidence is weak, there is some evidence that those in early stage 3 (i.e. with small to medium full-thickness rotator cuff tears) may have better outcomes from surgical treatment⁶.

96, 139

9.3 Patient Experiencing Significant Persisting Pain and/or Activity Restriction

Following participation in an active, non-surgical treatment program and at the four to six- week review (following the initial presentation to the health care provider), injured workers who are continuing to experience significant severe pain and activity restrictions, will require reassessment of their diagnosis and review of their management plan¹²⁵. Reassessment involves reviewing for the presence of red and yellow flags and possible referral for diagnostic imaging and pathology investigations. Diagnostic imaging assists the assessment for alternative or co-existing conditions⁴⁶, although not all injured workers will require it. The benefits of prescribed exercise and manual therapy can take longer than six weeks to manifest¹⁸. Imaging is indicated for those patients where there has been no improvement as measured by reduction in subjective pain OR increase in range of movement OR increased level of functioning following initiation of an active non-surgical treatment program.

For injured workers who are continuing to experience significant pain, and who have been unable to participate in prescribed exercise programs, consideration of a trial of corticosteroid injections may also be pursued (refer to section 9.4).

9.3.1 Diagnostic Imaging

For all decisions regarding diagnostic imaging, the injured worker's clinical information, the availability of imaging modalities and clinical experience of the radiologist, or ultrasonographer should be taken into account. This includes subacromial injection under imaging guidance by suitably experienced radiologists. The selection of appropriate imaging procedures may decrease unnecessary ionising radiation exposure and reduce overall treatment costs³⁶.

Brief Overview of Imaging Procedures used for Rotator Cuff Syndrome

Plain film X-rays

A plain film X-ray is a painless and non-invasive procedure which creates two-dimensional images of the body's internal organs or bones. A small amount of ionising radiation is used in this procedure which is roughly equivalent to what you receive from the general environment in a week (retrieved July 2012 from <http://www.betterhealth.vic.gov.au>).

Magnetic resonance imaging (MRI)

MRI scans use magnetic field and radio waves to take pictures primarily of soft tissue in the body, including joints. MRI scans image water, which allows high-resolution pictures of many tissues that are invisible to standard plain film X-rays. There are limitations for MRI scans of bone and for this reason bone injury or disease is usually investigated with regular plain film X-ray.

The MRI process requires large and expensive equipment, a highly trained operator, and a doctor specialising in radiology. Generally, MRI is prescribed only when serious symptoms and/or negative results from other tests indicate a need. Relative or absolute contraindications for MRI scans are:

- metal implants, e.g. a pacemaker
- claustrophobia
- pregnancy.

MRI is a non-invasive and painless procedure. There are no known long-term side effects (retrieved September 2012 from <http://medicaldictionary.thefreedictionary.com/magnetic+resonance+imaging>).

Ultrasound (US)

Ultrasound scans use high-frequency sound waves which are reflected off internal body structures to create an image on a monitor. This procedure is done using hand-held probes and is safe and non-invasive. Ultrasound is cheaper than MRI and arthrography but its efficacy is highly reliant on operator skills and experience.

CT Scan (CT)

The computed tomography (CT) scan is a medical imaging procedure that uses X-rays and digital computer technology to create cross-sectional images of the body. It can image every type of body structure at once including bone, blood vessels and soft tissue. A typical CT scan will expose a person to the same amount of radiation that would be received from their usual environments over about three years. The CT scan is a non-invasive and painless procedure (retrieved July 2012 from <http://www.betterhealth.vic.gov.au>).

MR and CT Arthrography (MRA and CTA)

Arthrography is a diagnostic study of the joint structures that allows the radiologist to determine the stability and integrity of the joint and investigate cartilage tears and other injuries. MR arthrography (CT arthrography in patients who are not candidates for an MRI) is an advanced imaging technique designed to give more on internal joint and bursal structures. These investigations use intra-articular injections, which enhance the visualisation of the structures of a joint. MR and CT arthrography is an invasive procedure which may result in a transient synovitis and carries a very low incidence of infection.⁹⁸.

9.3.2 Preferred Imaging for Rotator Cuff Syndrome

Although costly, MRI is recommended for injured workers with suspected rotator cuff syndrome who continue to experience significant pain and activity restriction. In addition to the demonstration of rotator cuff tears and tendinopathy, the advantages of MRI are the potential to diagnose a range of shoulder conditions including bursitis subacromial impingement and other inflammatory pathologies, as well as labral lesions, acromioclavicular joint arthritis, and tumours/lesions of bone and soft tissue. MRI also provides information on the size of cuff defects, tendon retraction and the degree of atrophy. This information is often required by surgeons prior to consideration for surgery. MRI allows other conditions to be excluded.

Current evidence suggests that MRI and US have equivalent diagnostic accuracy in the detection of rotator cuff pathology. This evidence is derived from studies of US provided in tertiary care settings which are likely to have experienced and skilled sonographers and up-to date ultrasound machines (high resolution). Clinical experience suggests that US in primary care settings may not be as accurate due to variable operators' skill and experience, availability and cost. Furthermore, the poor quality of hard copies, made of US images, make it impractical to obtain a second opinion¹⁸⁰.

MRA and CTA may identify rotator cuff lesions not detected on MRI and may be superior to MRI for the detection of labral lesions. However, these procedures are invasive, and can result in transient synovitis and possibly infection⁹⁸. MRA and CTA may be ordered on the rare occasion that MRI is inconclusive.

Although MRI provides superior imaging for soft tissue pathologies, hypo-intense areas normally present in the rotator cuff may mimic calcific deposits in these images. It is recommended that MR images should not be interpreted without corresponding radiographs²²³. X-ray will provide information in regards to calcific tendonitis.

RECOMMENDATION 26: Grade: B

Injured workers with suspected rotator cuff syndrome who have experienced significant activity restriction and pain four to six weeks following initiation of an active, non-surgical treatment program and have had no response to the treatment program should be referred for MRI and plain film X-ray.

RECOMMENDATION 27: Grade: B

In the absence of access to MRI or for those with contradictions for MRI, refer injured workers with suspected rotator cuff syndrome for ultrasound and plain film X-ray. Ultrasound performed by a skilled clinician provides equivalent diagnostic accuracy to MRI for rotator cuff tears (partial- or full-thickness).

9.4 Subacromial Injections of Corticosteroids

Injectable corticosteroids are commonly used in the treatment of painful shoulder conditions. Although corticosteroids will not reverse impairments to body structures within the rotator cuff, properly placed injections may reduce shoulder pain in some patients and improve functioning by allowing participation in an appropriate prescribed exercise program⁸². Subacromial corticosteroid injections are generally administered with a local anaesthetic such as lignocaine. Addition of the local anaesthetic is used diagnostically and therapeutically as it can result in immediate pain relief for a person with rotator cuff syndrome and indicate whether the placement of the needle was accurate.

Systematic reviews which have examined the efficacy of corticosteroids have generally supported their use in the treatment of rotator cuff syndrome. The available evidence from RCTs demonstrates that subacromial corticosteroid injections can provide significant pain relief in the short term when compared to placebo³⁴. In addition, a single economic evaluation of corticosteroid injection versus physiotherapy found that outcomes were similar for both treatment groups⁹⁹. In this study there was also a significant difference in treatment costs in favour of subacromial corticosteroid injection. The efficacy of subacromial corticosteroid injection compared to other treatments such as NSAIDs and lignocaine (on its own) have not been conclusive.

Although subacromial corticosteroid injections are commonly used for painful shoulder conditions, there are currently no uniform guidelines regarding dosage and other aspects of their administration¹⁸⁸. There are some inconsistencies in the research evidence for corticosteroid injections which are performed using radiologic or ultrasound guidance versus injections performed without (where the clinician uses external physical cues, anatomical landmarks on the worker to guide needle placement)^{40, 83, 142, 191}. Two trials have

demonstrated that corticosteroid injections performed by experienced practitioners, may fail to infiltrate the subacromial space^{62, 86}. In the second trial it was found that trial injections isolated to the subacromial bursa resulted in significantly decreased pain and improved functional scores, whereas injection of other structures resulted in increased pain scores.

In contrast a trial by Rutten et al. (2007)¹⁷² found no difference between the accuracy of blind versus ultrasound guided subacromial corticosteroid injection. Rutten et al. concluded that blind injection into the subacromial bursa could be used in daily routine¹⁷². A second trial completed by Ekberg et al. (2009)⁵⁶ found no important differences in short-term outcomes (six weeks) between ultrasound-guided subacromial corticosteroid injection and systemic corticosteroid injection for patients with rotator cuff syndrome. Further trials investigating the efficacy of corticosteroid injections for shoulder pain are needed. Important issues that need clarification include whether the anatomical site, frequency, dose and type of corticosteroid influences efficacy³⁴.

Adverse Effects: Although most side effects are rare and temporary, skin atrophy and depigmentation can be permanent and should be explained to the patient before performing an injection⁷³. There is strong evidence to conclude that the risks of serious adverse effects such as tendon rupture and infections after steroid injections are small⁷³.

RECOMMENDATION 28 Grade: A

For pain reduction in injured workers with persistent pain or who fail to progress following initiation of an active, non-surgical treatment program, the clinician may consider subacromial corticosteroid injections combined with a local anaesthetic.

RECOMMENDATION 29 Grade: Consensus

Injured workers should be educated regarding the possible risks and benefits of corticosteroid injections.

RECOMMENDATION 30 Grade: Consensus

Subacromial corticosteroid injections should only be administered by suitably trained and experienced clinicians.

