



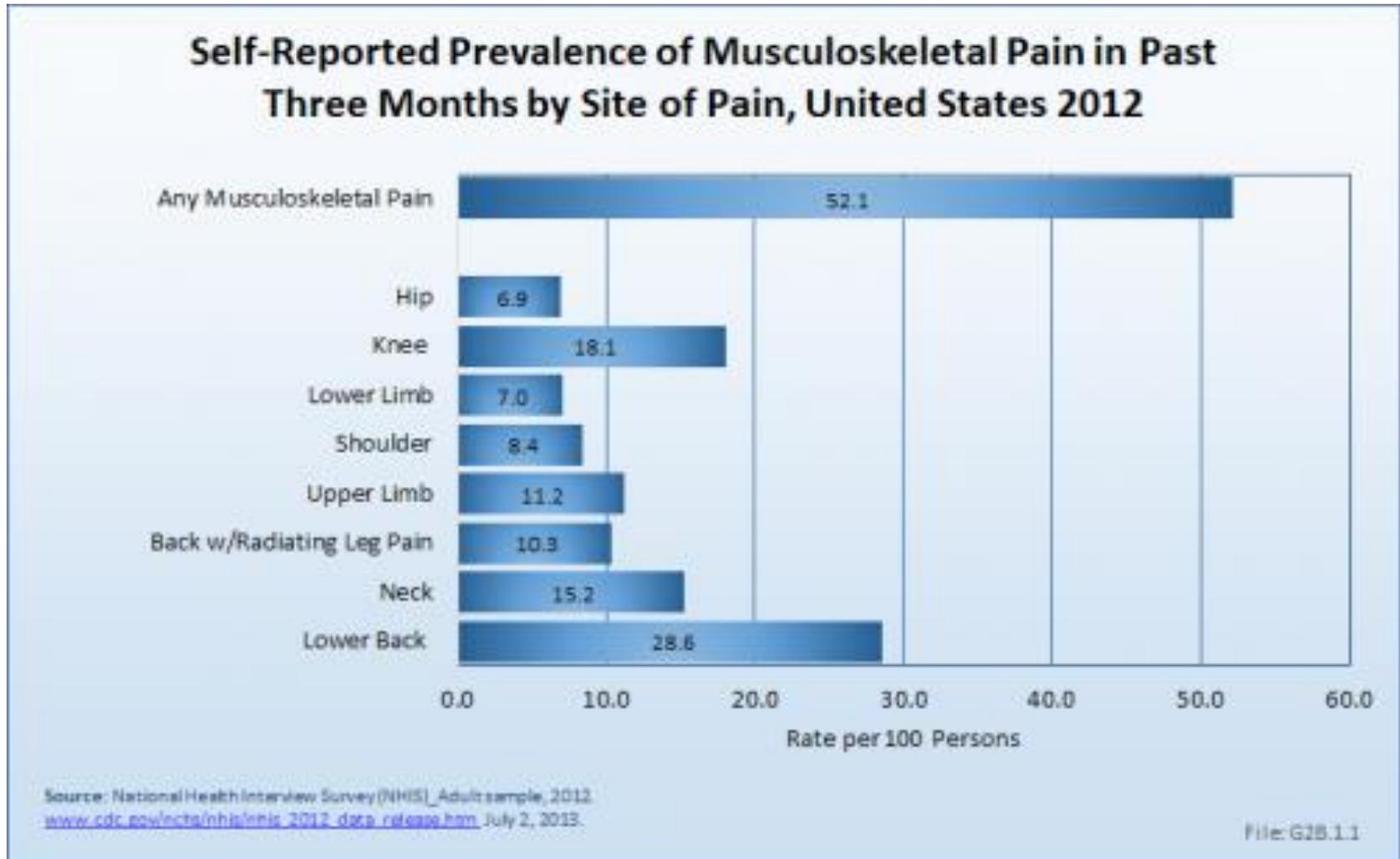
# Upper Limb Disorders: Causes and Management

Professor Karen Walker-Bone  
Professor of Occupational Rheumatology  
Director Arthritis Research UK/MRC Centre for  
Musculoskeletal Health and Work

# Plan

- Upper limb pain is common
- Low back pain
- SPECIFIC upper limb disorders
  - Of the shoulder and elbow
  - Of the forearm, wrist and hand
- Non-specific arm pain
- The ARM pain trial
- Conclusions

# Upper limb pain is common

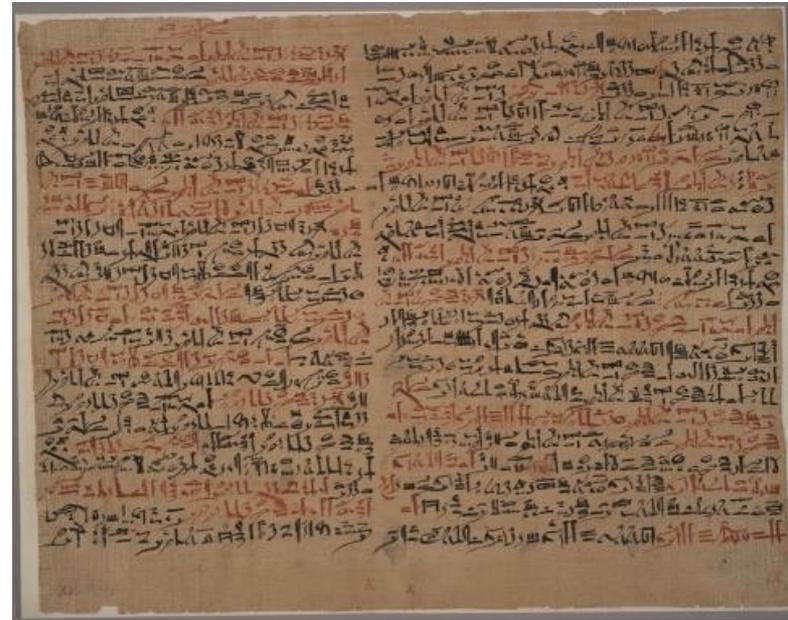


# Plan

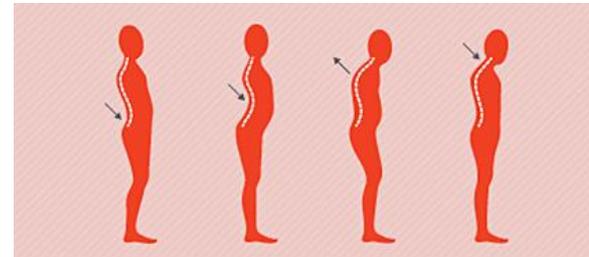
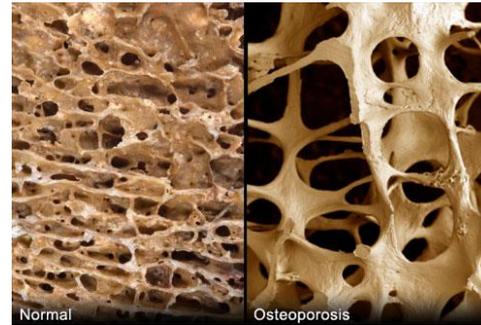
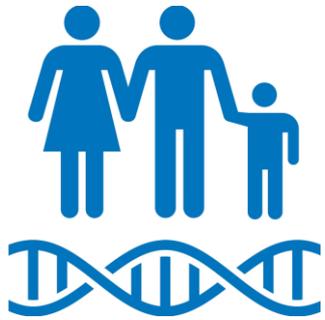
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# A history of low back pain...

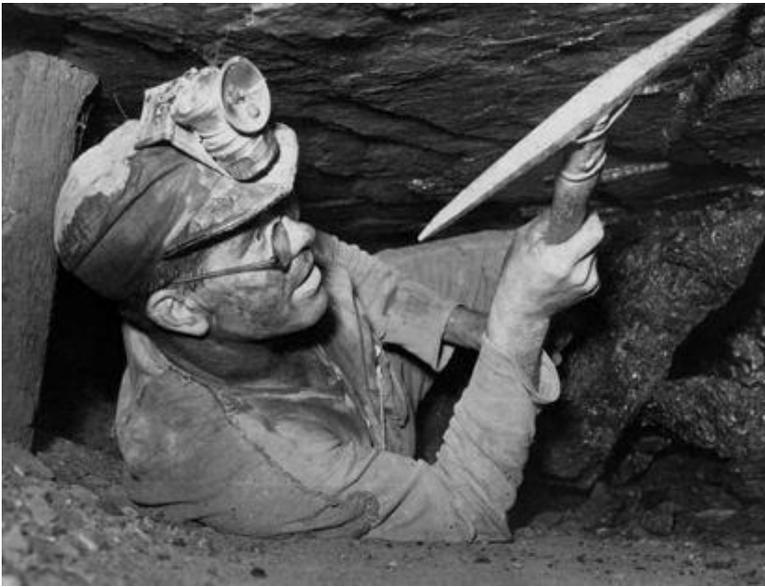
- Back pain dates back throughout history (papyrus 1500 BC)
- 17<sup>th</sup> Century treatise from Smith papyrus on non-traumatic back pain
- Simple back pain dismissed as 'rheumatics' until 1900s
- New ideas in 1900s: back pain possibly due to **injury**
- May attract **compensation**
- **Rest** is the treatment of choice



