Centre for Clinical Effectiveness
Enhancing patient outcomes through clinical application of the best available evidence

EVIDENCE CENTRE
EVIDENCE REPORT
Series 2001 Intervention

Shoulder supports in patients with hypotonicity following stroke

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SUMMARY STATEMENT:

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REQUEST:

Does use of shoulder supports prevent subluxation and improve function in patients with hypotonicity following stroke compared to no use of shoulder supports?

REQUESTED BY:

Krishen Pandita, Chief Occupational Therapist, Kingston.

SUMMARY OF FINDINGS:

- Five studies were found which met the inclusion and exclusion criteria for our search.
- Two studies, which examined the effectiveness of a particular type of shoulder support over time, failed to demonstrate any benefits of the intervention on shoulder subluxation or maintenance of function.
- Three studies measured the effectiveness of several types of shoulder support on shoulder subluxation at the time of application. However, there is no evidence that initial reduction of subluxation is related to long term prevention of subluxation or maintenance of long term functionality of the joint.
- There were problems with the methodology of the retrieved studies that included:
    - Inadequate description of patient characteristics, especially time from onset of stroke to entry into the studies
    - Lack of control for concomitant use of other therapies
    - Possible difference in the skill and care with which the supports were applied
    - Accuracy of methods of measuring subluxation

There is no evidence that the use of shoulder supports in patients with hypotonicity following stroke is effective in preventing subluxation or improving or maintaining shoulder function.

METHODOLOGY

Search Strategy

The Centre for Clinical Effectiveness defined the 'best available evidence' as that research we can identify that is least susceptible to bias. We determine this according to pre-defined NHMRC criteria (see Appendix).

First we search for systematic reviews, evidence-based clinical practice guidelines, or health technology assessments, and randomized controlled trials. If we identify sound, relevant material of this type, the search stops. Otherwise, our search strategy broadens to include studies that are more prone to bias, less generalisable, or have other methodologic difficulties. We include case-control and longitudinal cohort studies in our critical appraisal reports. While we cite observational and case series studies, and narrative reviews and consensus statements, in our reports we do not critically appraise them. Some studies can produce accurate results but they are generally too prone to bias to allow determination of their validity beyond their immediate setting.

Details of Evidence Request:

Patients	65 years old or over, post stroke, with hypotonicity of shoulder
Interventions	use of shoulder supports
Comparison	no shoulder supports
Outcome	prevention of shoulder subluxation, improved function

Search terms:

The following terms were used to search electronic databases:

Table 1. Search terms used in the retrieval of articles from electronic databases and websites

Field of focus	Search term
Patient-related	Cerebrovascular accident; brain infarction; brain stem infarctions; lateral medullary syndrome; cerebral infarction; infarction, anterior cerebral artery; infarction, middle cerebral artery; infarction, posterior cerebral artery; stroke; cva; shoulder/s; subluxation
Intervention-related	Splint/s; sling/s; support/s; cuffs

Resources Searched

We searched the following databases and Internet websites:

- Cochrane Library CD-ROM Issue 4 2000
- Ovid Medline 1966 – December Week 4 2000
- Ovid Premedline November 14 2000
- Ovid CINAHL 1982 - October 2000
- Ovid Current Contents 1993 Week 26 – 2000 Week 27
- Journals@Ovid Full Text November 15 2000
- Informit Australasian Medical Index October 2000
- PEDro – The Physiotherapy Evidence Database 16 November 2000

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Refinements, Searching & Reporting Constraints:

We included items of evidence that were available to us on 22 December 2000. Critical appraisal was performed on the subset of studies published in English.

Inclusion Criteria

- Primary studies investigating the effectiveness of shoulder supports in post stroke patients with hypotonicity.