Timing of Corticosteroid Injections

Optimum timing of corticosteroid injections in rotator cuff syndrome, relative to the symptom duration is also controversial. Some experts advocate injections when the patient does not respond to a certain

period of rest (two or three months)⁴. Alternatively, others have shown that steroid injections are more effective in acute or subacute tendonitis (duration of symptoms less than 12 weeks) than in chronic disease⁷³. When symptoms persist despite subacromial steroid injections, additional injections should not be used⁸². Corticosteroid injections should be limited to two or three times a year^{34, 126, 136}.

RECOMMENDATION 31 Grade: Consensus

If pain and/or function have not improved following two corticosteroid injections, additional injections should not be used.

9.5 Referral for Specialist Opinion

If corticosteroid injections are not effective and the injured worker continues to make no progress following three months of non-surgical treatment, it is recommended that further specialist opinion be sought.

The use of communication and related technologies in medicine (e.g. telephone, videoconferencing) is an emerging resource that can enhance the accessibility of specialist medical opinion. Telemedicine or telerehabilitation facilitates access by providing assessment and intervention remotely. There is growing evidence that the use of telerehabilitation may produce clinical outcomes similar to conventional interventions¹⁰³. When using technologies such as this, clinicians must consider the technical limitations of whichever system and device they use¹⁶⁵.

RECOMMENDATION 32 Grade: Consensus

Clinicians should refer for specialist opinion if an injured worker experiences significant activity limitation and participation restrictions and/or persistent pain following engagement in an active, non-surgical treatment program for three months.

9.6 Rotator Cuff Tears

Rotator cuff tears may involve one or more of the four tendons that constitute the rotator cuff. The most common tendon affected is the supraspinatus. There are a number of classification systems that are used to describe the size, location and shape of rotator cuff tears. Most commonly tears are described as partial- or full-thickness with a partial tear of the rotator cuff being an area of damage to the rotator cuff tendons, where the tear does not breach both surfaces of the tendons. There is no definite consensus on the best management for patients with rotator cuff tears.

Asymptomatic rotator cuff tears are relatively common (particularly in older populations)^{134, 183}, and further research is required to determine factors that promote or prevent a tear from progressing from asymptomatic to symptomatic.

Rotator Cuff Tear Size

A commonly cited classification system for full-thickness rotator cuff tears was developed by Cofield (1982)⁴³. The classification system is:

1. small tear: less than 1cm
2. medium tear: 1–3cm
3. large tear: 3–5cm
4. massive tear: greater than 5cm.

9.6.1 Rotator Cuff Surgery

Rotator cuff surgery may include repair of a tear of the rotator cuff and/or decompression of the subacromial space. Subacromial decompression is performed when there is significant impingement of the rotator cuff tendon between the acromion and humerus. Both procedures may be done as an open surgery or arthroscopically.

To date, systematic reviews have presented conflicting results regarding the efficacy of surgery for rotator cuff syndrome. Some authors have suggested that surgery for rotator cuff tears results in better outcomes than non-operative treatments^{96, 139}. In contradiction, others have argued that operative and non-operative interventions produce equivalent outcomes^{44, 74}. Advocates of surgical treatment suggest that repair of the rotator cuff tendon (especially early in the disease process), may alter the natural history of rotator cuff syndrome and protect/prevent tear progression, tissue degeneration, biceps involvement and acromioclavicular joint degeneration²²⁰. All systematic reviews agree that there is currently a lack of reliable evidence about the best type of surgical intervention for rotator cuff syndrome^{6, 44, 96, 177}.

A single clinical trial with low to moderate levels of bias¹³⁹ studied the effectiveness of surgery (mini-open or open rotator cuff repair) versus physiotherapy (exercise therapy) for rotator cuff tears. This study found significant differences between the groups in favour of surgery. In addition to this study, one level III study described within the American Academy of Orthopaedic Surgeons guideline⁶, compared conservative to surgical treatment of rotator cuff tears. There was a statistically significant difference in pain on shoulder range of motion and at

night in those patients who had surgery as compared to those with conservative treatment. These two studies together appear to provide limited evidence that rotator cuff surgery is effective for small to medium full-thickness tears.

Adverse Effects: There are some minimal risks associated with surgery for rotator cuff. They include: infection, post-surgical adhesions with loss of motion, damage to the deltoid from the surgical approach, injury to the axillary nerve, and damage to the coracoacromial arch from acromial resection, leading to anterosuperior escape¹³⁰.

RECOMMENDATION 33 Grade: B

On review, clinicians should refer injured workers for surgical opinion if there is a symptomatic, established small or medium full-thickness rotator cuff tear.

Evidence for the efficacy of rotator cuff surgery for large and massive full-thickness rotator cuff tears is inconclusive. Studies suggest greater post-operative functional deficits may occur in the presence of more significant muscle disease⁶. Significantly less improvement was reported with subjective patient satisfaction, and objective measures of range of motion and strength have been associated with rotator cuff repairs of large and massive tears⁸⁴. Although outcomes may be limited with surgical repair of large and massive rotator cuff tears, referral for surgical opinion is recommended. Massive rotator cuff tears can result in significant activity restriction and disability. A surgical approach may impede progression of large and massive rotator cuff tears and thus reduce the chance for an injured worker developing further pain and disability⁷⁵. In addition, the small but positive outcomes of surgery for large and massive rotator cuff tears suggest that operative treatment of chronic rotator cuff tears is an option⁶.

RECOMMENDATION 34 Grade: Consensus

Clinicians should refer injured workers for surgical opinion if there is a symptomatic, full-thickness rotator cuff tear greater than 3 centimetres.

9.6.2 When should Surgery be Performed for Rotator Cuff Syndrome?

The timing of surgery for rotator cuff syndrome seems to be based largely on practice preferences of experienced surgeons in the field. There is limited quality, evidence-based data for guiding treatment¹⁵³. One level I systematic review¹⁷⁷, one level II study⁴²

and three level IV studies^{19, 114, 153} concurred that earlier surgical treatment is preferable for full-thickness rotator cuff tears. The research suggests that early treatment is considered to be between three weeks to three months. One level III study²⁴ suggests no significant differences in outcomes between groups with rotator cuff surgery completed at three weeks, six weeks or twelve weeks post-injury. In the case of full thickness rotator cuff tears, proponents of early intervention opine that prolonged observation and non-surgical management allow the detached tendon to retract and resorb, while the muscle atrophies¹³⁰.

Indicators for Earlier Referral to Surgical Specialist

- young age
- manual occupation
- significant loss of function
- significant pain
- tears size greater than 3cm
- absence of signs of chronicity on MRI (e.g. absence of fatty infiltration or wasting of infraspinatus).

9.6.3 Recovery and Outcomes Following Rotator Cuff Surgery

The research identified a number of factors that may influence recovery and the outcomes following rotator cuff surgery. These are summarised in Table 8.

Table 8: Factors that may Influence Recovery Following Rotator Cuff Surgery

Factor	Comment	Studies and Level of Evidence
Age	Patients of older age are more likely to have slower or less recovery.	Bonde et al. 2003 (level III-3) ²⁶ ; Keijsers et al. 2010 (level II) ¹⁰⁵ ; AAOS, 2010 (Systematic Review – level I) ⁶ .
MRI tear characteristics	Supraspinatus and infraspinatus muscle atrophy and fatty degeneration have been found to have a negative effect on both tendon healing and clinical outcomes.	AAOS, 2010 (SR – one level III and seven level IV studies) ⁶ ; Harris et al, 2011(level III) ⁸⁴ .
Workers compensation status	Conflicting findings with regard to workers compensation and its effect on post-surgical outcomes. Some studies suggest workers compensation status is associated with less favourable outcomes after rotator cuff repair. Other studies have identified that there are other confounding pre-operative factors that need to be considered. For example 'WC recipients were younger and more likely to smoke, have a traumatic injury, and undergo surgery within 6 months of injury' Balyk et al. (2008).	Henn et al. 2008 (level II) ⁸⁷ ; AAOS 2010 (level I) ⁶ ; Balyk et al. 2008 (level II) ¹³ ; Holtby & Razmjou 2010 (level III) ⁹¹ ; Didden et al. 2010 (level III-3) ⁵⁰ ; Bhatia et al. 2010 (level IV) ²² .
Body mass index (BMI)	Conflicting findings with one study indicating people with a higher BMI are more likely to have less recovery following rotator cuff surgery, while another identified that BMI had no impact on pain or disability measures.	Warrender et al. 2011 (level III) ²⁰⁹ ; McRae et al. 2011(level II) ¹³¹ .
Psychological wellbeing	Psychological status, particularly depression, has been identified as a factor for reduced recovery following the development of rotator cuff syndrome.	Wylie et al. 2010 (level IV) ²¹⁸
Duration of complaints	The longer a person experiences pain the more likely they are to have less recovery.	Keijsers et al. 2010 (level II) ¹⁰⁵ ; Henn et al. 2008 (level II) ⁸⁷ .
High somatisation or multiple region complaints	A person who experiences a high pain intensity or pain in a number of body regions is more likely to have less recovery.	Keijsers et al. 2010 (level II) ¹⁰⁵
Expectations	Patients that have high pre-operative expectations with regards to pain relief, range of motion and continuing ability to perform activities of daily living may be more likely to experience reduced recovery following rotator cuff surgery.	Razmjou et al. 2008 (level III-3) ¹⁶⁶

RECOMMENDATION 35 Grade: Consensus

The clinician should be aware of factors that may influence prognosis post-rotator cuff surgery (refer Table 8).