# Risk factors for low back pain



# Occupational physical factors



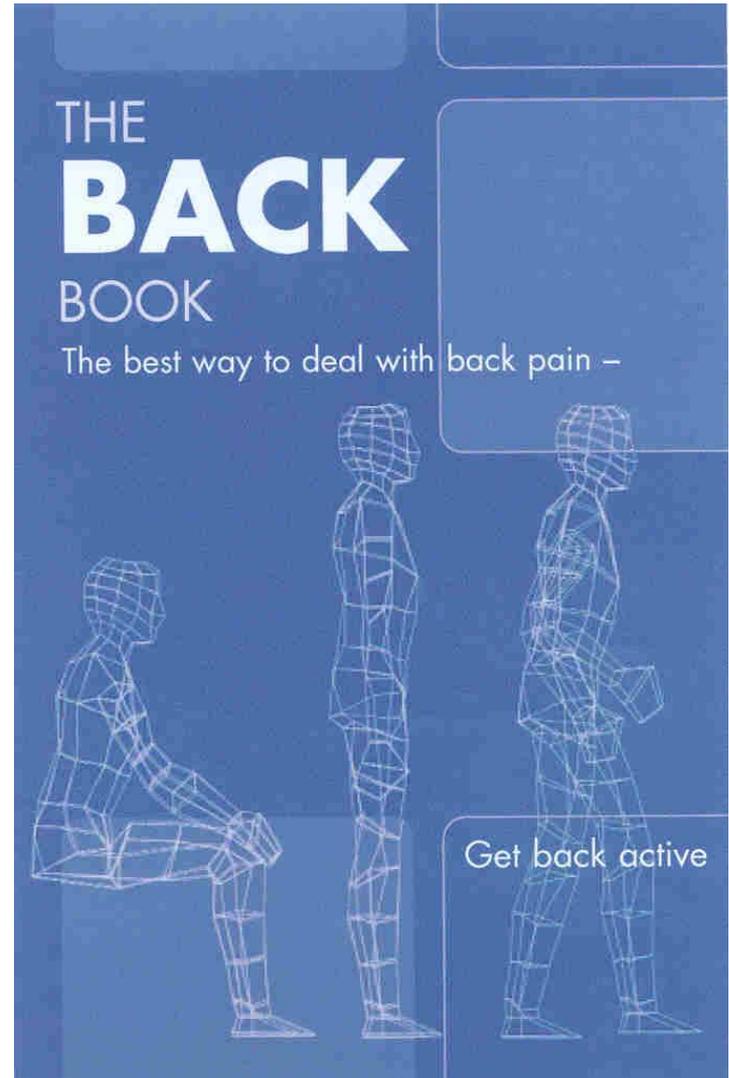
# OTHER risk factors for low back pain

- Psychological – mental and emotional
- Poor subjective health assessment
- Work dissatisfaction
- Psychological problems precede pain
- Poor education / poor income



# Management of non-specific low back pain

- Paradigm shift for the management of mechanical back pain 1994
- Advice to remain active
- Movement away from terms like 'injury'
- Movement away from making a diagnosis
- De-medicalisation



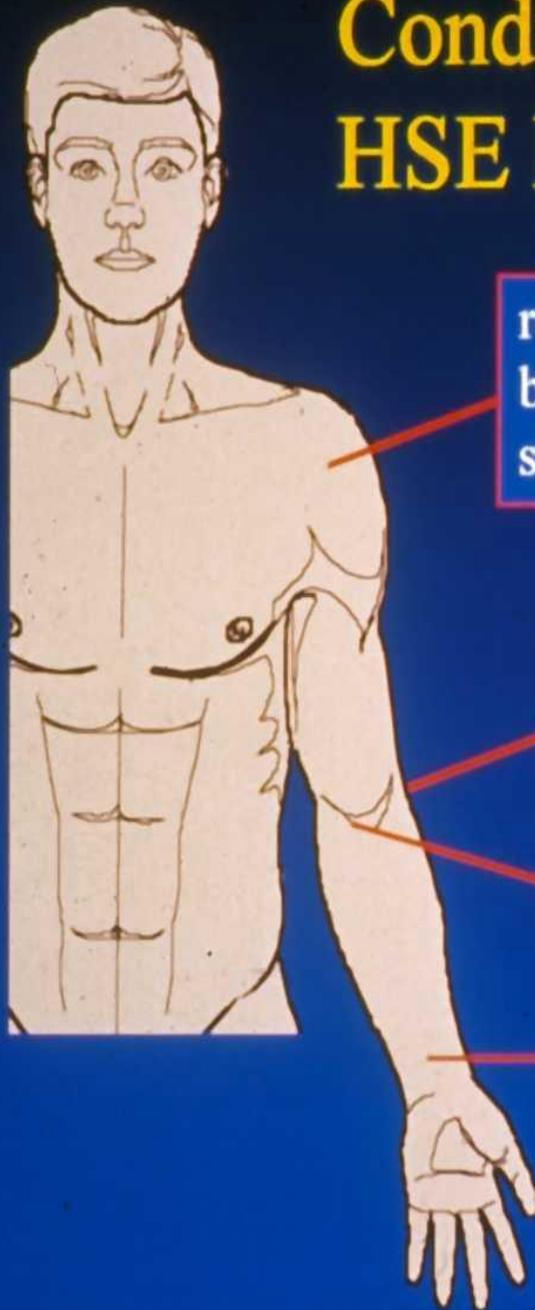
# Plan

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# SPECIFIC musculoskeletal disorders of the upper limb

- Heterogeneous group of conditions
- Diagnosed on the basis of a cluster of symptoms and signs
- Often no supporting investigations
- BUT: Widely accepted in medical practice – Codman, de Quervain, Cyriax, Ramazzini, Runge
- The most valid diagnoses are those for which aetiology is established

# Conditions Classified by the HSE Delphi Workshop



rotator cuff tendinitis  
bicipital tendinitis  
shoulder capsulitis

lateral epicondylitis

medial epicondylitis

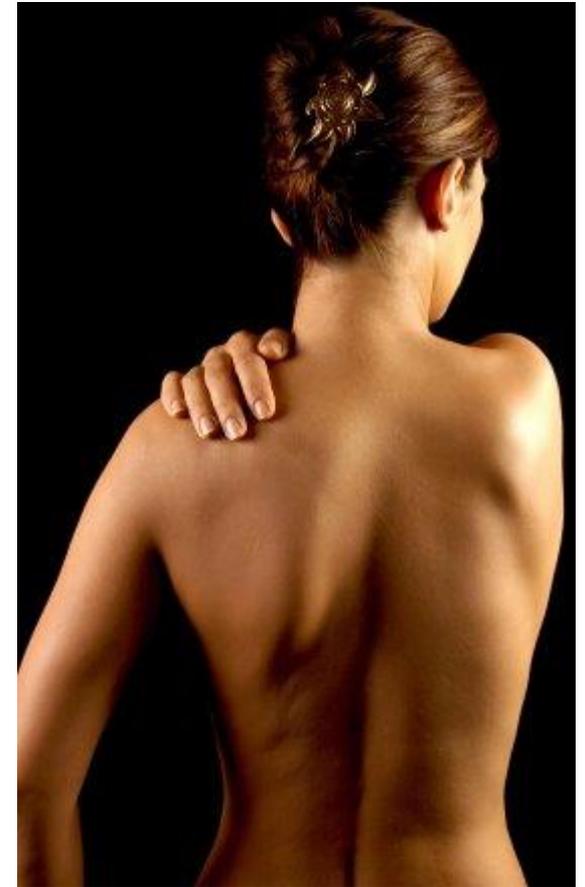
De Quervain's disease  
tenosynovitis of the wrist  
carpal tunnel syndrome  
non-specific forearm pain

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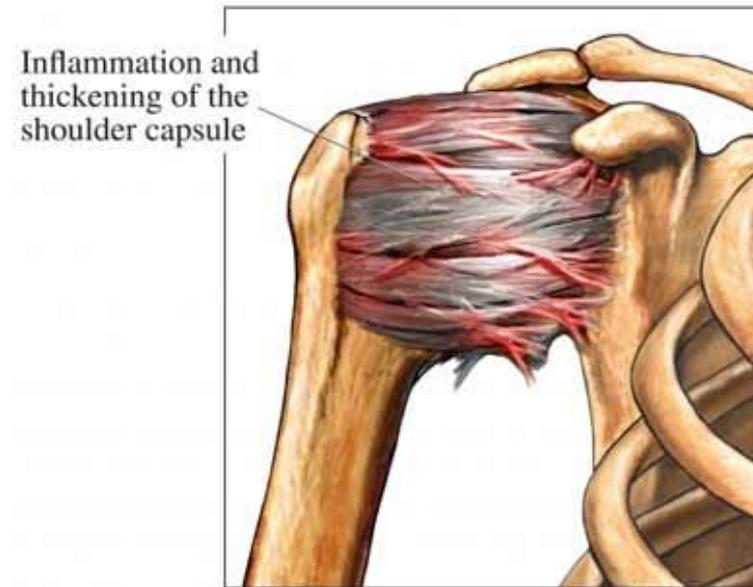
# Disorders of the shoulder and elbow

- Acromio-clavicular joint syndrome
- Shoulder capsulitis
- Impingement syndrome
- Bicipital tendinitis
- Olecranon bursitis
- Lateral and medial epicondylitis
- Referred arm pain (brachialgia)



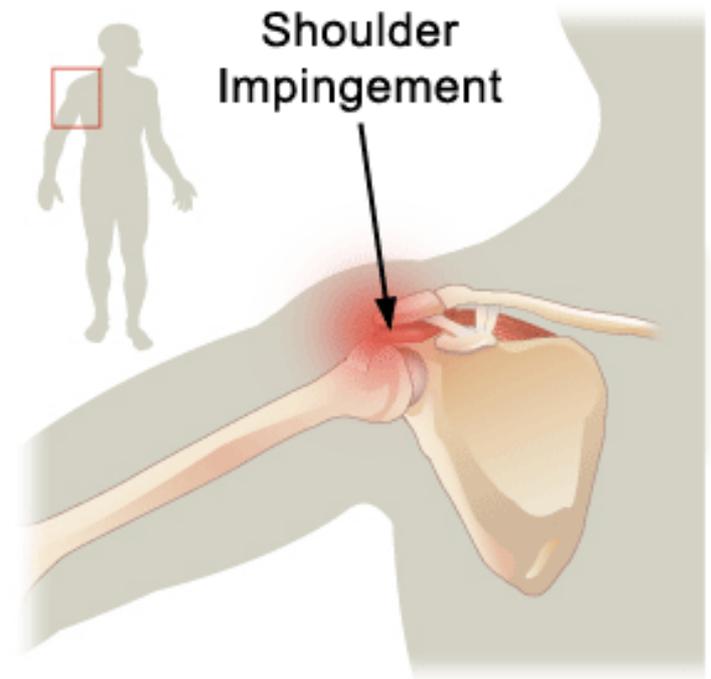
# Shoulder capsulitis

- Poorly understood, common disorder, older patients
- Term coined by Codman in 1934
- Shoulder pain associated with restriction of range of motion, night pain, functional loss
- Evolution through 3 phases: painful, adhesive and then resolution
- Capsule/extracapsular ligament – primary site supraspinatus tendinitis?
- Arthroscopic study suggested fibromatosis
- External rotation > abduction > internal rotation
- Diabetes, trauma, stroke, arthritis, PMR