Exclusion Criteria

Articles addressing only:

- the method of applying a particular support
- a biomechanical analysis of the effects of a particular support
- the prevention of the onset of pain

RESULTS:

From our sources we identified 8 relevant articles which we categorised as follows:

Table 2. Study designs of articles retrieved by search

Study Design	Number included
Systematic reviews or meta-analyses	0
Evidence-based clinical practice guidelines	0
Randomised controlled trials	**1**
Controlled trials, cohort or case-control analytic studies	**4**
Descriptive case series	3 (excluded)
Consensus reports, non-evidence-based clinical practice guidelines	0
Narrative reviews	0

We are reasonably confident these articles represent the most important findings published to date based on our refinements, searching and reporting constraints.

EVIDENCE SUMMARIES

Format

Evidence summaries are in the form of spreadsheets reproduced at the end of this report. Each spreadsheet contains the article citation, the study design, patient description, scientific validity of the article, results, and pertinent remarks from the authors and Centre for Clinical Effectiveness reviewer.

Findings

The commentary below elaborates on data in the Evidence Report Summary Table.

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Overall Results

Five articles of relevance have been appraised for this report. Two studies each investigated the effectiveness of a particular shoulder support over time – a randomised controlled trial by Hanger et al (2000), and a controlled trial by Hurd et al (1974.) The other three studies, all comparative studies with concurrent controls, used x-rays to compare the effectiveness of several supports in reducing subluxation on initial application. The studies are summarised in Table 3.

Table 3. Supports and outcomes investigated in appraised studies

Study	Shoulder support investigated	Control	Outcome measure	Findings
Hanger et al 2000	Strapping	Patients without strapping	Sensory loss, subluxation, pain, arm function, overall functional status, over time	No evidence of effectiveness
Hurd et al 1974	Shoulder hemisling	Patients without slings	Range of motion, pain, subluxation, nerve injury, measured three times over time	No evidence of effectiveness
Brooke et al 1991	Harris hemisling, Bobath sling, arm trough or lap board	Unaffected shoulder	X-ray measurement of subluxation on application of support (no followup)	Harris hemisling provided best correction of subluxation
Moodie et al 1986	Conventional sling, shoulder roll, Hook-Hemi harness, arm trough, plexiglass lap tray	Unaffected shoulder	X-ray measurement of subluxation on application of support (no followup)	Triangular sling best reduced subluxation, trough and lap tray also effective, shoulder roll and Hook-Hemi harness not effective
Zorowitz et al 1995	Single-strap hemi-sling, Roylan humeral cuff sling, Bobath roll, Cavalier support	Unaffected shoulder	X-ray measurement of subluxation on application of support (no followup)	Subluxation best reduced by the hemisling (vertical displacement) and Roylan cuff (horizontal and overall displacement)

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Research Methodology

The characteristics and size of the patient population differs between each of the studies assessed.

The only properly randomised study (Hanger et al, 2000) recruited 98 patients, and each of the other studies is based on a total of 20 patients (Zorowitz et al 1995) or less (Hurd et al, 1974, n=14, Brooke et al, 1991, n=10, Moodie et al, 1986, n=10.) Ages of patients vary across the studies from all greater than 65 years (Hanger et al, 2000) to 22 - 87 years (Hurd et al, 1974), 40 – 80 years (Brooke et al, 1991), 35 – 74 years (Moodie et al, 1986) or not stated (Zorowitz et al, 1995.) Causes of brain injury/stroke also vary across the studies.

Loss of range of movement in the shoulder following stroke begins very early (within days), therefore the timing of commencement of treatment may be significant to the outcome (Hanger et al, 2000.) There was quite a difference in time from onset of stroke to entry into each of the studies, from “within the preceding 4 weeks” (Hanger et al, 2000), less than 6 weeks (Zorowitz et al, 1995), 14 – 1795 days (Moodie et al, 1986) to the less informative “recent” (Brooke et al, 1991) or “known date of onset” (Hurd et al, 1974).

The interventions varied across studies, from long term (6 weeks) use of strapping (Hanger et al, 2000), use of a shoulder sling (length of treatment period not stated, Hurd et al, 1974) to application of various supports to determine the immediate effect on shoulder subluxation (Brooke et al, 1991, Moodie et al, 1986, Zorowitz et al, 1995.)

