Table SI. *Characteristics of included studies*

Authors/ design	Participants	Interventions	Outcome measures	Results/comments
RCT's				
Anderson & Maas, 1987 (24)	*n* = 92 patients female, Mean age: 54.47 years, range mid twenties to late seventies (SD 13.83) Disease duration: not stated Voluntary participants 50% particapants of a rheumatologist in a large public hospital, 50% particapants of a private rheumatologist Follow up: none – immediate effect	4 kinds of working splints used: Dorsal –Sans splint XR Palmar – San-splint® pink Gauntlet – Plastazote® Fabric –Cotton elastic pre-fabricated Splints fitted immediately following group allocation	Joint tenderness: richie scale Grip strength: sphygmanometer	Comparisons between the 5 groups in terms of age and pain level using ANOVA concluded that if there were any significant differences in grip strength it would be very unlikely to be due to age Splinting does not have an immediate positive effect on grip strength Results failed to support the hypothesis that splints would immediately increase grip strength
Haskett et al., 2004 (25)	*n* = 45 patients, female = 39, male = 6 Mean age: 49.1 (SD 13.0) years, range 25–75 years Disease duration: 8.6 (Sd 9.2) years, range, 0.5–45 years Diagnosis: RA N = 35 Follow up: baseline, end of each 4 week splint phase and end of 1 week washout period between splints Participants used splint of choice following the crossover trial and 37 returned for a 6 month follow up evaluation	4 week period using each of the splints in turn separated by 1 week washouts: Roylan® wrist extensor splint (RWS) Custom made leather wrist splint (LWS) Anatomical technologies ©elastic wrist support (AWS) Advised to use during activities that caused pain or discomfort Wear for a minimum of 10 h per week	Disease activity: Active joint count Perceived fatigue Morning stiffness Wrist pain: 10 cm horizontal visual analogue scale Hand function: Arthritis Hand Function Test (AHFT) Perceptions of function: McMaster-Toronto Arthritis Patient Function Preference questionnaire Splint diary completed daily	There did not appear to be order or carryover effects MANOVA indicated that wrist splints significantly reduced pain ($p = 0.007$). Custom leather splint was most effective in reducing pain from 4.1 cm –2.8 cm ($p = 0.001$). All splints improved hand strength & CRS provided significantly Stronger grip than the ACS ($p = 0.04$). Splints did not compromise dexterity Improvements were maintained at 6 months. No change in functional ability Cost of custom made versus off the shelf discussed – 2–3 times more expensive
Kjeken et al., 1995 (26)	*n* = 69 patients: 52 female, 17 male Mean age range: not given, median age – 64 years, range 24–79 years Disease duration: median 3 years, range 1–424 months Follow up: baseline and after 6 months	Frequency: Rehband ™ elastic wrist orthoses used during the 6 month treatment period when performing painful activities and intermittently in resting position during periods of severe joint pain. Treatment group: Rehband ™ elastic wrist orthosis. Measured at baseline and 6 months with and without orthosis Control group: no use of wrist orthosis	General disease activity: duration of morning stiffness (mins), pain at rest: (100 mm VAS), pain on motion (VAS) and Erythrocyte Sedimentation Rate. General functional capacity: Health Assessment Questionnaire (HAQ) Effects on wrist joint: presence/absence of wrist swelling and/or tenderness, joint circumference (cm), patient's experience of pain on motion (VAS) and pain during 2 standardised activities Active and passive motion: goniometer Pinch grip : Mannerfelt Intrinsicmeter Grip strength: sphygmomanometer Muscle atrophy: forearm circumference	Changes in wrist joint variables and general disease activity variables were not statistically different between the orthosis group and the control group Patients in the orthosis group had 25% and 12% improvements in grip strength and pinch grip and 50% reduction in pain while using the wrist orthosis Use of wrist orthoses improves function and reduces pain but has no effect after 6 months compared to a control group on measures of local or general disease activity

Pagnotta et al., 2005 (27)	$n=30$ patients, 26 female, 4 male Mean age: 56.7 years, range, 28–76 years Disease duration: mean time from disease onset 9.2 years, range from recent onset to 31 years ARA Classification Class I – $n=0$–0% Class II – $n=18$–60% Class III – $n=11$–37% Class IV – $n=1$–3% Follow up: baseline, 2 further assessment sessions 3–7 days apart but no indication how long after prescription	Allowed a brief practice of each task prior to the testing situation Two sessions 3–7 days apart Five work performance tasks and 2 endurance asks carried out with and without the splint Activities and whether splint or not first randomised Futuro ™, Roylan® D, Medical Specialties	Pain: 10 cm VAS Work: Baltimore Therapeutic Equipment Company work simulator Endurance: Baltimore Therapeutic Equipment Company work simulator Perceived difficulty of task: 10 cm VAS Perceived splint benefit: 10 cm VAS	With the splint on pain was significantly lower in 5 tasks as was perceived difficulty in task performance. Work performance did not differ significantly with the splint on versus off. While mean endurance scores were always better with the splint on, differences reached significance on only one task. The task with greatest overall perceived benefit was chopping with a knife. For most tasks splint use improved or did not change pain levels, did not interfere with work performance, increased or maintained endurance and did not increase perceived task difficulty Brief test allowed before!! With/without? 3 different types of splints no reference to this!