Resources

Rotator Cuff Syndrome Information Sheet

General Practitioner Guide – Return to Work

Employer Guide – Return to Work

Flowchart: First Presentation – Shoulder Pain

Flowchart: Review (Post 4–6 weeks)

Flowchart: Red Flags for Rotator Cuff Syndrome

Rotator Cuff Syndrome Information Sheet

What is Rotator Cuff Syndrome?

The rotator cuff is a group of muscles and tendons that support the shoulder joint. Damage to the rotator cuff, known as 'rotator cuff syndrome', can happen as a single incident (acute) or develop gradually over time (chronic or degenerative). Tears are described as either a partial- or a full-thickness tear depending on how much tendon is torn. Rotator cuff pain may also arise from shoulder tendonitis.

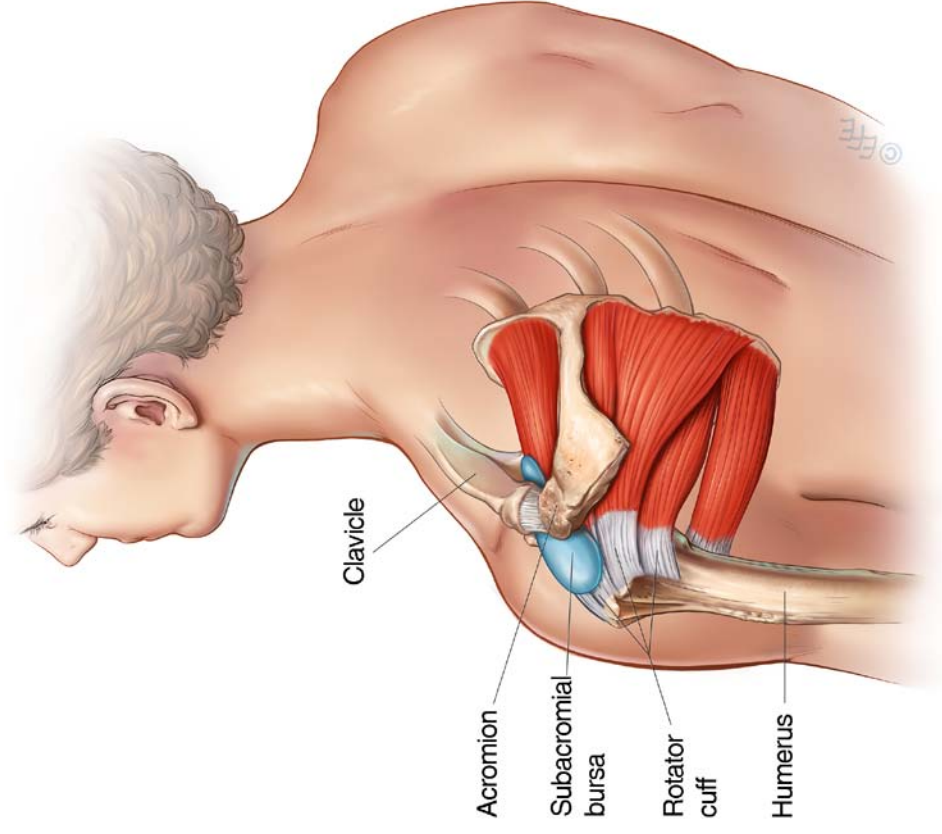


Figure 1: Shoulder without Injury

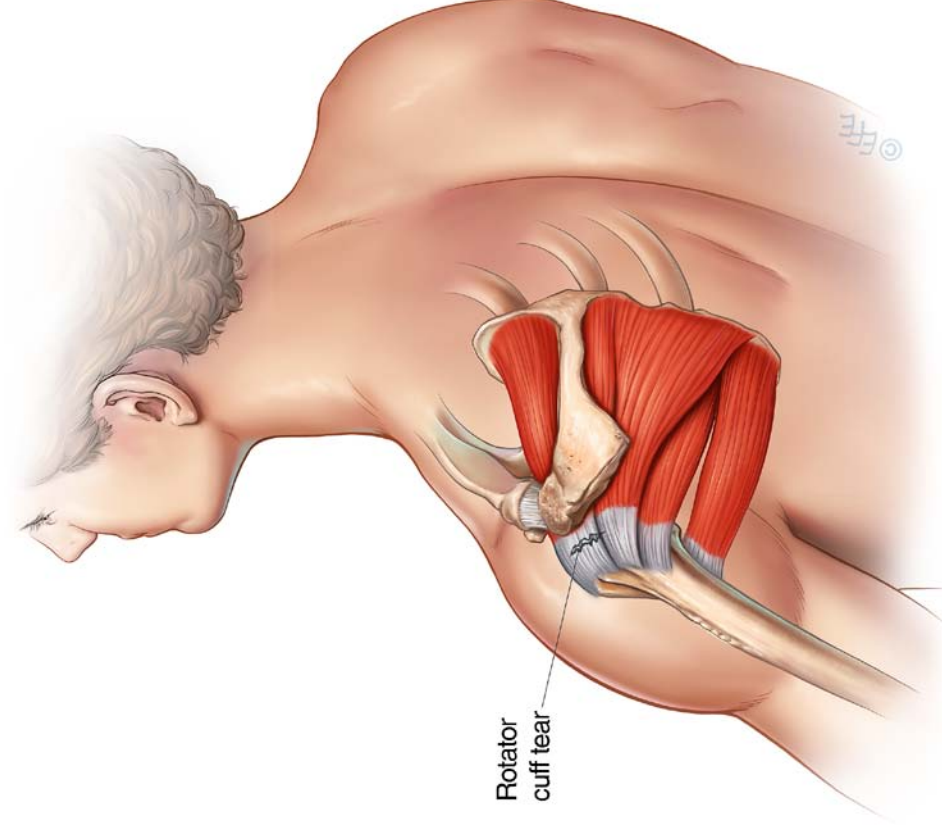


Figure 2: Shoulder with Rotator Cuff Tear (blue bursa not shown)

The information on this sheet should always be discussed with your health care provider and should not be used as a substitute for seeking professional health care advice.

Imaging

Magnetic resonance imaging (MRI) uses magnetic field and radio waves to take pictures primarily of soft tissue in the body, including joint damage. It is a non-invasive and painless procedure, and there are no known long-term side effects. There may be reasons why an MRI is not the right way to examine your shoulder for rotator cuff syndrome.

X-rays use small amounts of ionising radiation to create images of the shoulder. It is a non-invasive procedure. Although the dose of radiation from an X-ray is considered safe, discuss any concerns you have with your health care provider.

Ultrasound uses high frequency sound waves which are reflected off internal body structures to create an image on a monitor. This procedure is done using hand-held probes and is safe and is non-invasive.

Refer to www.betterhealth.vic.gov.au fact sheets on diagnostic imaging for further information.

Medications

Types of medication which may be prescribed to you by your health care provider include:

- paracetamol (such as Panadol or Herron Paracetamol) – this is a common drug offering relief from mild to moderate pain taken orally
- non-steroidal anti-inflammatory drugs (NSAIDs) (such as Nurofen or Voltaren) – these are used to reduce inflammation of the joints which cause pain and stiffness, either taken orally or as a gel/cream application.

Be aware that these medications may be contained in some over-the-counter pain relievers, so always seek medical advice before taking them due to possible adverse reactions.

Refer to the Australian Rheumatology Association patient information sheets for further advice on these medications at <http://www.rheumatology.org.au/community/PatientMedicineInformation.asp>

Treatment Options

Treatment options which may be discussed with you by your health care provider include:

- **cold application within the first 48 hours of injury**
- **hot or cold application 48 hours after injury**
- **prescribed exercise in conjunction with manual treatment by a suitably qualified health care provider (e.g. physiotherapist)**
- **acupuncture in conjunction with prescribed exercise**
- **corticosteroid injections (cortisone injections)**

Corticosteroids are powerful anti-inflammatory drugs used to reduce pain from inflammation. Injections of corticosteroids are usually given for musculoskeletal pain and are delivered by a needle in the shoulder, and may be with the guidance of equipment such as an ultrasound. Injecting cortisone does not have the same side effects as cortisone tablets; however, there may still be side effects at the site of injection such as localised pain. Refer to <http://www.mayoclinic.com/health/steroids/HQ01431> and your health care provider for more information on corticosteroids.

▪ surgery

Surgery is not always required for rotator cuff syndrome. If recommended, it may include repair of a rotator cuff tear and/or increasing the space between the head of the upper arm bone (humerus) and the acromion, known as 'decompression of the subacromial space'. These may be done as an open procedure or an arthroscopic procedure (keyhole surgery). The decompression is performed when the space between the two bones is too narrow and the rotator cuff tendons get pinched between them. The surgeon removes some of the bone to make more space for the rotator cuff tendons. An open rotator cuff repair involves the surgeon making a larger incision in the shoulder to expose the head of the upper arm bone.

Your recovery time will vary depending on the treatment types you receive and your own physical and personal factors. **REMEMBER keeping active, including through active exercise and physiotherapy treatments, as well as participating in your normal activities to the best of your ability will help your recovery.**

Return to Work

It is important that you continue to participate in your usual daily activities **as soon as possible** with guidance from your health care provider. In general, there is no evidence that supervised exercises will cause further damage to the injured rotator cuff. It is also important for your early recovery that you return to work. Your health care provider, your employer and you should work out together what duties and hours of work you might do so you can return to work as soon as possible. The duties need to be matched to your capabilities with changes made as you improve over time. Your return to work program might mean you work on different duties for a time. You may do a mix of your old duties and some new duties, but gradually increasing towards your pre-injury work if possible. Whatever work you do in your return to work program, the duties must be worthwhile for both you and your employer.