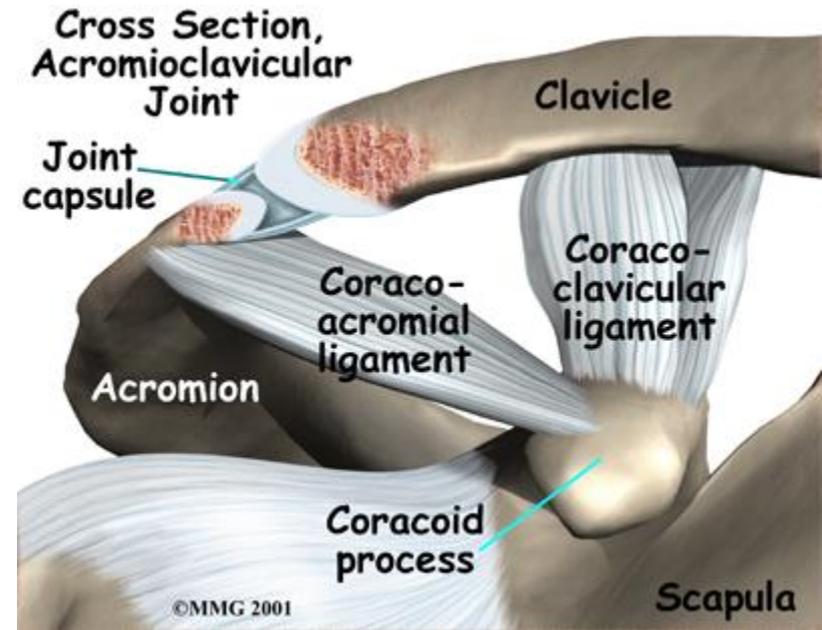
# Impingement syndrome

- Pain around the shoulder, upper arm, radiates down arm
- Night pain, functional disturbance
- Tendinopathy (?inflamed, torn)
- Tendon of the rotator cuff clinically definable by provocation testing?
- Women > men, 40-60 years
- Occupation – force, posture



# Acromio-clavicular joint syndrome

- ACJ is a plane synovial joint between the clavicle and the scapula
- Dysfunction causes local pain, tenderness and swelling, pain on full abduction
- Pain on horizontal adduction of the arm ('scarf test')
- Degenerative? Manual workers?



# Bicipital tendinitis

- Anterior shoulder pain, upper arm pain
- Positive Speed's and Yergason's tests
- Trauma, swimmers, weightlifters
- Often complicated by other shoulder pathology (rarely isolated)



# The discrimination of shoulder disorders in clinical practice

# Bamji et al, B J Rheumatol 1996

**Phase 1:** 3 Consultant rheumatologists separately examined 26 patients with shoulder pain

- Make a diagnosis
- Suggest investigations
- Recommend treatment

Results collated by a fourth Consultant

# Diagnosis

- Total agreement about diagnosis was reached in 12/26 patients (46%)

Adhesive capsulitis	9
Rotator cuff lesion	3

# For the remaining 14 patients:

	<b>A</b>	<b>B</b>	<b>C</b>
Adhesive capsulitis	7	2	1
Rotator cuff lesion	3	6	12
Biceps tendinitis	1	7	0
Acromioclavicular joint disease	4	5	0
Milwaukee shoulder	0	0	2
	<b>15</b>	<b>20</b>	<b>15</b>

# Bamji et al: Phase 2

3 Consultant rheumatologists examined 18 patients with shoulder pain together

- Complete agreement about diagnoses in 14/18 patients (78%)

Adhesive capsulitis	6
Rotator cuff lesion	4
Referred neck pain	2
Rotator cuff plus acromioclavicular joint	1
Rotator cuff plus referred neck pain	1

# Clinical diagnosis is reliable...

- 120 subjects presenting in primary care were assessed by 18 GPs
- All GPs had been taught a standardised system of assigning pre-defined diagnoses
- The GP diagnoses were compared with those of 13 Physiotherapists taught the same system
- Inter-observer agreement in 63% ( $\kappa = 0.31$ )

*Liesdek et al, Physiotherapy, 1997*

# Clinical diagnosis is reliable...

- 2 Physiotherapists examined 201 patients with shoulder pain, using a standardised system of pre-defined diagnoses

Agreement in 59%,  $\kappa = 0.45$

*De Winter et al, Ann Rheum Dis, 1999*

- 2 Physiotherapists examined 21 patients using pre-defined criteria and proforma

Agreement in 91%,  $\kappa = 0.88$

*Pellecchia et al, J Orthop Sports Phys Therapy, 1996*

# Why make a diagnosis?

- Separate states of disease with different causes, response to treatment or prognosis

# Treatment of shoulder disorders

Intra-articular corticosteroid injections recommended in the management of:

- rotator cuff tendinitis
- adhesive capsulitis
- Sub-acromial bursitis
- partial rotator cuff tears
- full thickness rotator cuff tears (in elderly or less active patients) (after 4-6 weeks)

*The Shoulder: Klippel & Dieppe, chapter 4.7.11*

# Long-term follow-up of shoulder disorders

- Natural history?
- 108 elderly patients reviewed at 3 years: one-third still disabled; 21% unable to perform personal care
- Same in those with and without injections

*Vecchio et al, B J Rheumatol 1995*

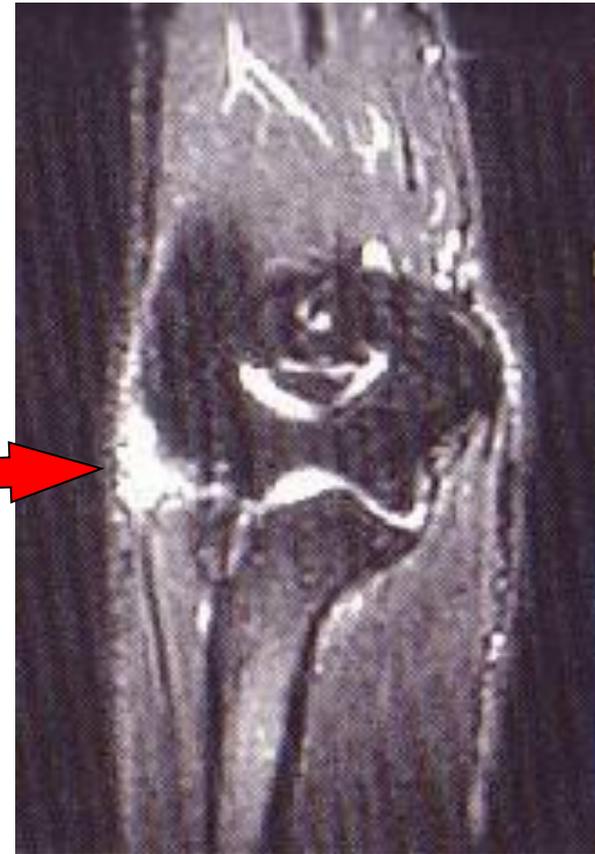
# Clinical diagnosis of shoulder disorders in practice

- Difficult to do in primary care setting
- Much easier in orthopaedic clinics!
- Imaging also helps
- In practice, aim to rule out unusual pathology..
- Otherwise, **painful, stiff shoulder**
- May be aggravated by lifting, working with arms above shoulder height, sustained abnormal posture, forces, pushing/pulling
- Physiotherapy and steroid injections

# Lateral and medial epicondylitis

- Tendinopathy of the common extensor tendon (lateral) or the common flexor tendon (medial)
- Local pain and tenderness increased by gripping
- Provocation tests aggravate pain
- Men=women, 40-60 years
- Tennis players, manual workers

Lateral epicondylitis



# Risk factors for lateral and medial epicondylitis

- Lateral epicondylitis associated with manual work (OR 4.0, 95% CI 1.9-8.4).
- Repetitive bending/straightening elbow > 1 hour day was independently associated with lateral (OR 2.5, 95% CI 1.2-5.5) and medial epicondylitis (OR 5.1, 95% CI 1.8-14.3).
- 5% of adults with epicondylitis took sickness absence because of their elbow symptoms in the past 12 months (median 29 days).

*Walker-Bone, 2011*

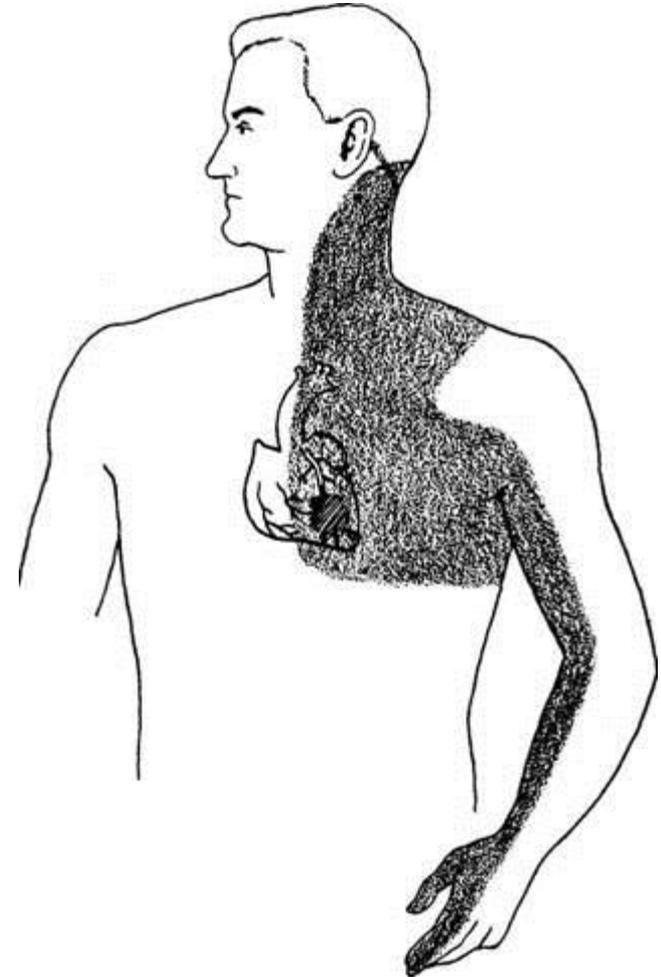
# Olecranon bursitis

- Common bursitis
- Pain, swelling, tenderness around posterior elbow
- Thickened bursa palpable
- History of trauma – blow or friction
- Septic, gout, arthritis
- Students, miners



# Referred arm pain (brachialgia)

- 'Sciatica' of the arm
- Dermatomal distribution of pain, sensory disturbance
- Associated with neck pain/restriction
- May be aggravated by some postures of the neck
- Neurological signs detectable
- Sensory disturbance
- History of trauma?



