



*Centre for*

# CLINICAL EFFECTIVENESS

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## EVIDENCE CENTRE CRITICAL APPRAISAL

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### REQUEST:

Does physiotherapy after Colles' fracture affect patient satisfaction and outcomes?

### REQUEST MADE BY:

**Ms Sarah Goldsmith & Ms Paula Harding**, manipulative physiotherapists at Monash Medical Centre, Clayton, approached the Centre in July 1998 requesting a critical appraisal of the evidence for effectiveness of physiotherapy after Colles' fracture on patient satisfaction and outcomes. This appraisal covers most of the available material. Material relating to case studies, letters to editors, short (<2 page length) reviews and some clinical studies have not been included since these were assessed as offering no additional relevant information.

### DATE OF REPORT:

16 September 1998.

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### DISCLAIMER

The information is an appraisal of the best available current evidence. It is primarily designed to give readers a starting point to consider the currently available research evidence. Readers should not use the comments made in isolation but should have read the literature suggested. Readers should also be aware that more appropriate research might have become available since the request was dealt with.

## INTRODUCTION

### Centre for Clinical Effectiveness

The Centre for Clinical Effectiveness exists to enhance patient outcomes through the clinical application of evidence-based research. The Public Health Division, Department of Human Services, Victoria, and the Southern Health Care Network fund the Centre. Amongst other programs, the Centre operates the Evidence Centre which accepts requests to identify and critically appraise the available evidence on particular clinical topics. The service operates for staff of the Southern Health Care Network, especially Program Directors, to use the information provided to influence medical planning and decision-making.

### Search Strategy

Injury terms:	Colles' fracture, radial fracture, distal radius
Therapy terms:	physiotherapy, physical therapy, manual therapy, exercises, rehabilitation, mobilisation, passive mobilisation
Outcome terms:	patient satisfaction, patient perception, patient outcomes, functional status, treatment outcomes, outcome assessment

### Searching & Reporting Constraints

We have included only those reports whose full text English language article was published within the last five years and available to us before 8 September 1998. This excluded a number of articles we believed offered little or no additional relevant information and some articles ordered through the inter-library loan procedure that did not arrive by this date. Subjects were adults of either sex with Colles' fracture who underwent physiotherapy or no physiotherapy.

## SEARCH RATIONALE

The Centre for Clinical Effectiveness Evidence Centre searches for best available evidence by a strategy that incorporates two factors:

1. A hierarchy that reflects methodological quality, that is, the likelihood of systematic bias affecting the research results reported.
2. A desire to limit the amount material obtained if adequate, sound, research summaries already exist.

The Evidence Centre goes first to databases that enable us to identify systematic reviews, then evidence-based clinical practice guidelines or health technology assessments, then individual randomised controlled trials. If adequate, sound, summaries of the best evidence available are found in this way then individual research trials are not included in the report. If adequate summaries are not found our search strategy becomes considerably broader and may incorporate individual studies that may be more prone to bias, less generalisable, or have other difficulties identified through our critical appraisal of their methodology. For this reason, when citing research, we define the NHMRC Level of Evidence appropriate for each study.

## LEVELS OF EVIDENCE

The quality of the evidence presented in this report was systematically assessed and classified according to the NHMRC's *Guidelines for the Development and Implementation of Clinical Practice Guidelines* (1995):

Level I	Evidence obtained from a systematic review or a meta-analysis of at least two relevant randomised controlled trials
Level II	Evidence obtained from at least one properly designed randomised controlled trial
Level III	Evidence from well designed controlled trials without randomisation, well-designed cohort or case-control analytic studies preferably from more than one centre or research group, or multiple time series with or without the intervention
Level IV	Opinions of respected authorities, based on clinical experience, descriptive studies or reports of expert committees

## DATABASES

We searched the following databases and websites in this order:

Cochrane Library CD-ROM  
 Best Evidence CD-ROM  
 OVID Medline  
 CINAHL  
 Bandolier  
 Agency for Health Care Policy and Research (AHCPR)  
 NHS Centre for Reviews and Dissemination (NHS CRD)  
 Health Information Research Unit (HIRU)  
 Aggressive Research Intelligence Facility (ARIF)  
 Turning Research into Practice (TRIP)  
 Canadian Medical Association Online (CMA Online)  
 American Association of Orthopedic Surgeons (AAOS)  
 Cliniweb  
 Medscape  
 MedMark  
 Medical World Search  
 Medical Matrix  
 Australian Physiotherapy Association  
 American Association of Physical Therapists  
 Manipulative Australian Physiotherapy Association