General Practitioner Guide – Return to Work

There are a range of factors to consider when an injured worker is remaining or returning to work or study. There needs to be adequate assessment and treatment (refer to Flowchart: First Presentation – Shoulder Pain and Flowchart: Review – Post 4–6 weeks). The management plan includes treatments provided by health care providers and which usually occur concurrently with the return to work program. (Refer to the *Explanatory Notes* for further information regarding each point).



General Practitioner Guide – Return to Work Explanatory Notes

- Make early contact with the employer where possible.**
It is beneficial for the GP to discuss the patient's return to work with the employer.
- Provide the Rotator Cuff Syndrome Information Sheet to the injured worker** (see Resources section of the guidelines).
- Be aware of barriers and facilitators to effective return to work programs.**
The person's injury (health condition) is only one aspect to be considered. The context of a return to work intervention significantly affects the progress and the outcome of a return to work program.
- Check that the injured worker has an income.**
This may be from the employer, the workers compensation insurer or social security. Any concerns about income can result in additional stress and complicate recovery. If the worker does not have an income, advise them to contact their employer or social security.
- Work with the team. A return to work program involves a team of people with different skills.**
Engage with employers, injured worker, health care providers including physiotherapists, return to work providers and coordinators, and the workers compensation insurer.
- Maintain communication and provide clear information to all stakeholders.**
Use any or all methods of communication such as telephone, email, fax, face-to-face communications and letters.

- Make sure the return to work program is based at the workplace, starts as early as possible and involves meaningful and value-added work at every stage.**

- Arrange for a workplace assessment.**

Understanding the physical, psychological, cognitive, perceptual and sensory demands of a job demands specific skills. Identifying the risk factors for the injured worker and the workplace also involves specific skills.

All interaction between the injured worker and/or employer and/or health care provider is covered by the NSW and Federal Privacy Acts.

NSW Health Privacy Principles [http://www.ipc.nsw.gov.au/lawlink/privacy.nsw/ll_pnsw.nsf/wFiles/privacy_fact_sheet_HPP_members_of_public.pdf/\\$file/privacy_fact_sheet_HPP_members_of_public.pdf](http://www.ipc.nsw.gov.au/lawlink/privacy.nsw/ll_pnsw.nsf/wFiles/privacy_fact_sheet_HPP_members_of_public.pdf/$file/privacy_fact_sheet_HPP_members_of_public.pdf) National Privacy Principles (Federal Act) <http://privacy.gov.au/materials/types/brochures?sortBy=53> Privacy Commissioner's office: The Privacy Hotline **1300 363 992**

Contextual Factors

The GP should be aware of the contextual factors and whether these are helping or hindering the return to work program (barrier or facilitator).

The environmental factors that can be barriers or facilitators include: services and systems policies: at the workplace, health services, workers compensation ■ support and relationships: co-workers, people in positions of authority, health professionals, family and friends ■ attitudes: those people listed above in 'support and relationships' ■ products and technology: for communication, or at the workplace (including workplace accommodations) ■ natural and the built environment: includes a broad range of issues such as physical geography, the climate or the workplace building and structures that may influence the return to work intervention (WHO, 2011²¹⁶).

The personal factors might include: personality and coping style of any and all of the stakeholders ■ injured workers pre-injury medical history ■ education, understanding and skill of the health professionals and the key personnel involved at the workplace ■ education and understanding of the injured worker and their level of perceived transferrable skills ■ cultural issues (WHO, 2011²¹⁶).

There needs to be a good match between the injured worker's capacity (including change over time as a result of recovery), and the pre-injury tasks and return to work tasks, with what is realistic in the workplace.

A good workplace assessment achieves this match. A workplace assessment should be performed by a person skilled in tasks analysis, who understands the injured person's capacity and performance in terms of impairment, activity limitations and participation restrictions. The workplace assessment should involve the supervisor and the injured worker and consideration should be given to their perceived relationship.

- Use well thought-out graded return to work programs to help the injured worker's recovery.**

The return to work program can be upgraded through planned changes in hours, pace or productivity or work tasks, or a combination of these. These same parameters are also measures of progress and outcome:

- hours (number of hours, hours per day/per week, shift times or time work is performed (morning/afternoon/evening), rest breaks (fixed or self-determined)
- pace of work or productivity: whether it is self-paced or regulated, machine-paced, less productivity demands or opt in/out of a bonus system
- work tasks: task demands (physical, cognitive), gradual increase in task demands, routine or variable tasks, simultaneous, competing or singular tasks, responsibility involved in tasks.

- Use a range of workplace accommodations to meet injured worker and workplace needs.**

Workplace accommodations might involve:

- suitable, meaningful duties: some of the pre-injury duties or shorter term alternative duties
- graded return to work
- ergonomic modifications:
 - task elimination
 - task redesign or sequence of task (changing task order or process)
 - workstation redesign including structural changes, provision of equipment
 - administrative controls (e.g. education, training or personal protective equipment).

- Involve the injured worker in the decisions around their return to work program.**

They must be engaged in the decisions and establishing the short-term and long-term goal for their return to work, reviewing their progress and where possible assist to identify solutions to problems occurring at the workplace. It helps the injured person to have some ownership for their return to work program and to understand the process. Solutions need to be discussed with all parties.

- The return to work program should be coordinated with active stakeholder involvement.**

Case management and coordination needs to strike a balance between the employer's and health care provider's focus, work productivity and the injured worker's needs.

- Consider the life changes for the worker that might occur because of the return to work program and where possible minimise the impact.**

Even if the return to work program is short-term, changes from their pre-injury work might be barriers to a return to work. Personal factors that might be a barrier for the return to work program include:

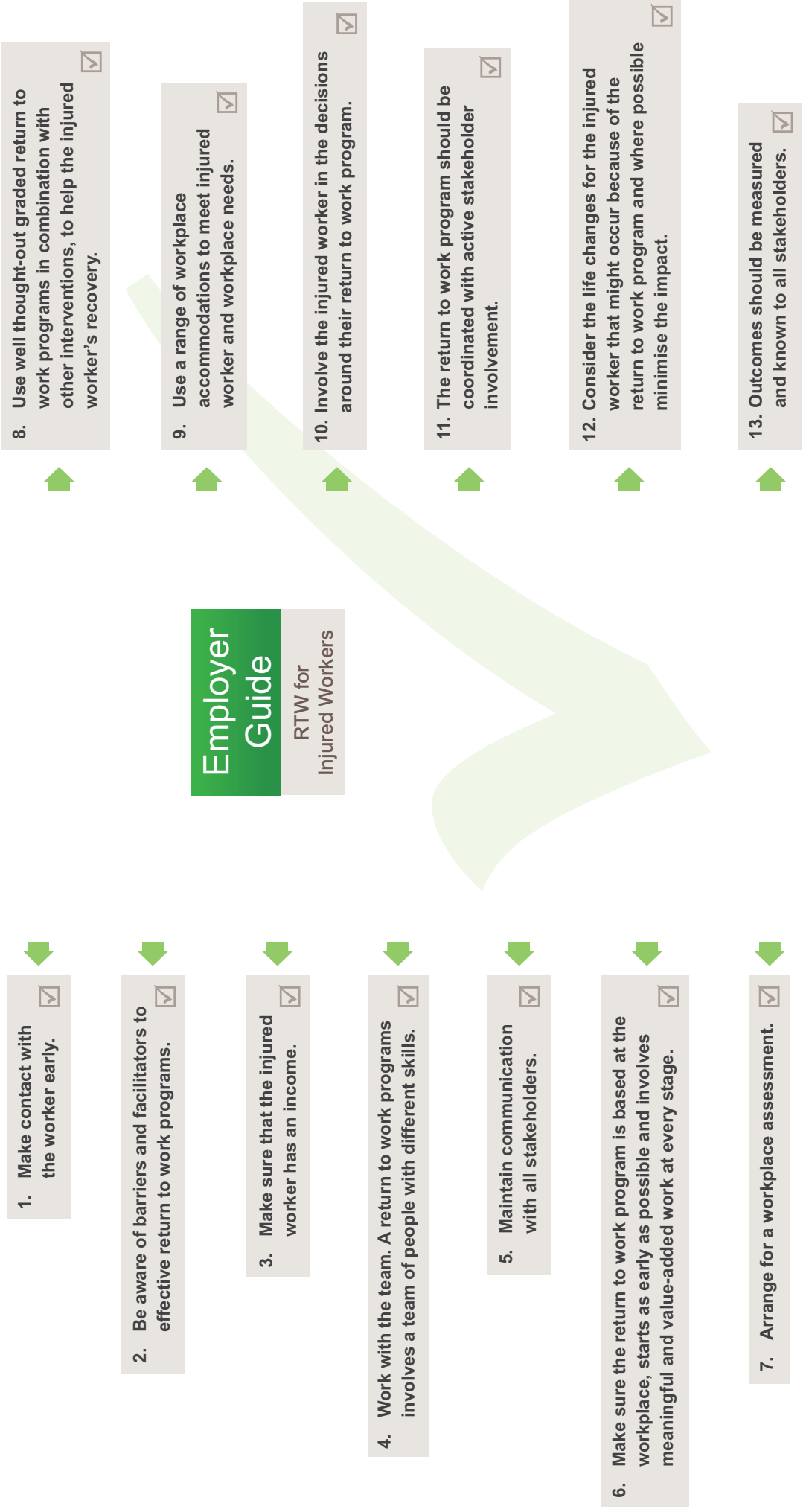
- transport to and from work
- child care responsibilities or arrangements
- relationships and activities with colleagues outside of work (e.g. regular recreational activities).