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# SPECIFIC disorders of the forearm, wrist, and hand

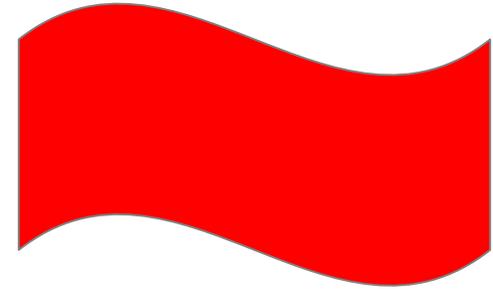
- Raynaud's syndrome / Vibration white finger
- Ganglion
- Dupuytren's contracture
- Trigger digit
- Carpal tunnel syndrome
- De Quervain's disease
- Tenosynovitis



# Raynaud's / Vibration white finger

- Raynaud's phenomenon
- Common in the general population
- Benign symmetrical coldness, dysaesthesiae of fingers
- Onset in teenage years
- Family history
- Girls > boys
- Fingers turn white then blue then red, induced by emotion / cold

# Red flags



- Onset in adulthood
- Asymmetry
- Males
- Recent-onset
- Joint pains, swelling, nailfold capillary abnormalities, carpal tunnel syndrome, positive autoantibodies – connective tissue disease

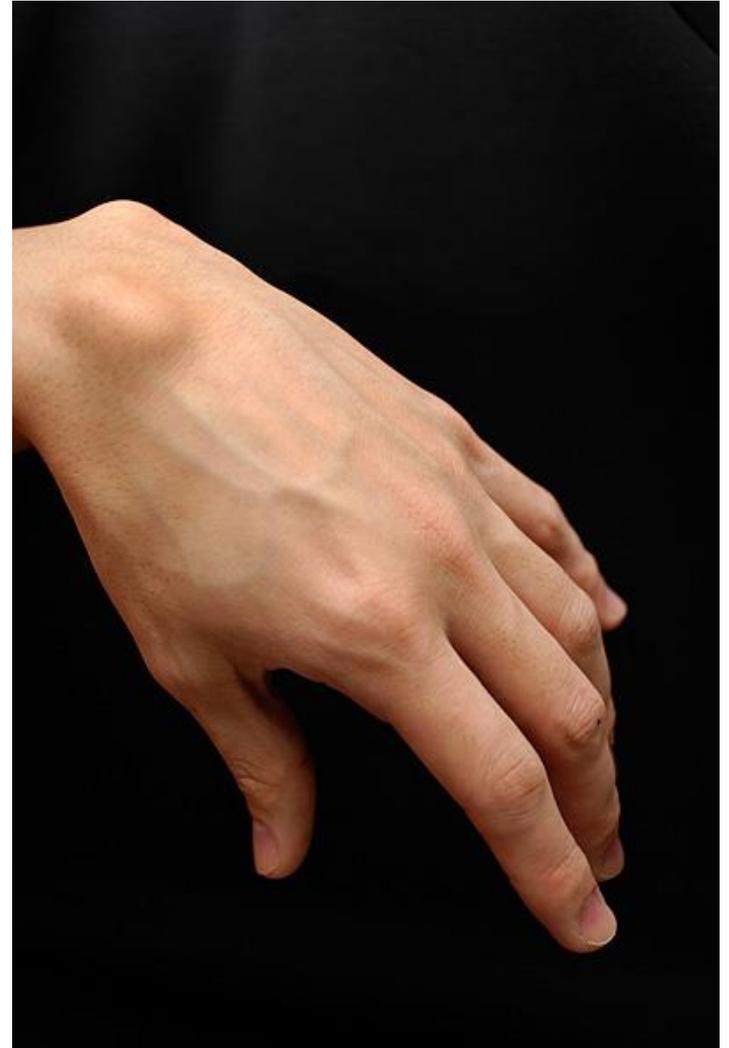
# Vibration white finger

- Use of vibrating tools – jack hammers, power tools, saws
- Probably dose-related
- Usually asymmetrical
- Aggravated by cigarette smoking
- People may apply for Industrial Injuries Disability Benefit
- BUT: although two International schemes for classification, experts disagree on diagnosis



# Ganglia

- Localised cystic swellings containing gelatinous fluid – tense but usually painless
- Communicate with an adjacent tendon sheath or joint capsule
- Common at the wrist
- Women > men, middle years, history of trauma common
- Some resolve spontaneously but can be injected or removed surgically – often recur
- ? Relationship with occupational factors



# Dupuytren's contracture

- Nodular thickening of palmar fascia
- Drawing fingers into flexion at MCP joints
- Men > women
- Increased with age
- Bilateral – dominant hand in unilateral
- Diabetes mellitus, heavy alcohol, epilepsy, heavy smoking, family history



# Trigger digit (stenosing tenosynovitis)

- Narrowing of the lumen of tendon sheath or expansion of tendon diameter
- Pain, reduced function, 'triggering', 'catching', 'clicking'
- Palpable nodule proximally
- Increases with age
- Dominant hand thumb, middle, ring fingers
- Women > men, 50-60 years, (congenital)
- Manual workers, diabetes

# Trigger finger - treatment

- Systematic review
  - Randomised controlled trials
  - Corticosteroid injection
  - Tenosynovitis (trigger finger)
- Results
  - Four trials
    - Two trials – injection / placebo
  - 285 patients (297 digits)
  - Methodological limitations
  - Evidence of efficacy

Corticosteroid Injections in the Treatment of Trigger Finger: A Level I and II Systematic Review

Sheryl B. Fleisch, BS  
Kurt P. Spindler, MD  
Donald H. Lee, MD

**Abstract**  
Trigger finger is a tendinitis (stenosing tenosynovitis) with multiple management approaches. We conducted an evidence-based medicine systematic review of level I and II prospective randomized controlled trials to determine the effectiveness of corticosteroid injection in managing trigger finger. MEDLINE, Cochrane database, and secondary references were reviewed to locate all English-language prospective randomized controlled trials evaluating trigger finger treatment. Four studies using injectable corticosteroids were identified, based on the following inclusion criteria: all were prospective randomized controlled trials of adults with >85% follow-up. This review indicates that the incidence of trigger finger is greatest in women (75%), with an average patient age range of 52 to 62 years. Combined analysis of these four studies shows that corticosteroid injections are effective in 57% of patients.

Multiple approaches are available for managing trigger finger. Splinting, corticosteroids (either single or multiple injections), percutaneous surgery, and open surgery are all established means of treatment. The many published articles that address methods of managing trigger finger are predominantly retrospective and are confounded by significant bias. A survey of the available literature without regard to evidence-based medicine (EBM) showed that splinting was effective in relieving trigger finger in 55% to 66% of patients.<sup>5,6</sup> A single injection of corticosteroid relieved symptoms in 47% to 87% of patients with trigger finger.<sup>7-11</sup> No data are available on recurrence of trigger finger symptoms with splinting. However, the recurrence of trigger finger with corticosteroid injection

Ms. Fleisch is Medical Student, Vanderbilt University School of Medicine, Nashville, TN. Dr. Spindler is Professor and Vice Chairman, Department of Orthopaedics/Sports Medicine, Vanderbilt Orthopaedic Institute, Nashville. Dr. Lee is Professor, Department of Orthopaedics, Vanderbilt Orthopaedic Institute.

None of the following authors has received anything of value from or owns stock in a commercial company or institution related directly or indirectly to the subject of this article: Ms. Fleisch, Dr. Spindler, and Dr. Lee.

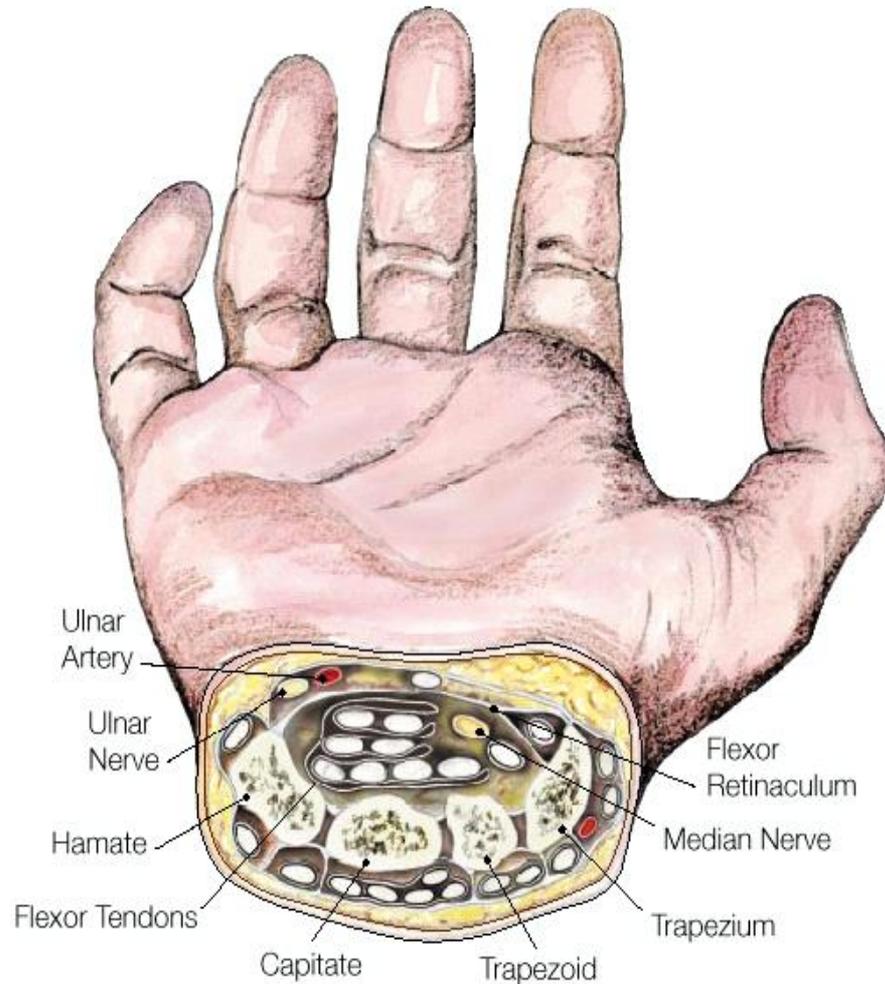
Reprint requests: Dr. Lee, Vanderbilt Orthopaedic Institute, Medical Center East, South Tower, Suite 3200, 1215 21st Avenue, Nashville, TN 37232-8828.