## RESULTS

From these sources we identified and appraised:

Evidence-based clinical practice guidelines	0
Non-evidence-based clinical development and use guidelines	0
<b>Systematic reviews or meta-analyses</b>	<b>1</b>
<b>Randomised controlled trials</b>	<b>5</b>
Well-designed controlled trials, cohort or case-control analytic studies	0
Concurrent comparisons	0
<b>Descriptive case series</b>	<b>1</b>
Consensus reports, narrative reviews	0
Economic studies	0

We are reasonably confident these figures represent the most important findings published to date by those considered experts in the field.

## References appraised:

Coyle, J.A. & Robertson, V.J. Comparison of two passive mobilizing techniques following Colles' fracture: a multi-element design. *Manual Therapy* 1998; 3: 34-41.

Kelly, A.J.; Warwick, D.; Crichlow, T.P. & Bannister, G.C. Is manipulation of moderately displaced Colles' fracture worthwhile? A prospective randomized trial. *Injury* 1997; 28: 283-287.

McPhate, M. & Robertson, V.J. Passive mobilisation in the physiotherapy treatment of Colles fracture. Conference proceedings: Manipulative Physiotherapist Association Meeting 1997: 121-122. Nov 26-29, Melbourne, Australia.

Millett, P.J. & Rushton, N. Early mobilization in the treatment of Colles' fracture: a 3 year prospective study. *Injury* 1995; 26: 671-675.

Murphy, N.M.; Madhok, R.; Handoll, H.H.G. & Dias, J.J. Treatment of distal radial fractures in skeletally mature individuals (Cochrane Review). In: *The Cochrane Library*, Issue 3, 1998. Oxford: Update Software.

Oskarsson, G.V.; Hjal, A. & Aaser, P. Physiotherapy: an overestimated factor in after-treatment of fractures in the distal radius? *Archives of Orthopaedic & Trauma Surgery* 1997; 116: 373-375.

Taylor, N.F. & Bennell, K.L. The effectiveness of passive joint mobilisation on the return of active wrist extension following Colles fracture: a clinical trial. *New Zealand Journal of Physiotherapy* 1994; April: 24-28.

## References for critical appraisal that did not arrive at the Centre for Clinical Effectiveness by September 8:

Hutchinson F. Decision making in distal radius fractures. *Journal of the Southern Orthopaedic association* 1995; 4: 290-306.

Flinkkila T., Raatikainen T. & Hamalainen M. AO and Frykman's classifications of Colles' fractures - no prognostic value in 652 patients evaluated after 5 years. *Acta Orthopaedica Scandinavica* 1998; 69: 77-81.