- Outcomes should be measured and known to all stakeholders.**

It is important that the injured worker's progress is monitored throughout the return to work program and change made if there is no progress. Outcomes can be measured by health care provider/s using standardised health-related measures to do with the injury, and/or other simple parameters such as tasks performed at work, hours at work and productivity at work. All outcome measures and the reasons for their use should be clearly explained to the injured worker.

Employer Guide – Return to Work

If your employee has rotator cuff syndrome, their injury is only one of the aspects that need to be considered when planning their return to work. This sheet provides guidance, based on the research evidence of what works, on some of the key actions that the employer should take to facilitate the injured worker returning to work.



Employer Guide – Return to Work Explanatory Notes

1. Make contact with the worker early.

The most appropriate person is the direct supervisor or dedicated workplace return to work coordinator (depending on the size of the organisation). Contact should be made within 48 hours. It is best to contact the worker directly (not a family member) and where possible with personal contact such as by phone or face-to-face, and later with a formal letter and follow-up.

The key messages should be support, seek information from the worker on their progress and for the employer to give information on the process of workplace-based return to work (RTW) programs.

2. Be aware of barriers and facilitators to effective return to work programs.

The person's injury is only one part to be considered. The context of a return to work intervention significantly affects the progress and the outcome of an RTW program.

The employer should be aware of the contextual factors and whether these are helping (facilitators) or hindering (barriers) the return to work program.

Example A: The role and involvement of the supervisor is important. A negative attitude of the supervisor, a co-worker, or the health care provider towards the injured worker can be a barrier for the RTW program.

Example B: A return to work coordinator, who is organised, approachable, knows the workplace and the people well, can be a facilitator for the RTW program.

When a barrier exists, an employer should consider their role in facilitating change to remove or minimise the barrier.

3. Make sure that the injured worker has an income.

This may be from the employer, the workers compensation insurer or social security. Concerns about income results in additional stress and complicates recovery for the injured worker.

4. Work with the team. A return to work programs involves a team of people with different skills.

Engage with the health care provider/s, employers, injured worker and the workers compensation insurer.

All interaction between the injured worker and/or employer and/or health care provider is covered by the NSW and Federal Privacy Acts. NSW Health Privacy Principles [http://www.ipc.nsw.gov.au/lawlink/privacy.nsw/ll_pnsw.nsf/vwFiles/privacy_fact_sheet_HPP_members_of_public.pdf/\\$file/privacy_fact_sheet_HPP_members_of_public.pdf](http://www.ipc.nsw.gov.au/lawlink/privacy.nsw/ll_pnsw.nsf/vwFiles/privacy_fact_sheet_HPP_members_of_public.pdf/$file/privacy_fact_sheet_HPP_members_of_public.pdf) National Privacy Principles (Federal Act) <http://privacy.gov.au/materials/types/brochures?sortBy=53> Privacy Commissioner's office: The Privacy Hotline **1300 363 992**

Contextual Factors

The employer should be aware of the contextual factors and whether these are helping (facilitators) or hindering (barriers) the return to work program.

The environmental factors that can be barriers or facilitators include: services and systems policies: at the workplace, health services, workers compensation ■ support and relationships: co-workers, people in positions of authority, health professionals, family and friends ■ attitudes: those people listed above in 'support and relationships' ■ products and technology: for communication, or at the workplace (including workplace accommodations) ■ natural and the built environment: includes a broad range of issues such as physical geography, the climate, or the workplace building and structures that may influence the return to work intervention (WHO, 2011²¹⁶).

The personal factors might include: personality and coping style of any and all of the stakeholders ■ injured workers pre-injury medical history ■ education, understanding and skill of the health professionals and the key personnel involved at the workplace ■ education and understanding of the injured worker and their level of perceived transferrable skills ■ cultural issues (WHO, 2011²¹⁶).

5. Maintain communication with all stakeholders.

Use any or all methods of communication such as telephone, email, fax, face-to-face communications and letters.

6. Make sure the return to work program is based at the workplace, starts as early as possible and involves meaningful and value-added work at every stage.

7. Arrange for a workplace assessment.

Understanding the physical, psychological, cognitive, perceptual and sensory demands of a job demands specific skills. Identifying the risk factors for the injured worker and the workplace also involves specific skills.

There needs to be a good match between the injured worker's capacity (including change over time as a result of recovery), the pre-injury tasks and return to work tasks with what is realistic in the workplace. A good workplace assessment achieves this match. A workplace assessment should be performed by a person skilled in task analysis, and who understands the injured person's capacity and performance in terms of impairment, activity limitations and participation restrictions. The workplace assessment should involve the supervisor and the injured worker.

8. Use well thought-out graded return to work programs in combination with other interventions, to help the injured worker's recovery.

The RTW program can be upgraded through planned changes in hours, pace, productivity, work tasks or a combination of these. These same parameters are also measures of progress and outcome:

- hours (number of hours, hours per day/per week, shift times or time work is performed (morning/afternoon/evening), rest breaks (fixed or self-determined)
- pace of work or productivity: whether it is self-paced or regulated, machine-paced, less productivity demands or opt in/out of a bonus system
- work tasks: task demands (physical, cognitive), gradual increase in task demands, routine or variable tasks, simultaneous, competing or singular tasks, responsibility involved in tasks

9. Use a range of workplace accommodations to meet injured worker and workplace needs.

Workplace accommodations might involve:

- suitable duties: some of the pre-injury duties or shorter term alternative duties
- graded return to work

■ ergonomic modifications:

- task elimination
- task redesign or sequence of task (changing task order or process)
- workstation redesign including structural changes, provision of equipment
- administrative controls (e.g. education, training or personal protective equipment).

10. Involve the injured worker in the decisions around their return to work program.

The injured worker must be engaged with establishing the short-term and long-term goal for their return to work. They must be able to review progress and where possible assist to identify solutions to problems occurring at the workplace. It helps the injured person to have ownership for their return to work program and to understand the process. Solutions need to be discussed with all stakeholders.

11. The return to work program should be coordinated with active stakeholder involvement.

Case management and coordination needs to strike a balance between the employer's needs, the health care provider's focus, work productivity and the injured worker's needs.

12. Consider the life changes for the injured worker that might occur because of the return to work program and where possible minimise the impact.

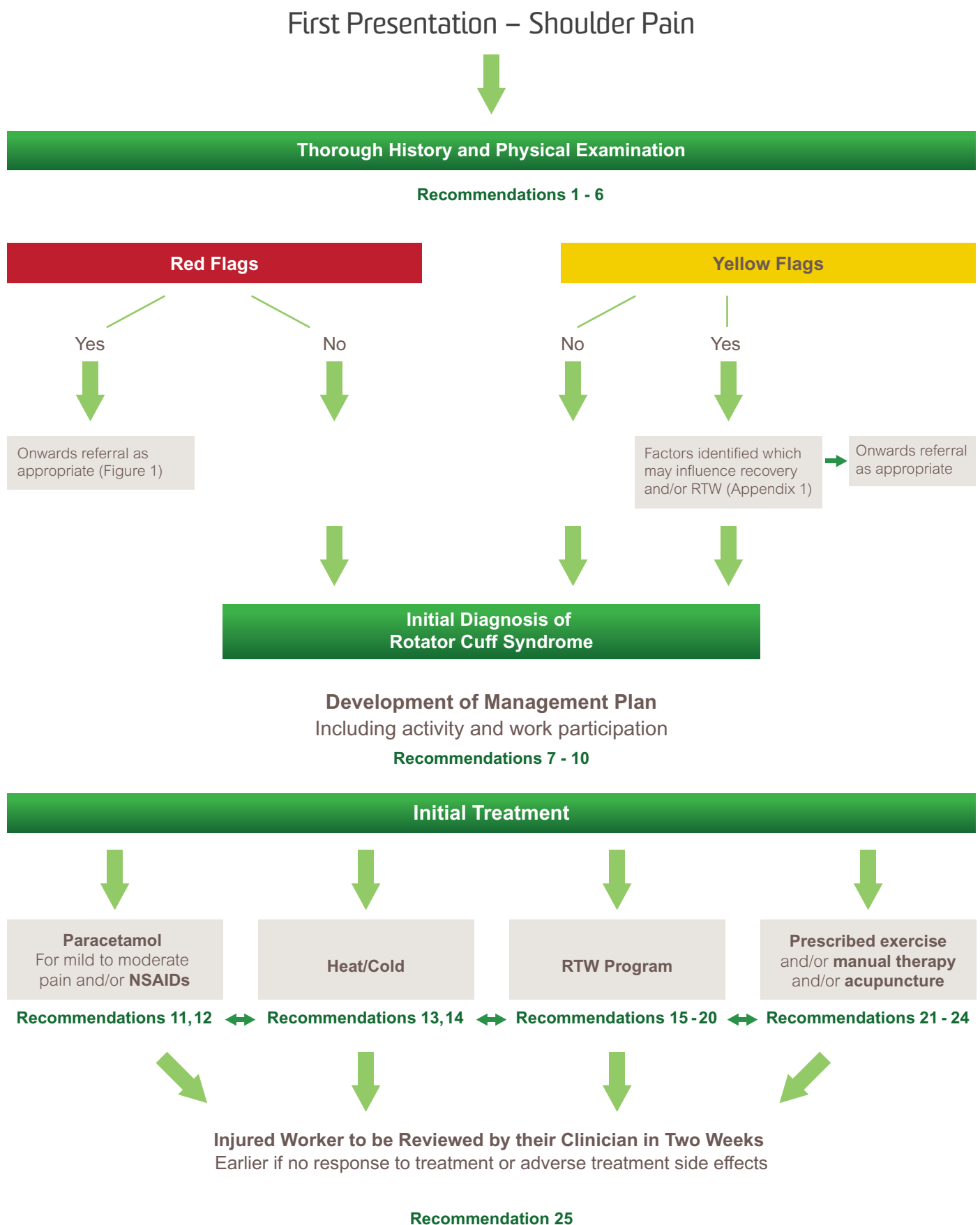
Personal factors that might be a barrier for the return to work program include:

- transport to and from work
- child care responsibilities or arrangements
- relationships and activities with colleagues outside of work (e.g. regular recreational activities).