Stern et al., 1996 (22)	$n=2$ patients, 22 female, 20 male Mean age: 56.50 years Disease duration: mean of 11.05 years since diagnosis Follow up: baseline and following one week of use	One week use of each of 3 designs of wrist orthoses (Smith & Nephew, Roylan® D-Ring & Kendall-Futuro ™ #33) preceded and followed by a one week wash out period Subjects directed to use their orthosis intermittently during functional tasks for a minimum of 4 h per day across 5 of the 7 days	Finger dexterity: The Purdue Test Hand function: The Jebsen-Taylor Test	Both finger dexterity and hand functions were reduced by splinting: men and women were affected similarly. There was no difference in finger dexterity or hand function afforded by the 3 orthoses. Results on both the Purdue and Jebsen-Taylor tests showed a significant learning effect across time
Stern et al., 1996 (23)	$n=36$ patients, 18 female, 18 male Mean age: women 49.44 years, men 62.67 years Disease duration: mean years since RA diagnosis; women, 12 years, Men 12.33 years Follow up: baseline and following one week of use	One week use of each of 3 designs of wrist orthoses on the dominant hand (Smith & Nephew, Roylan® D-Ring & Kendall-Futuro ™ #33) preceded and followed by a one-week wash out period Subjects directed to use their orthosis intermittently during functional tasks for a minimum of 4 h per day across 5 of the 7 days	Grip strength: Calibrated hydraulic Jamar dynamometer Effect of orthosis on daily tasks: written questionnaire	Immediate effect of splinting with commercial wrist orthoses is reduced grip After a 1 week adjustment period the Smith & Nephew Roylan D-Ring® afforded splinted grip to that of the non-splinted grip strength. The other 2 orthoses continued to reduce grip significantly below that of the Roylan®. Roylan® deemed comfortable by more subjects than other orthoses and helpful in some housework, farm chores and meal preparation. Hindered some self-care tasks, writing and typing
Thiele et al., 2009 (28)	$n=25$ patients, 13 female, 12 male Mean age: 54 years, range 18–82 years Diagnosis: OA $n=6$ (24%), RA 17 (68%), other inflammatory $n=2$ (8%) Disease duration: 15 years, range 1–58 years Follow-Up: baseline and end of each 2 week splint phase	Two phase crossover trial comparing a custom made leather splint with a commercial fabric splint (Futuro ™) Splints were worn for 2 weeks separated by a one week wash out period Total duration of trial 5 weeks Advised on appropriate use and care of splint – no specification of how long to wear	Power grip strength: Calibrated Jamar dynamometer General hand function: Australian/ Canadian osteoarthritis Hand Index VA 3.0 (AUSCAN) – general hand function, pain and stiffness Self perceived occupational performance: Canadian Occupational Performance Measure	Both styles of splints significantly reduced pain (effect size leather splint 0.79, fabric splint 0.43), improved hand function, and increased grip strength compared to baseline ($p<0.5$) with no increase in wrist stiffness There was a consistent trend for the leather splint to be superior to the fabric but this was only statistically significant for patient perceived occupational performance ($p=0.008$) and satisfaction ($p=0.015$). 72% of patients preferred the leather splint to the fabric

Tijhuis et al., 1998 (29)	$n=10$ patients, 8 female, 2 male. Mean age: 47.3 years, range 28–71 years Disease duration: not stated Follow up: before and after each of the two orthoses were worn for 2 weeks with 1 week separating	Randomised cross-over comparing the synthetic Thermolyn® wrist orthosis and the Futuro ™ wrist orthosis Splints were worn for 2 weeks separated by one week without treatment. Patients were asked to wear the othosis as much as possible during both day and night	Effect of wrist orthoses on pain: questionnaire, VAS Tender joint count: Ritchie scale Wrist Range of Motion: passively measured using method described by Gerhardt & Rippstein Grip strength: Martin Vigorimeter	Futuro ™ wrist splint as good as synthetic Thermolyn® splint with respect to short term utility and clinical effectiveness Patients judged Futuro ™ to be slightly better with respect to pain relief and was easier to handle. Five patients chose the Thermolyn® and 5 the Futuro ™ for continued use. No significant effect on grip and a non-significant positive effect on pain