<p>EVIDENCE REPORT SUMMARY TABLE</p> <p><b>PHYSIOTHERAPY INTERVENTION AND PATIENT SATISFACTION FOLLOWING COLLES FRACTURE</b></p>	<p><b>STUDY DESIGN &amp; NHMRC LEVEL OF EVIDENCE</b></p>	<p><b>DESCRIPTION:</b> Patients, Interventions, Comparisons, Outcomes, Inclusion &amp; exclusion criteria.</p>	<p><b>VALIDITY:</b> Methodology, rigour, selection, opportunities for bias.</p>	<p><b>RESULTS:</b> Generally favourable or unfavourable, specific outcomes of interest, estimate of experimental effect and precision if appropriate</p>	<p><b>AUTHORS' COMMENTS:</b> Risk/benefit, limitations</p>	<p><b>REVIEWERS' COMMENTS:</b> Risk/benefit, methodology, conclusions</p>
<p>Murphy,N.M.; Madhok,R.; Handoll,H.H.G. &amp; Dias,J.J. Treatment of distal radial fractures in skeletally mature individuals (Cochrane Review). In: The Cochrane Library, Issue 3, 1998.Oxford: Update Software.</p>	<p>Protocol for systematic review. Level I evidence.</p>	<p><b>Patients:</b> either sex who have completed skeletal growth with a displaced fracture of the distal radius (classified according to Cooney et al 1990).</p> <p><b>Intervention:</b> All randomised comparisons of the following interventions with placebo, no intervention or an alternative intervention, in the treatment of the distal radius: a) no reduction with external symptomatic support (i.e. plaster, wrist brace); b) reduction of the fracture with: i) static external splintage or ii) cast bracing or iii) internal fixation or iv) external fixation or v) percutaneous pinning or vi) temporary bone scaffold material or any combination of the above..</p> <p><b>Outcome:</b> anatomical reduction (radial length, shift &amp; angle, dorsal shift, total radiological deformity); functional outcomes (range of movement, pain, grip strength, activities of daily living); clinical outcomes (residual soft tissue swelling, local complications, cosmetic appearance, patient satisfaction with treatment, number of outpatient attendances, osteoarthritis, cost-benefit analysis). Exclusions: not reported.</p>	<p><b>Search strategy:</b> any randomised or quasi-randomised clinical trial of intervention found by searching Medline.</p> <p><b>Assess individual validity:</b> pending.</p> <p><b>Consistent results:</b> pending.</p> <p><b>Potential for bias:</b> since this review is part of the Cochrane Library, any bias should be eliminated or defined before searching and collection of data. However, the search strategy is not explicit, particularly with respect to how far back the search will go and other resources examined.</p>	<p>U/K: this review is currently underway and the first results are expected in October 1998.</p>	<p>"...(this systematic review will) determine what is the most appropriate treatment for displaced fractures of the distal radius."</p>	<p>This review is currently underway and the results are expected to be published in the Cochrane Library before the end of 1998.</p>

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<p>Coyle, J.A. &amp; Robertson, V.J. Comparison of two passive mobilizing techniques following Colles' fracture: a multi-element design. Manual Therapy 1998;3:34-41.</p>	<p>Randomised controlled trial. Level II evidence.</p>	<p><b>Patients:</b> n=8 women &gt;30 years; mean age 65 (range 31-82); each referred by orthopaedic surgeon or GP following type I or III Colles' fracture treated with 6 weeks cast immobilisation; 2 sessions per week for 3 weeks. <b>Intervention:</b> each patient underwent 2 passive treatment techniques in each session: oscillation &amp; sustained stretch. <b>Outcome:</b> range of active wrist extension, pain, grip strength. <b>Exclusions:</b> inflammatory arthritis, orthopaedic or neurologic problems affecting limb.</p>	<p><b>Randomisation:</b> to order of intervention, yes, as per table in paper, but only for first 4 patients then intervention order redesigned for last 4 patients. <b>Follow up:</b> only for 6 sessions. <b>Blinding:</b> yes, by independent observers. <b>Similar groups:</b> not reported. <b>Potential for bias:</b> few functional parameters assessed; low number of patients; only the first 8 patients who met the inclusion criteria were entered into trial; patients were their own control.</p>	<p>Both passive mobilising techniques increased the range of wrist extension, but, if pain was present, oscillations were more effective. Sustained stretches were more effective in the absence of pain or in a series of treatments.</p>	<p>"...both techniques produce increases in the range of wrist extension following Colles' fracture, but their relative effectiveness depends when they are used in a session and across a series of sessions."</p>	<p>Be aware that although this a randomised controlled trial, all patients received both sets of treatment and were therefore their own control.</p>

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<p>Kelly,A.J.; Warwick,D.; Crichlow,T.P. &amp; Bannister,G.C. Is manipulation of moderately displaced Colles' fracture worthwhile? A prospective randomized trial. Injury 1997;28:283-287.</p>	<p>Randomised controlled trial. Level II evidence.</p>	<p><b>Patients:</b> n=30 women; mean age 75 +/- 7 years; all presenting with moderately displaced (between 10 &amp; 30 degrees) distal radial fractures. <b>Intervention:</b> n=13 experimental (reduction under Bier's block; plaster immobilisation &amp; manipulation); n=14 control (plaster immobilisation only). <b>Outcome:</b> radiological assessment; functional assessment as per demerit point scale of Gartland &amp; Werley; grip strength; algodystrophy; pain; swelling; stiffness; vasomotor changes; pressure sensitivity; cosmetic appearance. <b>Exclusions:</b> &lt;65 years; previous ipsilateral forearm fractures.</p>	<p><b>Randomisation:</b> yes - using prenumbered envelopes. <b>Follow up:</b> radiology assessment after 5 weeks; all completed 13 weeks therapy after removal of plaster. <b>Blinding:</b> no. <b>Similar groups:</b> yes. <b>Potential for bias:</b> only elderly women examined.</p>	<p>Nil difference in terms of radiological assessment, functional assessment grip strength, algodystrophy. 11/15 experimental and 9/15 control considered wrist of normal appearance .</p>	<p>"There was no detectable difference between the groups in any of the outcome measures. Two thirds of the correction of dorsal angulation achieved by manipulation was lost by 5 weeks.....therefore up to 30 degrees of dorsal angulation and 5mm of radial shortening may be accepted in selected elderly patients."</p>	