13. Outcomes should be measured and known to all stakeholders.

It is important that the injured worker's progress is monitored throughout the return to work program and changes made if there is no progress. The outcomes can be measured by health care provider/s using standardised health-related measures do to with the injury and/or other simple parameters such as tasks performed at work, hours at work and productivity at work.

Flowchart: First Presentation – Shoulder Pain



Rotator Cuff Syndrome Recommendations

Recommendation 1:

Diagnosis of rotator cuff syndrome requires a thorough history-taking which should include the following factors and consideration of their implications: age, occupation and sports participation, medical history, mechanism of injury, pain symptoms, weakness and/or loss of range of motion (body function impairments), activity limitations and social situation.

Recommendation 2:

Assessment of rotator cuff syndrome requires physical examination which should include the following: direct observation of the shoulder and scapula; assessment of active and passive range of motion; resisted (isometric) strength testing; and evaluation of the cervical and thoracic spine (as indicated). It may also include administration of other clinical tests dependent upon the experience and preference of the clinician.

Recommendation 3:

The clinician must exclude 'red flags' in the diagnosis of rotator cuff syndrome. 'Red flags' are signs and symptoms which suggest serious pathology (see Figure 1).

Recommendation 4:

The clinician should take note of 'yellow flags' discussed or identified during history-taking. 'Yellow flags' are contextual factors such as personal, psychosocial or environmental factors that could impact on recovery and/or RTW following injury (see Appendix 1).

Recommendation 5:

X-rays and imaging are not indicated in the first four to six weeks for an injured worker presenting with suspected rotator cuff syndrome in the absence of 'red flags' (see Figure 1).

Recommendation 6:

Clinicians will educate injured workers with suspected rotator cuff syndrome on the limitations of imaging and the risks of ionising radiation exposure.

Recommendation 7:

In established rotator cuff syndrome, maintaining activity within the limits of pain and function should be recommended. Its reported benefits include: earlier RTW; decreased pain, swelling and stiffness; and greater preserved joint range of motion.

Recommendation 8:

Clinicians should use a shared decision-making process with the injured worker to develop a management plan.

Recommendation 9:

Clinicians should use and document appropriate outcome measures at baseline and at other stages during the recovery process to measure change in the injured worker's impairments, activity limitations and/or participation restrictions.

Recommendation 10:

Health care providers should consider any additional issues, potential disadvantages or need for additional resources (such as an interpreter) for the injured worker and their family if the injured worker identifies as Aboriginal and/or Torres Strait Islander, or is from a culturally and linguistically diverse or non-English speaking background.

Recommendation 11:

Injured workers should be prescribed paracetamol as the initial choice for mild to moderate pain.

Recommendation 12:

Injured workers with acute shoulder pain may be prescribed NSAIDs (either oral or topical) for pain relief. NSAIDs can be prescribed alone or in conjunction with paracetamol.

Recommendation 13:

To reduce pain and swelling following acute rotator cuff syndrome, injured workers may intermittently apply cold within the first 48 hours.

Recommendation 14:

From 48 hours post-injury, injured workers may intermittently apply either heat or cold for short periods for pain relief.

Recommendations 15:

There must be early contact between the injured worker, workplace and health care provider.

Recommendation 16:

A specific and realistic goal for the RTW of the injured worker, with appropriate time frames, should be established early with outcomes measured and progress monitored.

Recommendation 17:

The RTW program must involve consultation and engagement with a team which includes the injured worker, relevant health care providers and the workplace.

Recommendation 18:

The RTW program should include a workplace assessment and job analysis matching worker capabilities and possible workplace accommodations.

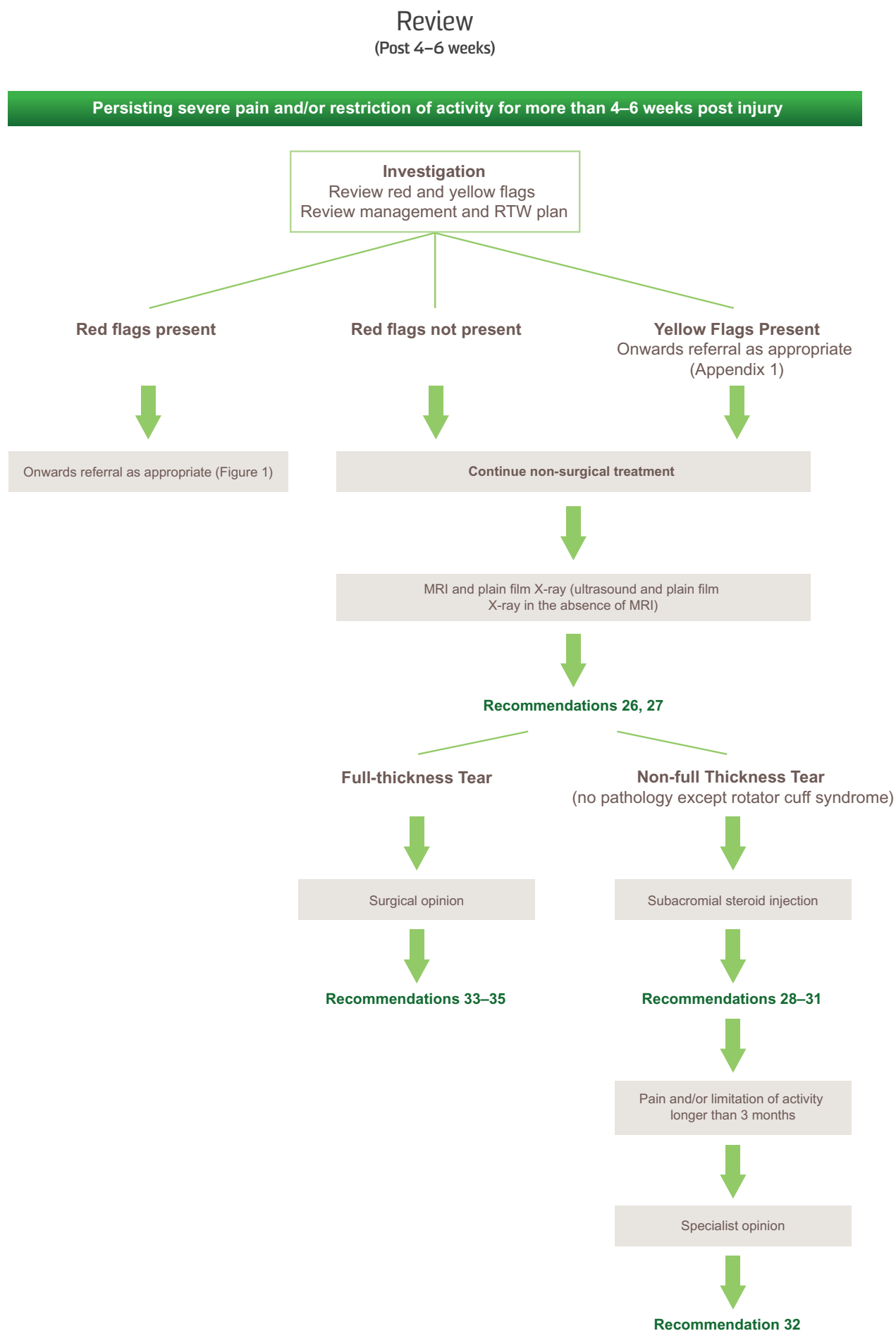
Recommendation 19:

The RTW program, where possible, should be workplace-based. Improved outcomes occur if rehabilitation processes take place within the workplace.

Recommendation 20:

When planning a RTW program, a graded RTW should be considered and adjusted following review of objectively measured outcomes.

Flowchart: Review (Post 4–6 weeks)



Initial Management

Recommendation 21:

Injured workers should be initially treated with exercise prescribed and reviewed by a suitably qualified health care provider. There is no evidence of adverse impacts for prescribed exercise programs for patients with rotator cuff syndrome.

Recommendation 22:

Manual therapy may be combined with prescribed exercise by a suitably qualified health care provider*, for additional benefit for patients with rotator cuff syndrome.

** Under the NSW workers compensation system health care providers who are eligible to be paid for this treatment include physiotherapists, chiropractors and osteopaths. These treatment providers are trained in the prescription and modification of exercises consistent with pathology.*

Recommendation 23:

Clinicians may consider acupuncture in conjunction with exercise; both modalities should be provided by suitably qualified health care providers.

Recommendation 24:

The evidence suggests that therapeutic ultrasound does not enhance outcomes compared to exercise alone. The health care provider should refrain from using ultrasound for either pain reduction and/or increased function for injured workers with subacromial impingement syndrome (SAIS).