Veehof et al., 2008 (30)	$n=33$ patients, majority were female with 71% female ($n=12$) in splinting group ($n=17$ total) and 69% female ($n=11$) in control group ($n=16$ total). Mean age (SD): 60.3 (SD 10.8) years in splinting group. 55.1 (SD 12.8) years in the control group Disease duration: 8.2 (SD 6.8) years in splinting group and 5.0 (SD 4.6) years in control group Follow up: baseline and after 4 weeks	Splinting group: Prefabricated wrist splint to be used as much as possible during the day for 4 weeks. Choice of 4 splints: Roylan® D-Ring, GM005H, GM008 or GM009 (General Medical Bracing) Control group: Usual care and offered a splint after the study	Daily diary: record of number of hours splint worn Disease activity: Disease activity score in 28 joints Wrist pain: 100 mm VAS Grip strength: Martin Vigorimeter Functional ability: Disabilities of the Arm Shoulder & Hand (DASH) questionnaire and short version, Sequential Occupational Dexterity Assessment (SODA-S) Patients perceived changes: transition items to describe the magnitude and direction of perceived change in wrist pain, grip strength and functional ability, scored on a 5 point scale	A large and highly significant treatment effect on wrist pain was found. VAS scores decreased by 32% in the splinting group and increased by 17% in the control group Small and non-significant treatment effects were found with regard to non-splinted grip strength and functional ability
QUASI EXPERIMENTAL				
Backman & Deitz, 1988 (31)	$n=3$ patients, female Aged: 66, 69 and 67 years Disease duration: 1,1 and 5 years Follow up: baseline phase with repeated measures of the dependant variables (6 or 7 sessions), followed by intervention and an eight-data-point phase ranging from 10–15 days	Single subject, alternating treatment design with and without a custom-made polyethylene gauntlet wrist splint. Splint and no splint conditions alternated repeatedly and counter balanced over a period of 4 months	Duration of splint use: diary sheet Grip, tip pinch and tripod pinch strength: Martin Vigorimeter Applied strength: measured by two activities-pouring water and lifting groceries. Dexterity/function: measured by two activities – writing and manipulating coins	There is a demonstrable improvement in hand function as measured by grip and pinch strength with use of the splint. The splint improved the ability to lift and pour, hindered the speed of writing and had a limited impact on coin manipulation
Burtner et al., 2003 (32)	$n=5$ patients, 4 female, 1 male Mean age: 48.4 years, range 42–56 years Disease duration: 16.2 years, range 7–23 years Follow up: immediate effects	4 splint conditions: no splint and 3 splint types: Static positioning splint – Liberty™ D-Ring wrist brace long Dynamic splint – hinged wrist resist Dynamic splint – spiral custom made wrist hand splint	Muscle activation: surface EMGs recorded muscle activity of 8 muscles in the dominant upper extremity involved with reach and grasp Grip and Pinch strength: Jamar dynamometer and pinch meter, respectively Manual Dexterity: nine-hole peg test	Statistically significant differences were found when hinged ($p<0.001$) and spiral splints ($p=0.02$) were worn. Grip strength decreased with hinged splints. Two point pinch increased and dexterity improved on the nine hole peg test with the spiral splint No significant EMG differences were found during different splint conditions

Nordenskiold, 1990 (33)	$n=104$, 22 female patients with RA and 82 females without RA Mean age: 53 years, range 30–65 years (RA), 40 years, range 23–65 (non RA) Disease duration: mean 11 years, range 1–33 years Follow up: immediately before and after application of splint	RA group: 2 types of soft volar wrist splint, Camp and Rehband ™ Control group: 2 types of soft volar wrist splint, Camp and Rehband ™ Nb: unclear as to whether all subjects used one or other or both splints	Pain: 100 mm VAS Pain on performance of ADL tasks: VAS following setting a breakfast table for 2 people, filling a glass with milk from a full carton and vacuuming a floor without a rug for 3 mins Grip force: GRIPPIT Effectiveness of splint: interview with standardised questions	Pain was decreased by 39%, 42% and 52% when using an orthosis in the 3 ADL situations Anecdotally, the women noted that the splints provided support and decreased pain both at home, in work and during leisure activities Orthoses improved grip force at onset of pain by 26%, 22% and 29%. All subjects showed reduced grip strength (20–25%) when compared to grip strength in a group of women without RA