The relevant outcomes assessed also varied across studies, from clinical assessment for sensory loss, sensory inattention and glenohumeral subluxation at the bedside (not radiological, Hanger et al 2000,) range of motion and electromyographic evaluation of the joint, glenohumeral subluxation (method not stated, Hurd et al 1974) to x-ray measurement of subluxation (Brooke et al 1991, Moodie et al 1986, Zorowitz et al 1995.)

There is no evidence that the measurement of shoulder subluxation on application of a support is related to long term prevention of subluxation or maintenance of long term functionality of the joint. Although those studies of the immediate effect of application of shoulder supports on subluxation purport to demonstrate the advantage of use of some supports over others (Brooke et al 1991, Moodie et al 1986, Zorowitz et al 1995), this may not be helpful in the actual treatment of patients suffering from hypotonicity of the shoulder following stroke.

Focussed Appraisal

The likelihood of selection and assessment bias is low for the Hanger et al (2000) study of strapping. Randomisation to either a control or intervention group was determined by computer-generated numbers and assessment of each patient was undertaken three times by the same independent physiotherapist who was blinded to the treatment. However the method of measuring shoulder subluxation, at the bedside rather than radiographically, may not accurately measure the subluxation. The uncontrolled concomitant use of cuff slings by patients may also have affected the results, which demonstrated no benefit in using the strapping technique for maintaining range of movement or improving functional outcome.

Hurd et al (1974) also found no significant difference between control patients and those who used a support, in this case a shoulder hemisling, following a first cerebrovascular accident. However the population size was small (n=14), and no baseline data has been

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provided. The authors also state that they could not control for the amount of physical therapy received by patients after discharge from hospital, which could have a bearing on the results.

Measurement of the change in subluxation on application of various slings in the Brooke et al study (1991) was also studied in a small number of patients (n=10) with unknown time interval from onset of stroke. Measurements may have been affected by the skill and care in the application of the supports, the positioning of the patients for x-ray, as well as some magnification variability in the x-rays. There was no stated randomisation of the order in which the supports were applied which may have affected the results.

Moodie et al (1986) found that the triangular sling provided the best reduction in subluxation but again the number of patients was small (n=10) and time from onset of stroke varied widely (14 – 1795 days, mean 259.) Supports were applied in the same order to all patients which may have had a bearing on the results. The authors have reservations about the use of the sling as it may restrict motor demand and sensory stimulation to the upper paretic extremity and reinforce the flexor pattern.

In the study by Zorowitz et al (1995, n=20) the randomisation method for patients was not described. The x-rays were analysed in random order. There was no control for the effect of the order of application of supports. There was no also control for differing levels of functionality between patients who were grouped for statistical analysis.

There is no evidence to suggest that the long term use of shoulder supports in patients with hypotonicity after stroke reduces shoulder subluxation or improves shoulder function.

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REFERENCES

1. National Health and Medical Research Council. A Guide to the Development, Implementation and Evaluation of Clinical Practice Guidelines. Canberra: Commonwealth of Australia, 1999.

ARTICLES CRITICALLY APPRAISED FOR THIS REPORT

1. Brooke, M. M., B. J. de Lateur, et al. 1991. "Shoulder subluxation in hemiplegia: effects of three different supports." Archives of Physical Medicine & Rehabilitation. 72: 582-6.

2. Hanger, H. C., P. Whitewood, et al. 2000. "A randomized controlled trial of strapping to prevent post-stroke shoulder pain." Clinical Rehabilitation. 14: 370-380.

3. Hurd M. M., K. H. Farrell, et al 1974. "Shoulder Sling for Hemiplegia: Friend or Foe?" Archives of Physical Medicine and Rehabilitation. 55: 519-522.

4. Moodie, N. B., J. Brisbin, et al. 1986. "Subluxation of the glenohumeral joint in hemiplegia: evaluation of supportive devices." Physiotherapy Canada. 38: 151-7.