Review

Recommendation 25:

Injured workers with suspected rotator cuff syndrome should be reviewed by their clinician within two weeks of initial consultation, with the proviso that the injured worker can contact their clinician earlier if they have had no response to their prescribed treatment, or if they have experienced treatment side effects.

Recommendation 26:

Injured workers with suspected rotator cuff syndrome who have experienced significant activity restriction and pain for four to six weeks following initiation of an active, non-surgical treatment program and have had no response to the treatment program should be referred for MRI and plain film X-ray.

Recommendation 27:

In the absence of access to MRI or for those with contraindications for MRI, refer injured workers with suspected rotator cuff syndrome for ultrasound and plain film X-ray. Ultrasound performed by a skilled clinician provides equivalent diagnostic accuracy to MRI for rotator cuff tears (partial- or full-thickness).

Recommendation 28:

For pain reduction in injured workers with persistent pain or who fail to progress following initiation of an active, non-surgical treatment program, the clinician may consider subacromial corticosteroid injection combined with local anaesthetic.

Recommendation 29:

Injured workers should be educated regarding the possible risks and benefits of corticosteroid injections.

Recommendation 30:

Subacromial corticosteroid injections should only be administered by suitably trained and experienced clinicians.

Recommendation 31:

If pain and/or function have not improved following two corticosteroid injections, additional injections should not be used.

Recommendation 32:

Clinicians should refer for specialist opinion if an injured worker experiences significant activity limitation and participation restrictions and/or persistent pain following engagement in an active, non-surgical treatment program for three months.

Surgery

Recommendation 33:

On review, clinicians should refer injured workers for surgical opinion if there is a symptomatic, established small or medium, full-thickness rotator cuff tear.

Recommendation 34:

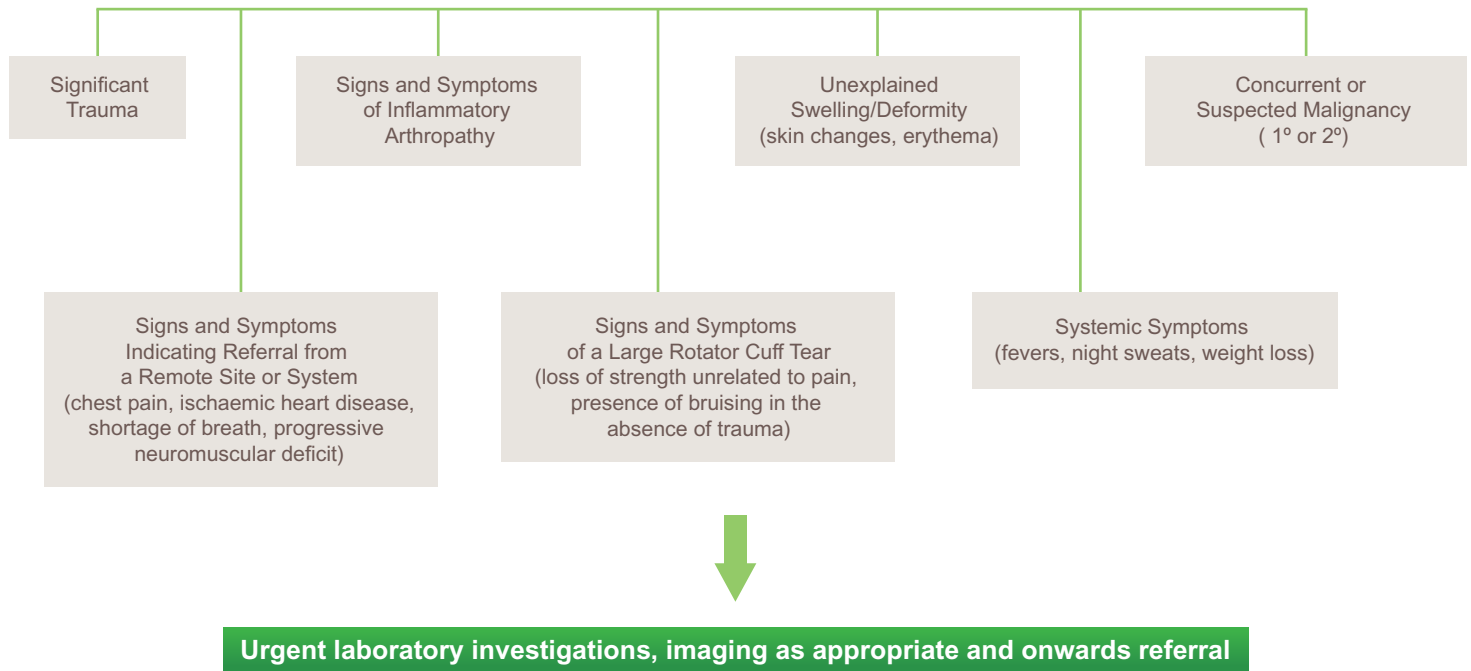
Clinicians should refer injured workers for surgical opinion if there is a symptomatic, full-thickness rotator cuff tear greater than 3 centimetres.

Recommendation 35:

The clinician should be aware of factors that may influence prognosis post-rotator cuff surgery (see Table 8).

Flowchart: Red Flags for Rotator Cuff Syndrome

Red Flags for Rotator Cuff Syndrome



Glossary

Rotator cuff syndrome

Rotator cuff syndrome includes the diagnoses of shoulder impingement syndrome (SIS), subacromial impingement syndrome (SAIS), subacromial bursitis, rotator cuff tendonitis and degenerative rotator cuff tears (partial- or full-thickness). It does not include acute rotator cuff injury related to a major traumatic event or the diagnoses of osteoarthritis of the glenohumeral joint or acromioclavicular joint, subluxation or dislocation of the aforementioned joints, adhesive capsulitis (frozen shoulder) or fractures.

RTW

Return to work

Health care provider/Clinician

A health care provider/clinician is a health professional involved in the injured worker's assessment, diagnosis, and/or treatment. One particular health care provider/clinician for example a General Practitioner should lead, or be in charge of, the injured worker's management plan.

Primary care

Primary level of care refers to the first stage of health care at the community level. It is usually provided through health centres or clinics and is the first contact people have with the health system. Medical care provided at primary level includes short, simple treatments for acute conditions (e.g. infections) and routine management of chronic conditions (e.g. leprosy, epilepsy, tuberculosis, diabetes).

Tertiary care

Tertiary level of care is highly specialised medical care. It is provided by specialist medical professionals in association with nurses and paramedical staff and involves the use of specialised technology. These services are provided by large hospitals usually located in major cities at the national or regional level. Medical care provided at the tertiary level might include brain surgery, cancer care or orthopaedic surgery.

Differential diagnosis

A systematic diagnostic procedure used by medical professionals to identify the presence of a disease where multiple alternatives are possible.

Capabilities

Capabilities describe the individual's abilities to execute a task or action at a given time, in a standardised environment.

Workplace accommodation

Arrangements made to accommodate persons with an injury/disability that enables them to perform duties necessary to the job. Workplace accommodations might involve:

- suitable duties: some of the pre-injury duties or shorter term alternative duties
- graded return to work
- ergonomic modifications.

Workplace assessment

A workplace assessment involves assessment of the physical, cognitive, psychosocial and environmental demands of the worker's usual duties and/or potential suitable duties within a workplace⁴⁵.

Job analysis

A job analysis involves making a detailed list of the tasks involved and the skills required to perform a worker's usual duties⁴⁵.

APPENDIX 1 Red and Yellow Flags for Rotator Cuff Syndrome

Red Flags

The following 'red flags' may present as shoulder pain and/or loss of function:

- unexplained deformity or swelling or erythema of the skin
- significant weakness not due to pain
- past history of malignancy
- suspected malignancy (e.g. weight loss or loss of appetite)
- fevers/chills/malaise
- significant unexplained sensory/motor deficits
- pulmonary or vascular compromise.

Yellow Flags

Yellow flags include:

- older age (50 + years for RTW)
- higher perceived pain intensity
- longer duration of symptoms
- previous injury
- extensive sick leave taken over the previous three years prior to injury
- unemployment
- comorbidities, previous shoulder pain or poor perceived general health
- depression at the time of injury
- avoidance of activity for fear of pain and harm
- perceived high job demands and low control at work
- higher body mass index
- lack of social support.

There is inconsistent evidence on the influence of the following yellow flags:

- being female with more than 28 days of sick leave due to pain
- having a workers compensation claim.