*J Am Acad Orthop Surg* 2007;15:166-171

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Journal of the American Academy of Orthopaedic Surgeons

# Carpal tunnel syndrome



# Clinical features of carpal tunnel syndrome

- Pain, tingling and dysaesthesia in the palmar aspect of the hand, in a 'median nerve distribution'
- Nocturnal exacerbation
- Weakness of grip
- Tinel's sign, Phalen's sign, weakness and wasting thenar eminence, sensory disturbance
- Nerve conduction studies – BUT not 'gold standard'
- Women > men, 45-54 years, obesity, family history, hormonal factors, hand/wrist arthritis, endocrine disease, the pill, HRT, pregnancy
- Prevalence around 5%, but increased in 'high risk' industries: repetitive work, forceful work, adverse wrist posture, ?keyboard users

# Treatment of carpal tunnel syndrome

- Conservative
  - Nocturnal splints
  - Diuretics
  - Oral corticosteroids
  - Corticosteroid injections

# Non-surgical treatment of Carpal Tunnel Syndrome

- Systematic review
  - 2 systematic reviews
  - 16 randomised controlled trials
  - Non-surgical management
  - Carpal tunnel syndrome
- Results
  - Corticosteroid injections
    - Short-term relief
  - Oral corticosteroids
    - Lesser effect

## What Can Family Physicians Offer Patients With Carpal Tunnel Syndrome Other Than Surgery? A Systematic Review of Nonsurgical Management

Felicity Goodyear-Smith, MB, ChB, MGP

Bruce Arroll, MB, ChB, PhD  
Department of General Practice & Primary Health Care, Faculty of Medical & Health Sciences, The University of Auckland, Auckland, New Zealand



### ABSTRACT

**BACKGROUND** We undertook a literature review to produce evidence-based recommendations for nonsurgical family physician management of carpal tunnel syndrome (CTS).

**METHODS** Study design was systematic review of randomized controlled trials (RCTs) on CTS treatment. Data sources were English publications from all relevant databases, hand searches, and guidelines. Outcomes measured were nonsurgical management options for CTS.

**RESULTS** We assessed 2 systematic reviews, 16 RCTs, and 1 before-and-after study using historical controls. A considerable percentage of CTS resolves spontaneously. There is strong evidence that local corticosteroid injections, and to a lesser extent oral corticosteroids, give short-term relief for CTS sufferers. There is limited evidence to indicate that splinting, laser-acupuncture, yoga, and therapeutic ultrasound may be effective in the short to medium term (up to 6 months). The evidence for nerve and tendon gliding exercises is even more tentative. The evidence does not support the use of nonsteroidal anti-inflammatory drugs, diuretics, pyridoxine (vitamin B<sub>6</sub>), chiropractic treatment, or magnet treatment.

**CONCLUSIONS** For those who are not able to get surgery or for those who do not want surgery, there are some conservative modalities that can be tried. These modalities include ones for which there is good evidence. It would be reasonable to try some of the techniques with less evidence if the better ones are not successful. Reconsideration of surgery must always be kept in mind to avoid permanent nerve damage.

*Ann Fam Med* 2004;2:267-273. DOI: 10.1370/afm.21.

### INTRODUCTION

Carpal tunnel syndrome (CTS) is the most commonly occurring peripheral nerve compression syndrome, with a 10% lifetime risk of development.<sup>1</sup> It most often occurs after the age of 30 years, with women affected more than men by a factor of 3 to 1.<sup>2</sup> A US study of 1,016 patients at the Mayo Clinic found an incidence (cases per 100,000 person-years) of 99 (crude) overall. The age-adjusted rates were 52 for men, 149 for women, and 105 for both sexes combined.<sup>2</sup>

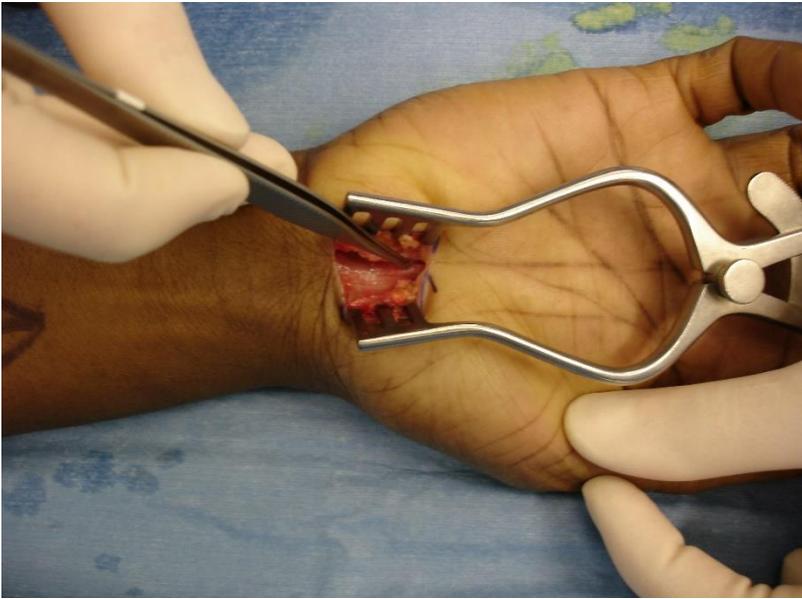
CTS involves median nerve compression at the level of the wrist. Median nerve entrapment can result in sensory and motor impairment, as well as pain in the hand and/or arm. There is no single reference standard for diagnosis of the syndrome, and a combination of symptoms, signs, and tests should be used to characterize the disorder.<sup>1</sup> Distinction should be made between CTS (a clinical syndrome involving a cluster of symptoms)

*Conflict of interest, none reported.*

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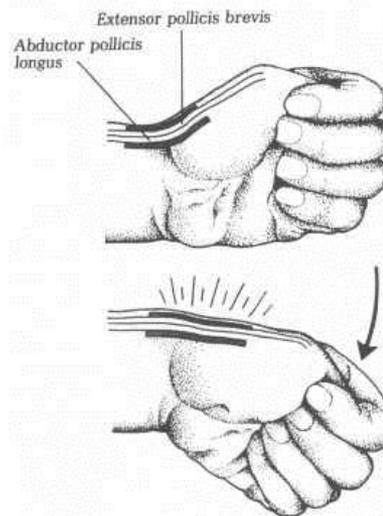
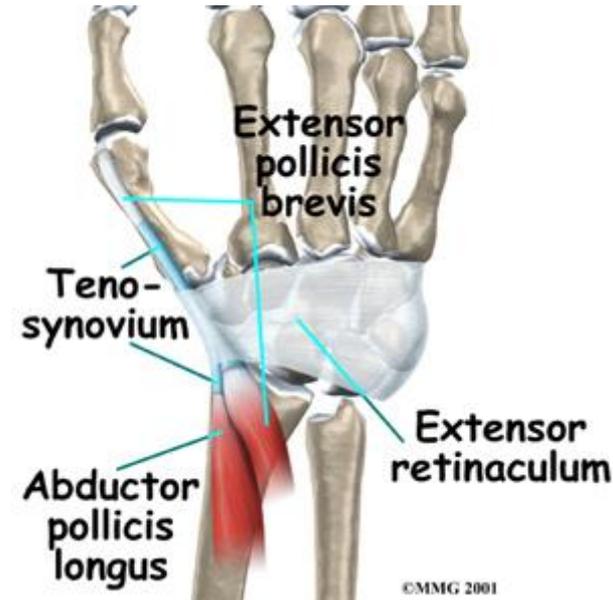
# Carpal tunnel release surgery



- Technical variations e.g. open vs endoscopic
- Sutures?
- Splinting post-op NOT recommended
- When safe to return to work post-op?
- Safe to return to work including vibration?

# De Quervain's disease

- At the common tendon sheath of extensor pollicis brevis and abductor pollicis longus
- 'washerwoman's wrist'
- Pain radial wrist on gripping, pinching, poor thumb function
- Finkelstein's test
- Women > Men, 40-60 years
- Rowers, manual workers



# Tenosynovitis of the hand/wrist

- Inflammation of the tendon sheath of one or more tendons (flexor/extensor)
- Swelling, local pain, warmth, redness, tenderness
- Pain on resisted movements
- Women > men, 40-60 years
- Manual workers: force, repetition, awkward posture



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# Non-specific forearm pain

- Pain, allodynia, sensory disturbance, hyperaesthesiae
- No physical signs of other conditions
- Women > men
- Higher social classes
- Younger patients
- Clerical workers
- Mechanism unknown

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Daily Mail, Saturday, September 18, 1999

Daily Mail Reporter

## £25,000 for RSI victim caught in a mouse trap

A GRAPHIC designer who claimed she was never shown how to use a computer mouse has been awarded £25,000 damages for repetitive strain injury.

Michelle Gould, 26, said she experienced so much pain in her hands and arms that everyday tasks became impossible after using the mouse for up to six hours a day while working for Shell UK.

Following a three-day hearing at Colchester County Court, Judge Nicholas Brandt ruled that the company was at fault for failing to correct the way she used the mouse. She had shown him how she held it with her hand, wrist and forearm unsupported.

Miss Gould, from Braintree, Essex, joined Shell in 1991 and worked in central London. She started suffering pain around two years later. Her employers sent her to a doctor and reduced her workload.