5. Zorowitz, R. D., D. Idank, et al. 1995. "Shoulder subluxation after stroke: a comparison of four supports." Archives of Physical Medicine & Rehabilitation. 76: 763-71.

ARTICLES NOT INCLUDED IN THE APPRAISAL

Descriptive Case Reports or Case Series

1. Morin, L. and G. Bravo 1997. "Strapping the hemiplegic shoulder: a radiographic evaluation of its efficacy to reduce subluxation." Physiotherapy Canada. 49: 103-8.

2. Rajaram, V and M Holtz 1985. “Shoulder forearm support for the subluxed shoulder.” Archives of Physical Medicine & Rehabilitation. 66: 191-2.

3. Sodring, K. M. 1980. “Upper extremity orthoses for stroke patients.” International Journal of Rehabilitation Research. 3:33-8.

Study outcomes not relevant to request

1. Ancliffe, J 1992. “Strapping the shoulder in patients following a cerebrovascular accident (CVA): a pilot study.” Australian Physiotherapy.38: 37-40.

Biomechanical analysis of support, not clinical study

1. Prevost, R 1988. “Bobath axillary support for adults with hemiplegia.” Physical Therapy. 68: 228-232.

Method of application of support, not clinical study

1. Smith, J. J. 1987. “Compression bandage for shoulder subluxation.” Clinical Management. 7: 36.

APPENDIX

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The information in this report is a summary of that available and is primarily designed to give readers a starting point to consider currently available research evidence. Whilst appreciable care has been taken in the preparation of the materials included in this publication, the authors and Southern Health do not warrant the accuracy of this document and deny any representation, implied or expressed, concerning the efficacy, appropriateness or suitability of any treatment or product. In view of the possibility of human error or advances of medical knowledge the authors and Southern Health Care Network cannot and do not warrant that the information contained in these pages is in every aspect accurate or complete. Accordingly, they are not and will not be held responsible or liable for any errors of omissions that may be found in this publication. You are therefore encouraged to consult other sources in order to confirm the information contained in this publication and, in the event that medical treatment is required, to take professional expert advice from a legally qualified and appropriately experienced medical practitioner.

Levels Of Evidence

As Defined By "A Guide To The Development, Implementation And Evaluation Of Clinical Practice Guidelines" (National Health & Medical Research Council, Canberra, 2000):

Level I		Evidence obtained from a systematic review or meta-analysis of all relevant randomised controlled trials.
Level II		Evidence obtained from at least one properly designed randomised controlled trials.
Level III	-1	Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method).
	-2	Evidence obtained from comparative studies with concurrent controls and allocation not randomised (cohort studies), case control studies or interrupted time series with a control group.
	-3	Evidence obtained from comparative studies with historical control, two or more single-arm studies or interrupted time series without a parallel control group.
Level IV		Evidence obtained from case series (either post-test or pre-test and post-test), opinions of respected authorities (narrative reviews), descriptive studies, reports of expert (i.e. consensus) committees, case studies.