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<p>McPhate, M. &amp; Robertson, V.J. Passive mobilisation in the physiotherapy treatment of Colles' fracture. Conference proceedings: 1997 Manipulative Physiotherapist Association Meeting. Nov 26-29, Melbourne, Australia.</p>	<p>Randomised controlled trial. Level II evidence.</p>	<p><b>Patients:</b> n=32 women; age &gt;50 years; presenting at fracture clinic of 2 tertiary hospitals. <b>Intervention:</b> All pts treated by experienced manipulative physiotherapists following plaster removal and all received comprehensive regime of home exercises; experimental group (exercise instruction &amp; passive mobilisation); control group (exercise instruction only). <b>Outcome:</b> grip strength; pain; range of active wrist extension, patient compliance. <b>Exclusions:</b> not reported.</p>	<p><b>Randomisation:</b> yes - using prenumbered envelopes. <b>Follow up:</b> radiology assessment after 5 weeks; all completed 13 weeks therapy after removal of plaster. <b>Blinding:</b> yes - independent examiners assessed outcome measures. <b>Similar groups:</b> U/K. <b>Potential for bias:</b> presented as conference proceedings; only women assessed; group demographics not reported; follow up too short; no functional tests used; possibly too few patients.</p>	<p>Both initially and at follow up: nil difference between the two groups with respect to age, active range of wrist extension, grip strength, but level of pain decreased with mobilisation (<math>p &lt; 0.05</math>); on completion of treatment combined sample improved significantly in their range of wrist extension and grip strength (<math>p &lt; 0.0001</math>) but not in their levels of pain; no correlation between compliance and improvement in grip strength.</p>	<p>"...subjects treated with passive mobilisation reported a decrease in final pain after 4 treatments (~2 weeks after plaster removal). Those treated with exercises alone did not report any decreases in pain. Therefore, adding mobilising to a physiotherapy treatment regime following Colles fracture can significantly decrease pain."</p>	

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<p>Millett,P.J. &amp; Rushton,N. Early mobilization in the treatment of Colles' fracture: a 3 year prospective study. Injury 1995;26:671-675.</p>	<p>Randomised controlled trial. Level II evidence.</p>	<p><b>Patients:</b> n=90 consecutive women; mean age 60 years (range 22-88); presenting with unilateral Colles' fracture with no previous history of forearm or hand injury, normal forearm and hand function before injury, essentially normal contralateral forearm and hand. <b>Intervention:</b> control group n=45 treated non-operatively for 5 weeks with plaster immobilisation; experimental group n=45 treated same but plaster cast for 3 weeks followed by 2 weeks in a flexible Viscopaste cast. All fractures manipulated under local or general anaesthesia. No patient received formal physiotherapy. <b>Outcome:</b> radiological assessment; functional assessment (grip strength, ranges of motion, joint mobility, abduction &amp; adduction); pain, swelling &amp; disability. <b>Exclusions:</b> generalised rheumatic disease, inability to follow up.</p>	<p><b>Randomisation:</b> yes - but method not reported. <b>Follow up:</b> radiology and functional assessments up to 3 years following injury. 17 lost to follow up. <b>Blinding:</b> not reported. <b>Similar groups:</b> yes. <b>Potential for bias:</b> only women assessed; no blinding in study reported; randomisation method not described;</p>	<p>At 3 years: 1/3 of patients in both groups reported pain in injured wrist; 13% control pts &amp; 4% exp pts had wrist swelling; 36% control pts &amp; 27% exp pts had residual deformity; 10% control &amp; exp pts had mild disability; 33% control pts &amp; 22% exp pts had complications but pain, swelling, deformity, disability, complications were statistically significant); there was little radiographic difference between groups; exp pts had earlier return of grip and hand strength, earlier &amp; greater range of motion &amp; joint mobility.</p>	<p>"...early mobilisation after Colles' fracture has the potential not only to improve short-term functional recovery but also patient satisfaction. We found no evidence to suggest that early mobilisation was detrimental, and it may in fact slightly enhance return of grip strength and joint mobility after fracture of the distal radius."</p>	<p>This trial has long follow up which is better than other reported trials of therapy after Colles' fracture.</p>