"But in time the workload increased again and before I knew it I was suffering the same symptoms," she said. "I used to come home in tears many days with pain. It affected my life outside work. I could not do my husband's work was difficult. Eventually, I had to leave."

Her solicitor Mr Peter Richbell said: "She used the mouse a lot more than most people because she was working on complex graphs and images."

Mr Richbell, whose firm specialises in personal injury claims, believes this may be the first successful case linking RSI to use of a mouse. He said Miss Gould had almost recovered from the condition, but was having to consider a career change.

"Her symptoms have lessened even though she does get the odd twinge," he said. "But it has been her life ambition to work in graphic design and this has certainly affected her career prospects."

A Shell UK spokesman said: "We are very disappointed by the outcome of this case, particularly in view of very positive comments made by the judge about Shell as a caring employer. Shell takes any kind of work-related injury extremely seriously."

He said the company's legal advisers would decide whether to appeal after they studied the full judgment.

Jenny Hope, Medical Correspondent, writes: "About 200,000 people suffer RSI, which is now the main health problem linked to working with computers, keyboards and screens. Sufferers battled against sceptical doctors and employers for years but there has been a string of high-profile compensation cases and, more importantly, medical research into the condition."

The debate arose because RSI has been confused with injuries which have afflicted factory workers for 200 years.

Doctors could understand how the constant forceful repetitive movements of a chicken plucker or heavy machine operator could cause damage but the comparative movements in tapping a keyboard or clicking a mouse seemed trivial.

But research has proved that rapid finger and wrist activity for hours on end places intolerable strain on tendons and muscles. Discomfort turns to constant pain, weakness and neuritis which makes everyday activities such as washing up or gripping cutlery almost impossible.

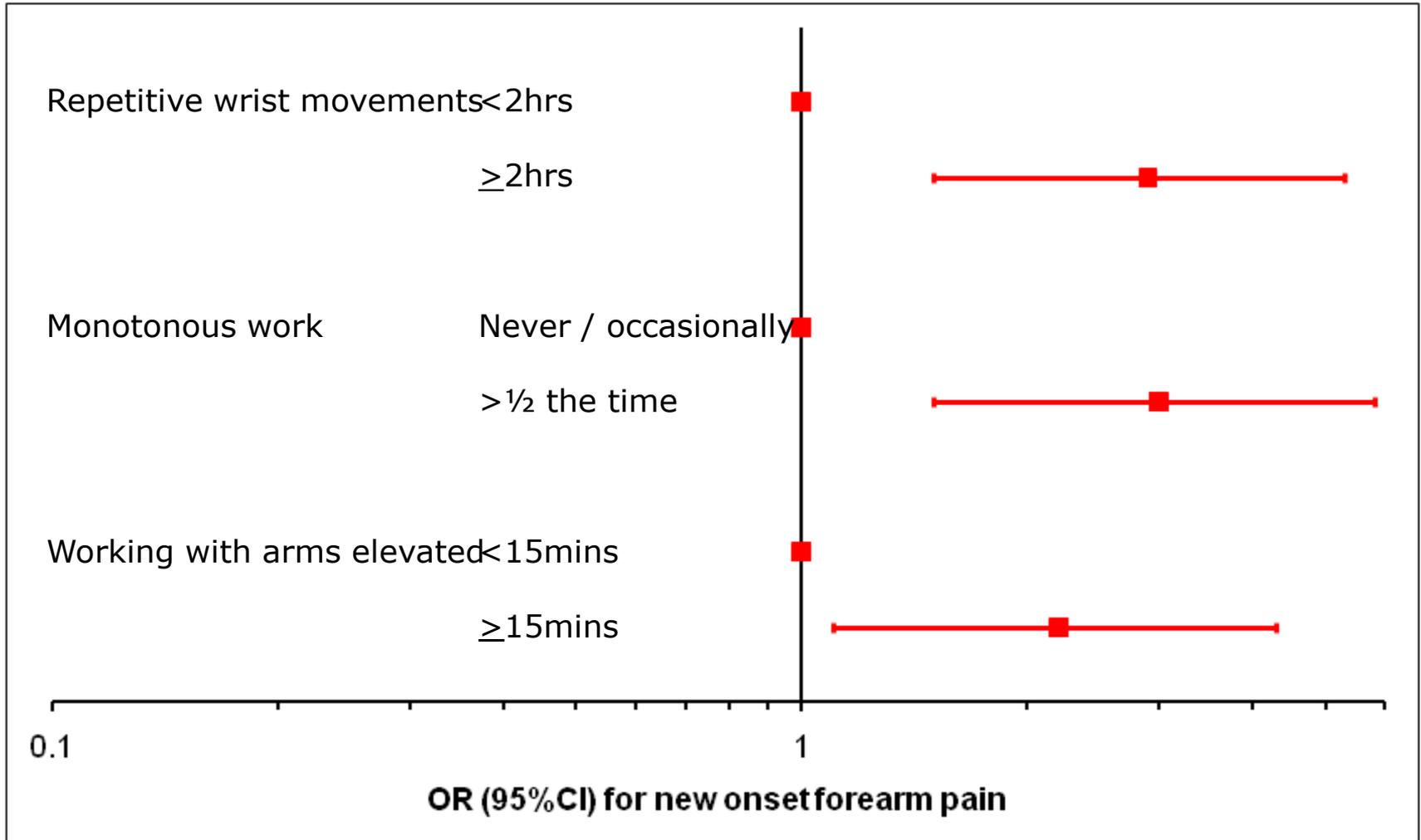
The Government's Health and Safety Executive now lists work-related upper limb disorders (an alternative name for RSI) as the main health problem working with VDUs and one of the main causes of sickness absence.

Hard-working individuals are most at risk because they ignore warning aches and pains in their determination to get the job done, but poorly designed desks and equipment and lack of proper breaks also contribute.