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Evidence Summary Therapy Shoulder supports in stroke patients	**Study 1** Hanger, H. C., P. Whitewood, et al. 2000. "A randomized controlled trial of strapping to prevent post-stroke shoulder pain." Clinical Rehabilitation. 14: 370-380.	**Study 2** Hurd M. M, K. H. Farrell et al. 1974. "Shoulder Sling for Hemiplegia: Friend or Foe?" Archives of Physical Medicine and Rehabilitation. 55: 519-522.
STUDY DESIGN & NHMRC LEVELS OF EVIDENCE	Level II Randomised controlled trial	Level III – 1 Controlled trial, alternate allocation
DESCRIPTION: Subjects, Interventions, Comparisons, Outcomes, Inclusion & Exclusion Criteria	**Patients:** n=98, >65 years, stroke, requiring ongoing inpatient rehabilitation, at five assessment and rehabilitation wards for older people at Princess Margaret Hospital, Christchurch, New Zealand. **Intervention:** Strapping for a total of six weeks or until active abduction of the affected arm to 90º against gravity for 2 seconds was attained or until discharge from hospital, whichever was soonest **Comparison:** No strapping **Outcome:** Clinical assessment for sensory loss, sensory inattention and glenohumeral subluxation (bedside assessment, not radiological); pain measures; arm function by arm and hand subsections of the Motor Assessment Scale; overall functional status by the FIM (four point scale) and the Rankin Disability scale, measured at entry, at end of treatment phase and at week 14 **Incl & Excl Criteria:** Inclusion: patients admitted with an acute hemiplegic stroke in the preceding 4 weeks. Dysphagic patients were included wherever possible, with verbal consent from patient and written from next of kin. Patients with premorbid shoulder condition (rotator cuff lesion, glenohumeral osteoarthritis) were not excluded for that reason alone. Exclusion: subarachnoid haemorrhage, inability to give informed consent, previous shoulder surgery precluding passive external rotation, ability to abduct affected shoulder to 90º and hold it for 2 seconds already, residence outside the greater Christchurch area.	**Patients:** n=14 patients at outset, age 22 to 87 years, nine observed for three months or longer. Patients referred to physical medicine department over a nine month period. **Intervention:** Use of shoulder hemisling, length of treatment period not stated **Comparison:** No sling **Outcome:** Shoulder range of motion; shoulder pain; glenohumeral subluxation; possible peripheral nerve injury – early in study, then two to three weeks later and again three to seven months after the cerebrovascular accident **Incl & Excl Criteria:** Inclusion: first cerebrovascular accident (CVA) with known date of onset; total flail upper extremity; no history of trauma to neck, shoulder or arm; willingness to participate in follow-up Exclusion: Previous CVA, brain tumour or cervical spine injury or peripheral nerve trauma.
VALIDITY: Methodology, rigour, selection, opportunity for bias	**Randomisation:** Yes, good method. (By computer-generated random number sequence with stratification into two groups according to the severity of disability at baseline, established prior to randomisation using FIM. Different sets of envelopes for each of the two groups.) **All patients accounted for:** Yes **Patients treated equally:** Yes **Similar groups:** Yes, except for type of stroke - the strapped group had a greater number of intracerebral haemorrhages than the controls, the control group more patients with lacunar syndrome. **Potential for bias:** Low, see above, and each patient was assessed three times by the same independent physiotherapist who was blind to the randomisation code and treatment.	**Randomisation:** Pseudorandomisation, alternate allocation **All patients accounted for:** Yes **Patients treated equally:** Yes **Similar groups:** Not stated **Potential for bias:** Small sample size, time from onset of stroke not stated, may have varied between patients/groups, 5/14 patients lost to followup.
RESULTS: Generally favourable or unfavourable, specific outcomes of interest, estimate of experimental effect and precision if appropriate	There was no evidence that “this particular strapping technique does work, either in reducing pain, maintaining range of movement or improving functional outcome …”	No evidence “to suggest that a sling should be considered essential in the care of the flail upper extremity after cerebrovascular accident.”

AUTHORS COMMENTS: Risk/benefit, limitations	"There was already a 15º difference between the affected and unaffected shoulders at entry into the study (mean of two weeks post stroke.)" "The technique may be ineffective" Cuff type arm slings were also routinely used by the patients, and these may have "counteracted any beneficial effects of strapping."	"Another variable which could not be accounted for was the amount of physical therapy received after discharge from the hospital, usually three to four weeks after the cerebrovascular accident" which could have a bearing on the range of motion of the shoulder. "… there was no appreciable difference in the parameters of shoulder range of motion, shoulder pain or subluxation, and there was no evidence of an increased incidence of peripheral nerve injury in the patients treated without a sling as compared to those who used a sling."
REVIEWER'S COMMENTS: Risk/benefit, methodology, conclusions	The method of measuring subluxation and the variable use of cuff slings may both have some bearing on the results of this study which does not demonstrate any benefit of the use of strapping to reduce shoulder subluxation or maintain range of movement after stroke.	This study is based on a small number of patients for whom no baseline data is provided. There is no evidence that this type of sling is beneficial in reducing shoulder subluxation.