APPENDIX 2 Clinical Questions

Assessment	Treatment	Prognosis
<ol style="list-style-type: none"> 1. What is the diagnostic accuracy of ultrasound? 2. When should an ultrasound be performed? 	<ol style="list-style-type: none"> 1. What is the benefit of paracetamol in the management of RCS? 2. What is the benefit of oral steroids in the management of RCS? 3. What is the benefit of oral anti-inflammatories (NSAIDs) in the management of RCS? 4. What is the benefit of glucosamine in the management of RCS? 5. What is the benefit of fish oil in the management of RCS? 	<ol style="list-style-type: none"> 1. What are the barriers and facilitators to a RTW following RCS? <p>Body impairments</p> <ul style="list-style-type: none"> ▪ size of tear <p>Activities and participation</p> <ul style="list-style-type: none"> ▪ type of employment ▪ sports, tasks performed at home <p>Contextual factors</p> <ul style="list-style-type: none"> ▪ personal factors ▪ time since injury ▪ previous injury ▪ type of employment ▪ attitude of client ▪ age, sex ▪ length of time in present occupation ▪ height/weight <p>Environmental factors</p> <ul style="list-style-type: none"> ▪ surgery ▪ therapy ▪ family attitude ▪ employer attitude ▪ support
<ol style="list-style-type: none"> 3. What is the diagnostic accuracy of MRI? 4. When should an MRI be performed? 	<ol style="list-style-type: none"> 6. What is the benefit of steroid injection in the management of RCS? 	<ol style="list-style-type: none"> 2. Which outcome measures are appropriate, reliable and valid to use following RCS?
<ol style="list-style-type: none"> 5. Is the X-ray useful to the identification of RCS? 6. Under what circumstances should X-rays be performed? 	<ol style="list-style-type: none"> 7. What is the benefit of exercise in the management of RCS? 8. What is the benefit of ultrasound in the management of RCS? 9. What is the benefit of electro-physical agents in the management of RCS? 10. What is the benefit of soft tissue techniques/ manual therapy (excluding massage)? 	
<ol style="list-style-type: none"> 7. Is CT useful to the identification of RCS? 8. When should a CT be performed? 	<ol style="list-style-type: none"> 11. What is the benefit of the heat/cold in the management of RCS? 12. What is the benefit of rest in the management of RCS? 13. What is the benefit of acupuncture in the management of RCS? 	

Assessment	Treatment	Prognosis
9. Is MRA useful to the identification of RCS?	14. What are the clinical indicators for surgery?	
10. When should an MRA be performed?	15. When should surgery be considered for RCS (timing)?	
	16. What factors affect RCS post-surgery prognosis?	
11. Which is the preferred means of imaging to determine pathology?	17. What factors should be considered for an RTW program (informed by prognosis RTW questions)?	
12. What factors should be included in history-taking when diagnosing RCS?	18. When should an RTW be considered for RCS?	
13. What should be included in a physical assessment for diagnosis of RCS?	19. How should a return to work program be implemented following RCS?	
14. Is subacromial injection useful to the identification of RCS?		

APPENDIX 3 NHMRC Evidence Hierarchy

Level	Intervention ¹	Diagnostic accuracy ²	Prognosis	Aetiology ³	Screening Intervention
I ⁴	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies
II	A randomised controlled trial	A study of test accuracy with: an independent, blinded comparison with a valid reference standard, ⁵ among consecutive persons with a defined clinical presentation ⁶	A prospective cohort study ⁷	A prospective cohort study	A randomised controlled trial
III-1	A pseudorandomised controlled trial (i.e. alternate allocation or some other method)	A study of test accuracy with: an independent, blinded comparison with a valid reference standard, ⁵ among non-consecutive persons with a defined clinical presentation ⁶	All or none ⁸	All or none ⁸	A pseudorandomised controlled trial (i.e. alternate allocation or some other method)
III-2	A comparative study with concurrent controls: <ul style="list-style-type: none"> Non-randomised, experimental trial⁹ Cohort study Case-control study Interrupted time series with a control group 	A comparison with reference standard that does not meet the criteria required for Level II and III-1 evidence	Analysis of prognostic factors amongst persons in a single arm of a randomised controlled trial	A retrospective cohort study	A comparative study with concurrent controls: <ul style="list-style-type: none"> Non-randomised, experimental trial Cohort study Case-control study
III-3	A comparative study without concurrent controls: <ul style="list-style-type: none"> Historical control study Two or more single arm study¹⁰ Interrupted time series without a parallel control group 	Diagnostic case-control study ⁶	A retrospective cohort study	A case-control study	A comparative study without concurrent controls: <ul style="list-style-type: none"> Historical control study Two or more single arm study
IV	Case series with either post-test or pre-test/post-test outcomes	Study of diagnostic yield (no reference standard) ¹¹	Case series, or cohort study of persons at different stages of disease	A cross-sectional study or case series	Case series

Explanatory notes

¹ Definitions of these study designs are provided on pages 7–8 of *How to use the evidence: assessment and application of scientific evidence* (NHMRC 2000b) and in the accompanying glossary.

² These levels of evidence apply only to studies of assessing the accuracy of diagnostic or screening tests. To assess the overall effectiveness of a diagnostic test there also needs to be a consideration of the impact of the test on patient management and health outcomes (Medical Services Advisory Committee 2005, Sackett & Haynes 2002). The evidence hierarchy given in the 'Intervention' column should be used when assessing the impact of a diagnostic test on health outcomes relative to an existing method of diagnosis/comparator test(s). The evidence hierarchy given in the 'Screening' column should be used when assessing the impact of a screening test on health outcomes relative to no screening or opportunistic screening.

³ If it is possible and/or ethical to determine a causal relationship using experimental evidence, then the 'Intervention' hierarchy of evidence should be utilised. If it is only possible and/or ethical to determine a causal relationship using observational evidence (e.g. cannot allocate groups to a potential harmful exposure, such as nuclear radiation), then the 'Aetiology' hierarchy of evidence should be utilised.

⁴ A systematic review will only be assigned a level of evidence as high as the studies it contains, except where those studies are of level II evidence. Systematic reviews of level II evidence provide more data than the individual studies and any meta-analyses will increase the precision of the overall results, reducing the likelihood that the results are affected by chance. Systematic reviews of lower level evidence present results of likely poor internal validity and thus are rated on the likelihood that the results have been affected by bias, rather than whether the systematic review itself is of good quality. Systematic review *quality* should be assessed separately. A systematic review should consist of at least two studies. In systematic reviews that include different study designs, the overall level of evidence should relate to each individual outcome/result, as different studies (and study designs) might contribute to each different outcome.

⁵ The validity of the reference standard should be determined in the context of the disease under review. Criteria for determining the validity of the reference standard should be pre-specified. This can include the choice of the reference standard(s) and its timing in relation to the index test. The validity of the reference standard can be determined through quality appraisal of the study (Whiting et al. 2003).

⁶ Well-designed population-based case-control studies (e.g. population-based screening studies where test accuracy is assessed on all cases, with a random sample of controls) do capture a population with a representative spectrum of disease and thus fulfil the requirements for a valid assembly of patients. However, in some cases the population assembled is not representative of the use of the test in practice. In diagnostic case-control studies a selected sample of patients already known to have the disease are compared with a separate group of normal/healthy people known to be free of the disease. In this situation, patients with borderline or mild expressions of the disease, and conditions mimicking the disease are excluded, which can lead to exaggeration of both sensitivity and specificity. This is called 'spectrum bias' or 'spectrum effect' because the spectrum of study participants will not be representative of patients seen in practice (Mulherin & Miller 2002).

⁷ At study inception, the cohort is either non-diseased or all at the same stage of the disease. A randomised controlled trial with persons either non-diseased or at the same stage of the disease in *both* arms of the trial would also meet the criterion for this level of evidence.

⁸ All or none of the people with the risk factor(s) experience the outcome; and the data arises from an unselected or representative case series which provides an unbiased representation of the prognostic effect. For example, no smallpox develops in the absence of the specific virus; and clear proof of the causal link has come from the disappearance of smallpox after large-scale vaccination.

⁹ This also includes controlled before-and-after (pre-test/post-test) studies, as well as adjusted indirect comparisons (i.e. utilise A versus B and B versus C, to determine A versus C with statistical adjustment for B).

¹⁰ Comparing single arm studies, that is case series from two studies. This would also include unadjusted indirect comparisons (i.e. utilise A versus B and B versus C, to determine A versus C but where there is no statistical adjustment for B).

¹¹ Studies of diagnostic yield provide the yield of diagnosed patients, as determined by an index test, without confirmation of the accuracy of this diagnosis by a reference standard. These may be the only alternative when there is no reliable reference standard.

Note A: Assessment of comparative harms/safety should occur according to the hierarchy presented for each of the research questions, with the proviso that this assessment occurs within the context of the topic being assessed. Some harms (and other outcomes) are rare and cannot feasibly be captured within randomised controlled trials, in which case lower levels of evidence may be the only type of evidence that is practically achievable; physical harms and psychological harms may need to be addressed by different study designs; harms from diagnostic testing include the likelihood of false positive and false negative results; harms from screening include the likelihood of false alarm and false reassurance results.

Note B: When a level of evidence is attributed in the text of a document, it should also be framed according to its corresponding research question eg. level II intervention evidence; level IV diagnostic evidence; level III-2 prognostic evidence.

Note C: Each individual study that is attributed a "level of evidence" should be rigorously appraised using validated or commonly used checklists or appraisal tools to ensure that factors other than study design have not affected the validity of the results.

Source: Hierarchies adapted and modified from: NHMRC 1999; Blandier 1999; Lijmer et al. 1999; Phillips et al. 2001.

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APPENDIX 4 International Classification of Diseases Codes

ICD 9 codes

- 726.1 Rotator cuff syndrome of shoulder and allied disorders
- 726.10 Disorders of bursae and tendons in the shoulder region (unspecified)
- 726.11 Calcifying tendonitis of the shoulder
- 727 Other disorders of synovium, tendon and bursa
- 727.2 Specific bursitides of occupational origin
- 727.61 Complete rupture of the rotator cuff tendon (non-traumatic)
- 727.82 Calcium deposits in tendon and bursa
- 840 Sprains and strains of shoulder and upper arm
- 840.4 Rotator cuff sprain
- 840.5 Subscapularis muscle (tendon) sprain
- 840.6 Supraspinatus muscle (tendon) sprain

ICD 10 codes

- M75 Shoulder lesions
- 75.1 Rotator cuff syndrome
- 75.3 Calcific tendonitis of the shoulder
- 75.4 Impingement syndrome of the shoulder
- 75.5 Bursitis of the shoulder

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