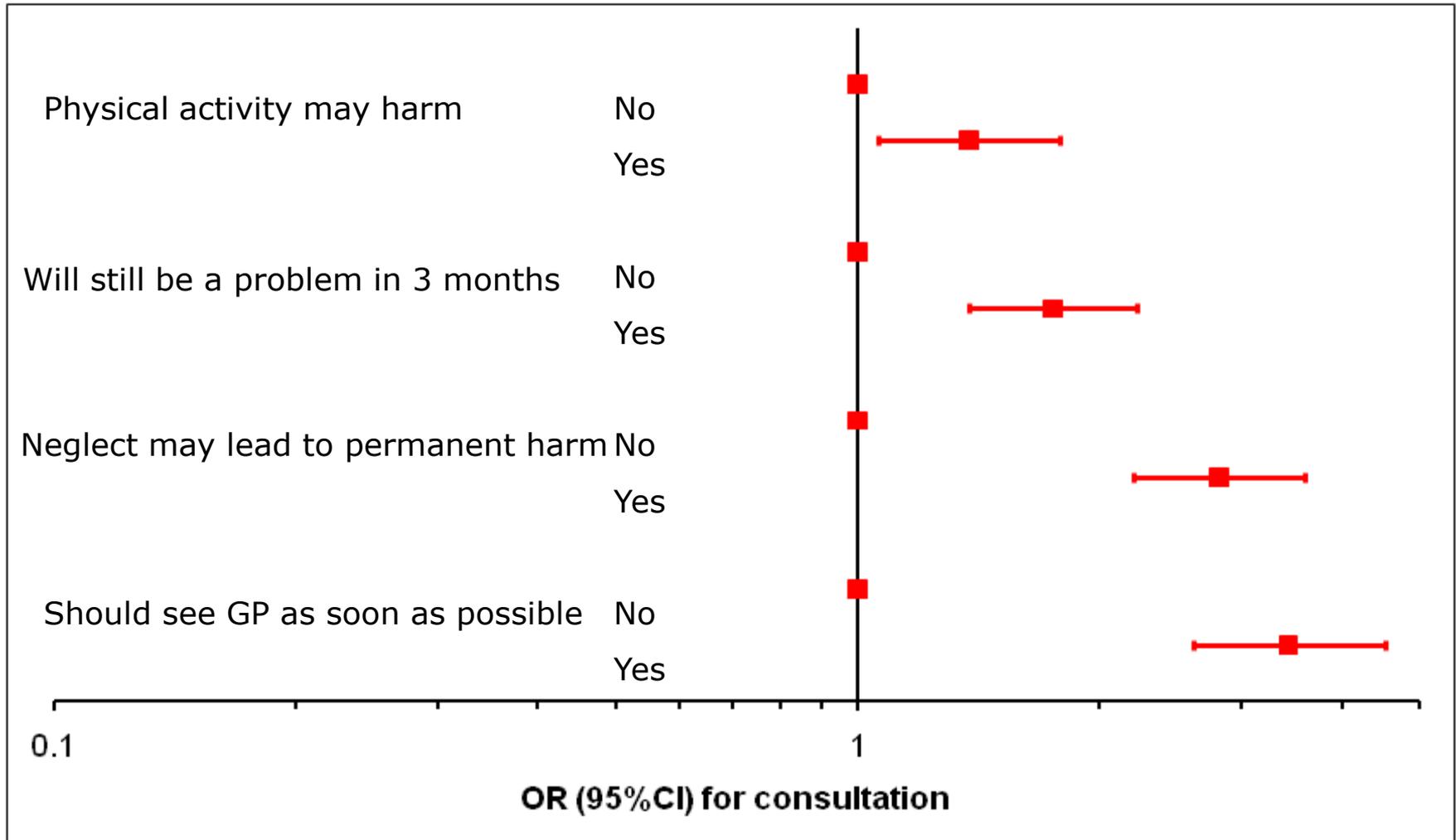


Miss Gould using a different type of mouse

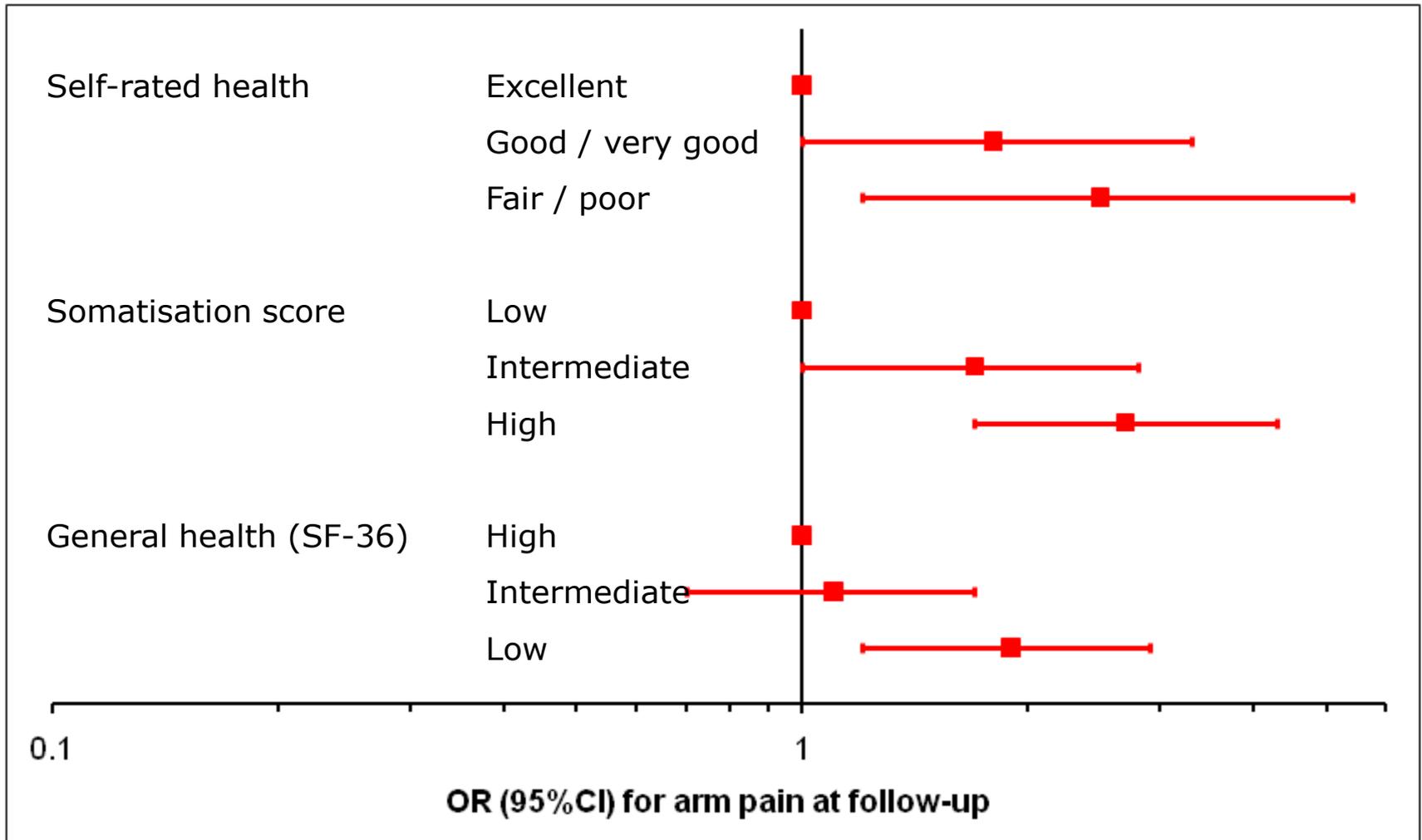
# Independent Risk Factors



# Beliefs about arm pain generally



# Health versus Prognosis



# ... Is non-specific arm pain like low back pain?

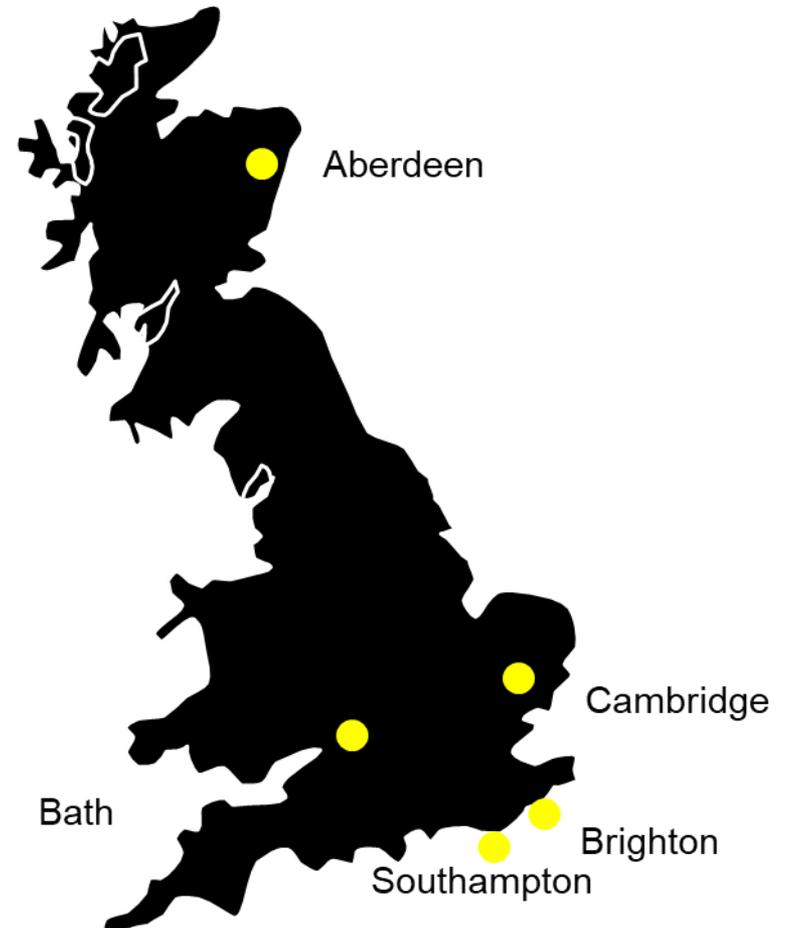
- Mechanical and psychosocial risk factors
- 'Epidemics' in workplaces – beliefs are important
- Is medicalisation unhelpful?

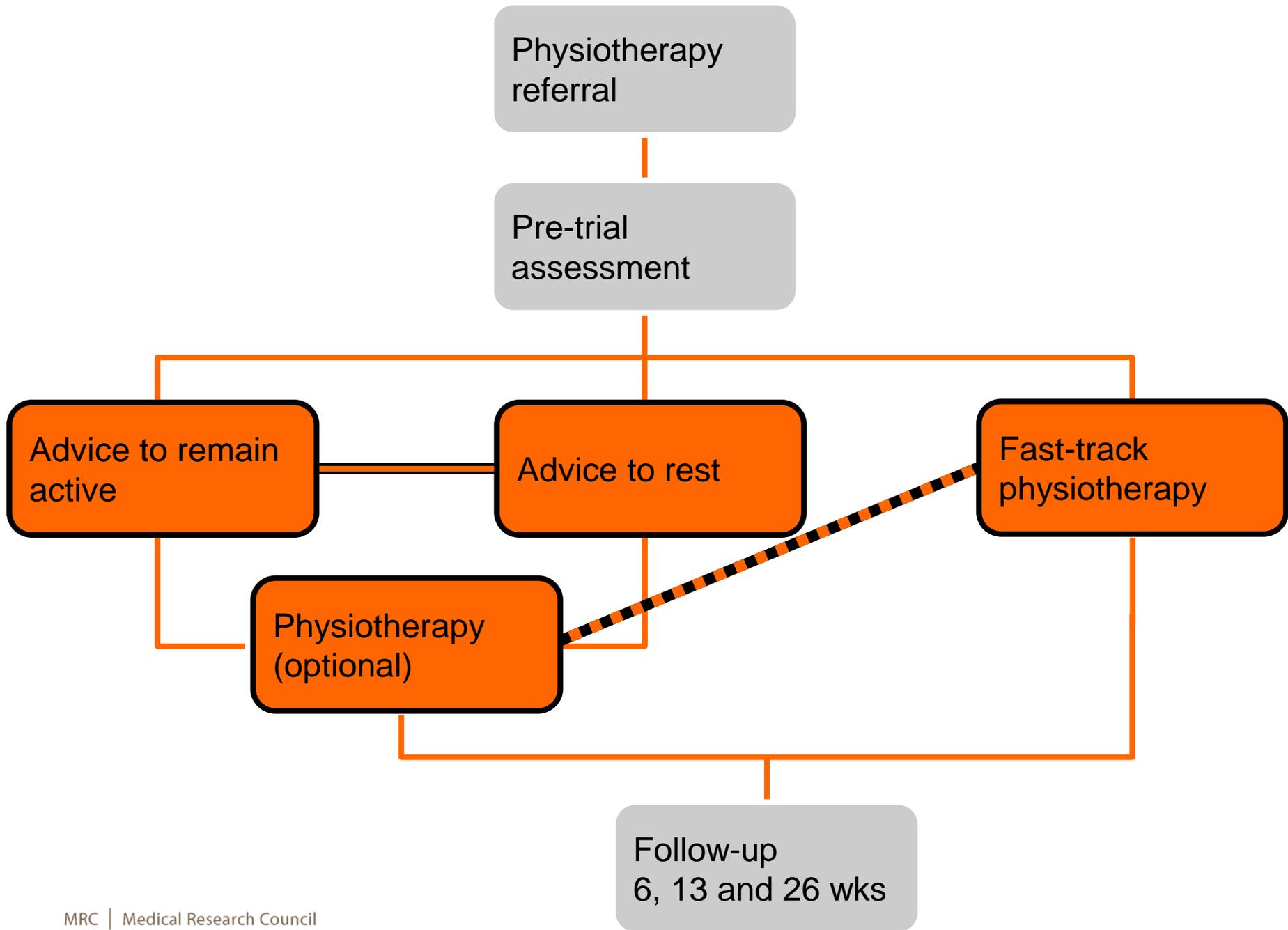
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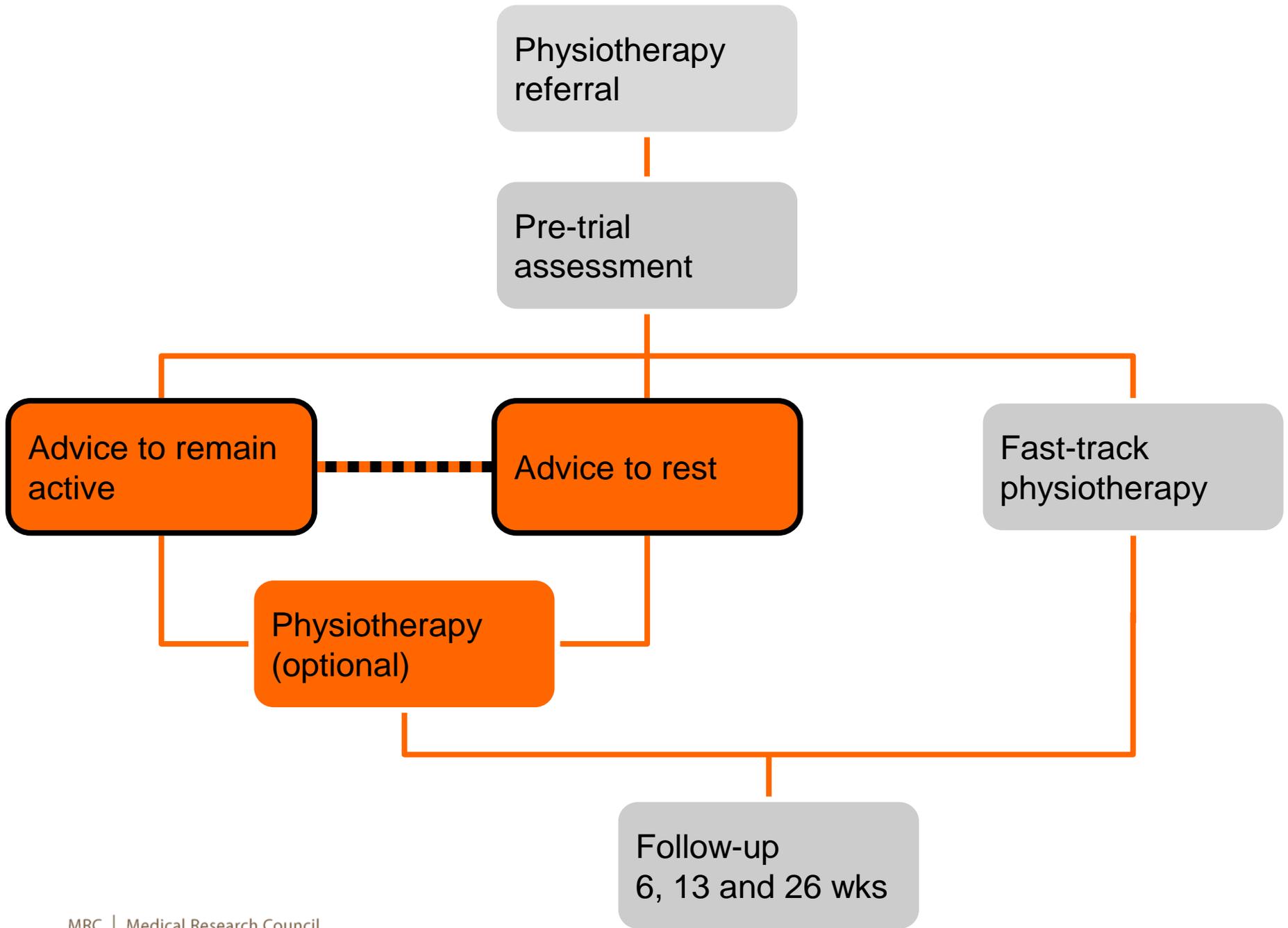
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# ARM pain RCT