Evidence Summary Therapy Shoulder supports in stroke patients	**Study 3** Brooke, M. M., B. J. de Lateur, et al. 1991. "Shoulder subluxation in hemiplegia: effects of three different supports." Archives of Physical Medicine & Rehabilitation. 72: 582-6.	**Study 4** Moodie, N. B., J. Brisbin, et al. 1986. "Subluxation of the glenohumeral joint in hemiplegia: evaluation of supportive devices." Physiotherapy Canada. 38: 151-7.
STUDY DESIGN & NHMRC LEVELS OF EVIDENCE	Level III - 2 Comparative study with concurrent control, allocation not randomised	Level III - 2 Comparative study with concurrent control, allocation not randomised
DESCRIPTION: Subjects, Interventions, Comparisons, Outcomes, Inclusion & Exclusion Criteria	**Patients:** n=10, 40 – 80 years, with recent brain damage and hemiplegia. Six ischaemic infarcts, 1 hypertensive bleed, 1 embolus, 1 melanoma removal, 1 chordoma removal. **Intervention:** Fitting of each of three types of sling to each patient: Harris hemisling, Bobath sling, arm trough or lap board. **Comparison:** Uninvolved shoulder **Outcome:** Measurements of shoulder subluxation on x-ray **Incl & Excl Criteria:** None stated.	**Patients:** n=10, 35 – 74 years old, time since onset of incident 14 - 1795 days (mean 259), exhibiting hemiplegia detected by palpitation when seated **Intervention:** Application in turn of the five aids to be evaluated: conventional sling, shoulder roll, Hook-Hemi harness, arm trough, plexiglass lap tray. **Comparison:** Unaffected shoulder **Outcome:** X-ray measurement of degree of subluxation **Incl & Excl Criteria:** Not stated
VALIDITY: Methodology, rigour, selection, opportunity for bias	**Randomisation:** None – control was uninvolved shoulder **All patients accounted for:** Individual data not supplied, only ranges, means and standard deviations for each type of sling. **Patients treated equally:** Not stated **Similar groups:** N/A **Potential for bias:** Time intervals from onset of injuries not stated. Small sample size, mixed ages, mixed aetiology of hemiplegia.	**Randomisation:** None – control was unaffected shoulder **All patients accounted for:** Yes, 10 columns in graphs illustrating reduction in subluxation for each aid. **Patients treated equally:** Not stated **Similar groups:** N/A **Potential for bias:** Small sample size. Time intervals from time of onset vary greatly, might effect mobility of joint.
RESULTS: Generally favourable or unfavourable, specific outcomes of interest, estimate of experimental effect and precision if appropriate	The Harris hemisling provided good correction (of subluxation) and was consistent. The arm trough or lap board, and the Bobath sling were less effective. The Harris hemisling gave good correction of the subluxation with a mean vertical distance of 37.8 mm compared to 38.5 mm for the uninvolved shoulder. Bobath sling = 43.2 mm. Arm trough or lap board tended to overcorrect with a mean vertical distance of 30.7 mm.	The conventional triangular sling provided the best reduction in subluxation. The trough and the lap tray were also effective. The shoulder roll and the Hook-Hemi harness were not found to be effective. Mean measurements (cm) Control shoulder 0.96 (SD 0.27) Sling 0.94 (SD 0.30) Roll 1.60 (SD 0.35) Hook 1.95 (SD 0.44) Trough 1.03 (SD 0.43) Tray 0.80 (SD 0.34)
AUTHORS COMMENTS: Risk/benefit, limitations	X-rays "There is, however, some magnification and therefore variability depending on distances between shoulder and x-ray film because of the spread of the x-rays from the point of origin of the x-ray beam. Positioning of the patients may also effect the measurements." "Important variables which need to be considered are the skill and care in actual application of the supports … there are probably some differences in the consistency of use."	"… there are well-documented concerns about the use of the triangular sling, particularly in the area of interference with body image, excessive immobilization, and reinforcement of the flexor pattern." "Therefore … we have serious reservations about using the sling as the primary or sole glenohumeral support. The reason is that, with the sling, the paretic upper extremity is denied constant motor demand and sensory stimulation when most needed." Supports were applied in same order to all patients – May effect results.
REVIEWER'S COMMENTS: Risk/benefit, methodology, conclusions	This study does not investigate the effectiveness of use of the various supports over time, but simply measures the effect on shoulder subluxation at the time of application of each support.	This study does not investigate the effectiveness of use of the various supports over time, but simply measures the effect on shoulder subluxation at the time of application of each support.