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<p>Taylor,N.F. &amp; Bennell,K.L. The effectiveness of passive joint mobilisation on the return of active wrist extension following Colles' fracture: a clinical trial. New Zealand Journal of Physiotherapy 1994;April:24-28.</p>	<p>Randomised controlled trial. Level II evidence.</p>	<p><b>Patients:</b> n=30 (6M 24F); mean age 62 years (range 39-78); presenting to physiotherapy department of hospital following removal of plaster cast after Colles' fracture. <b>Intervention:</b> control group n=15 (1M 14F) received superficial heat (wax or hot pack), active exercises, home advice, sham mobilisation in the form of soft tissue massage to wrist and hand; experimental group n=15 (5M 10F) also received heat, exercise and advice and also 5 minutes of passive joint mobilisation. All conservatively managed with cast for 6 weeks; all treated twice a week until discharge from physiotherapy (as judged by physiotherapist, relating to acceptable range of wrist movement or failing to achieve further benefits from treatment). <b>Outcome:</b> range of active wrist extension. <b>Exclusions:</b> not reported.</p>	<p><b>Randomisation:</b> yes - but method not reported. <b>Follow up:</b> until discharge by therapist. <b>Blinding:</b> not reported. <b>Similar groups:</b> yes. <b>Potential for bias:</b> no blinding in study reported; randomisation method not described; few functional parameters assessed; 4 therapists (each with differing postgrad experiences) administered treatments who did not necessarily treat the same patients (or mix of control and experimental) throughout; subjective discharge criteria; low numbers of patients.</p>	<p>Amount and final range of wrist extension no different between groups, although all patients improved by end of treatment.</p>	<p>"...routine passive mobilisation of the wrist following Colles' fracture was no more effective in assisting the return of active wrist extension than soft tissue management."</p>	<p>This paper reports only 2 functional measurements - far fewer than other similar articles - and supports this by commenting that other assessments are inadequate. Patient satisfaction or comfort was not assessed. Authors undertook power analysis of data to confirm that sample size was sufficient for their study.</p>

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<p>Oskarsson,G.V.; Hjal,A. &amp; Aaser,P. Physiotherapy: an overestimated factor in after-treatment of fractures in the distal radius? Archives of Orthopaedic &amp; Trauma Surgery 1997;116:373-375.</p>	<p>Descriptive study. Level IV evidence.</p>	<p><b>Patients:</b> n=110 (17M 83F); mean age 58 (range 25-75); all treated for Colles' fracture at surgical department during 1989 with 4-6 weeks cast immobilisation. <b>Intervention:</b> instructed self-training (presumably n=60: 8M 52F) versus physiotherapy treatment (presumably in n=40: 9M 31F). <b>Outcome:</b> wrist movement, pain, grip strength. <b>Exclusions:</b> not reported.</p>	<p><b>Randomisation:</b> no <b>Follow up:</b> at 10 and 35 weeks. <b>Blinding:</b> no. <b>Similar groups:</b> N/A. <b>Potential for bias:</b> few functional parameters assessed; low number of patients; exclusion criteria not reported.</p>	<p>Higher pain score in supervised patients (p&lt;0.009). Grip strength: at 10 and 35 weeks regression analysis showed no difference between treatments. Wrist movement: while there was significant gain in score for those who underwent physiotherapy treatment, there was no difference at both 10 and 35 weeks.</p>	<p>"... following the typical distal radius fracture, only patients with severe stiffness and those who for any reason cannot execute their self-training program should be referred to a physiotherapist."</p>	