- Among patients referred to physiotherapy with an episode of distal arm pain . . . .
- . . . advice to remain active and maintain usual participation results in a long-term reduction in arm pain and disability, compared with advice to rest the arm







# Treatment: Group 1

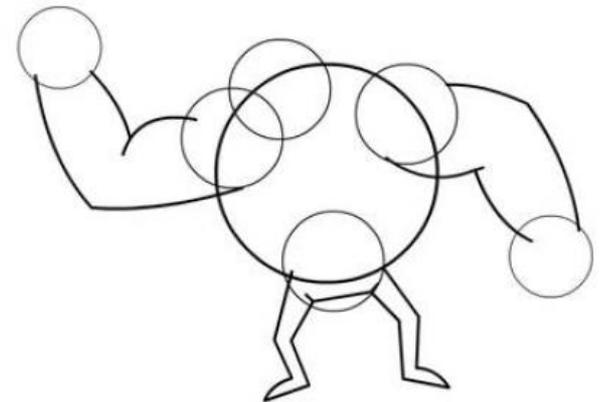
## Advice to remain active

- Upper limb pain is common
- Early RTW is (probably) helpful
- Lasting damage is rare
- Recovery can be expected
- Many cases settle with self-management
- Maintaining activity is (probably) helpful

## ARM PAIN

**how to deal with it:**

→keep active to recover quickly



# Treatment: Group 2

Material available via  
NHS-Direct

- Advice to rest
  - Biomedical “injury-diagnosis-treatment” model
  - Advice about rest and avoidance of activity
- Similar in length and format

**ADVICE AND GUIDANCE ON  
ARM PAIN**

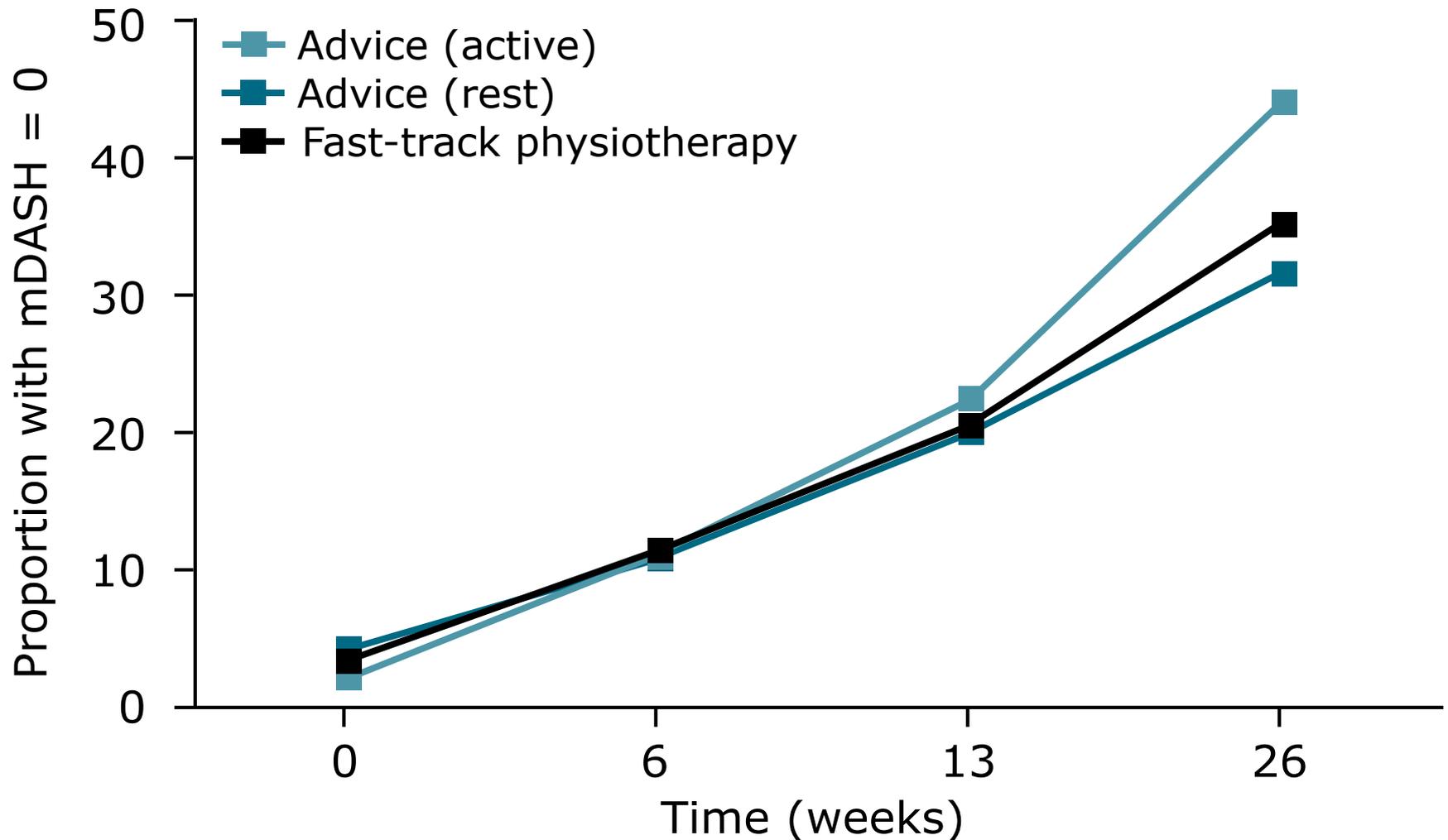
**causes; diagnosis; treatment**



# ARM pain trial: the results

- 539 patients recruited
- Randomised evenly to three groups
- Mean age 49 years (SD 13.6)
- 54.5% female
- 87.6% right-handed
- Equal distribution of pain in elbow, hand/wrist or both
- Pain most common in dominant arm (45.5%) or bilateral (24.7%)

# The arm pain trial: Disabilities of the Arm, Shoulder and Hand (DASH)



## Results (3)

- Advice to rest associated with a 0.56 odds of (95% CI 0.36, 0.87) meeting the primary outcome at 26 weeks

# Conclusion

- Upper limb pain is common
- Specific disorder or non-specific pain?
- In the workplace, our role must focus on excluding serious pathology through history and examination
- Try to de-medicalise, reassure, pain relief
- Explore psychological and psychosocial factors
- ?Avoid workplace activities
- Try to keep in the workplace
- Role for CBT, early physiotherapy..



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- Dr Neil Basu
- Prof Steve Bevan
- Prof Marijn de Bruin
- Prof Anthony Bull
- Prof Kim Burton
- Prof Susan Cartwright
- Prof David Coggon
- Prof Cyrus Cooper
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