Evidence Summary Therapy Shoulder supports in stroke patients	**Study 5** Zorowitz, R. D., D. Idank, et al. 1995. "Shoulder subluxation after stroke: a comparison of four supports." Archives of Physical Medicine & Rehabilitation. 76: 763-71.
STUDY DESIGN & NHMRC LEVELS OF EVIDENCE	Level III - 2 Comparative study with concurrent control, allocation not randomised
DESCRIPTION: Subjects, Interventions, Comparisons, Outcomes, Inclusion & Exclusion Criteria	**Patients:** n=20, age not stated, admitted to rehabilitation after first thromboembolic or haemorrhagic strokes. **Intervention:** Application in turn of the supports to be evaluated: single-strap hemi-sling, Rolyan humeral cuff sling, Bobath roll, Cavalier support. **Comparison:** Unaffected shoulder **Outcome:** X-ray measurements of affected shoulder compared to unaffected shoulder. 7 mm marker used to correct for magnification errors. **Incl & Excl Criteria:** Inclusion: not stated. Exclusion: Time from onset > 6 weeks, history of prior neurological condition resulting in unilateral or bilateral hemiparesis, presence of clinical stroke syndrome undetected by CT or MRI, and neuroanatomic lesions resulting in bilateral hemiparesis.
VALIDITY: Methodology, rigour, selection, opportunity for bias	**Randomisation:** Not applied to patients. X-rays were analysed in random order and had identifying information covered to reduce bias by analyst. **All patients accounted for:** Means and confidence intervals provided, not data for individual patients. **Patients treated equally:** Not stated **Similar groups:** N/A **Potential for bias:** Supports applied in same order to all patients – May have affected results. Patients with different levels of functionality were grouped for statistical analysis, although there appeared to be no significant correlation between level of functionality and degree of subluxation.
RESULTS: Generally favourable or unfavourable, specific outcomes of interest, estimate of experimental effect and precision if appropriate	Overall, the single strap hemisling corrected the vertical displacement (best in 55% of patients) while the Cavalier support did not significantly correct it (best in 40% of patients), and the remaining two supports significantly reduced but did not correct it (Bobath roll best in 20% of patients.). No significant horizontal displacement was measured without supports. Overall, horizontal symmetry was maintained with the single strap hemi-sling and the Roylan cuff, but the Bobath roll and Cavalier support produced significant lateral displacement of the humeral head (Hemi-sling, Bobath roll and Roylan cuff each produced best horizontal correction in 25 % of patients, Cavalier support best in only 10%). Overall, the Roylan cuff was the only support that significantly decreased total subluxation asymmetry but did not eliminate it (best in 49% of patients.) The remaining three supports did not alter total asymmetry significantly.
AUTHORS COMMENTS: Risk/benefit, limitations	"Although supports are used commonly … there is no absolute evidence that supports prevent or reduce long-term shoulder subluxation … or that a support will prevent supposed complications of shoulder subluxation."
REVIEWER'S COMMENTS: Risk/benefit, methodology, conclusions	NB Bobath roll uses different strapping technique to that illustrated in the Brooke paper. This study does not investigate the effectiveness of use of the various supports over time, but simply measures the effect on shoulder subluxation at the time of application of each support.