Pagnotta et al., 1998 (34)	$n=40$ patients, 33 female, 7 male Mean age: 52.4 years, range 25–81 years Disease duration: 9.2 years (SD 12.3) Follow up: following one week of splint wear	Two period crossover design Futuro ™ Kendall #33 splint fitted and worn on a daily basis for one week while receiving inpatient services to become accustomed to the splint. Outcome measurements then carried out with and without the splint on 2 separate days	Disease activity: tenderness, swelling – Joint Examination Appendix (American Rheumatism Association), crepitus, 1 standard radiograph of the wrist and hand Range of motion: Treuhaft assessment Work performance: The Baltimore Therapeutic Equipment Company Dexterity: The Jebsen Hand Function Test Pain: 10 cm VAS	BTE screwdriver test, work performance was less with the orthosis ($p=0.0002$). On the BTE shears tests there was no significant difference in work performance with & without the splint Mean pain was significantly less with the orthosis on. Mean time to complete all 7 Jebsen Hand Function Test components was longer with the splint on (62 vs 57.6 seconds' $p=0.0086$
OBSERVATIONAL				
Cytowicz-Karpilowski et al., 1999 (35)	$n=60$ female patients Mean age: 60 (SD 9.4) years, 45.7 (SD 11.1) years Disease duration: 6.4 (SD 4.3) years, 6.1 (SD 3.9) years (unclear as to why these differ for the two tests) Follow up: immediate effects	Study 1: Measured with and without a leather band to strengthen the carpometacarpal joint. Study 2: Measured with and without a felt pad under the capitulum of the third and fourth metacarpals to correct the flattened transverse arch.	Distribution of force during a cylindrical grip: HAN_v_1.0 Computer System for Hand Measurement	There are statistically significant differences between the mean maximal forces, especially those exerted by the distal phalanges for both the band and pad ($p<0.001$). After bandage application forces exerted by the distal phalanges were 10–45% stronger The largest increase was found in the distal phalanges after the bandage application After application of the felt pad the forces exerted by the distal phalanges increased by 17–41%
Gumpel & Cannon, 1981 (36)	$n=16$, sex not stated Age: not stated Disease duration: not stated Follow up: not clear	Intra-patient comparison of Futuro ™ and Spencer wrist splints. Given one splint to use then the other at the following outpatient clinic appointment	Length of wear: patient report Support: patient report Interference with activity: patient report Comfort: patient report Putting on/taking off: patient report	For support both splints were equal (11/14 found Futuro™ gave adequate support, 12/16 for Spencer) Both splints interfered almost equally with some normal activities, the balance being marginally in favour of Futuro ™. Both were comfortable in use (Futuro ™ 10/14, Spencer 8/12). Equal rating – don/doffing
Nicholas et al., 1982 II (37)	$n=36$ available for re-evaluation, 25 female, 11 male. Age: not stated Disease duration: taken but not stated Follow up: irregularly seen at routine clinic visits or when repairs required for splints	Lightcast II fibreglass splints were moulded on patients and worn for 9 to 12 months. Patients were seen at irregular intervals and for a final evaluation after approximately 9 months.	Attitude towards splint material: patient report	29/36 reported wearing their splint 15/29 liked the material 5/29 disliked the appearance 1/29 found it too rough 1/29 thought it did not breathe properly 1/29 found it stretched when wet 2/29 found it broke easily 7/16 patients fitted unilaterally and 5/13 fitted bilaterally found the splint uncomfortable No patient found the material had an unpleasant odour Therapists were unhappy with the odour and stickiness of the material

SURVEY/QUESTIONNAIRE

Agnew & Maas, 1987 (39)	*n*=395, study 1 *n*=265 study 2 *n*=130, sex not stated Mean age: not stated Disease duration: not stated Follow up: survey – 1 year following use of new splint for study 2	Two consecutive surveys of patient compliance with wearing wrist splints were carried out to identify factors contributing to compliance Custom made thermosplastic and custom made 2-way stretch elastic fabric splints	Study 1 areas of investigation: General level of compliance with all types of wrist splints and compliance for performing ADLs. Variables that might contribute to compliance with splint wear Study 2 areas of investigation: Levels of compliance with a new wrist working splint while performing various activities. Focused on educating patients and therapists about the benefits of splinting	Study 1: Perceived benefits of splinting and discomfort in wearing splints were identified as the major determining factors in compliance which was found to be about 75% Appearance of splints was a minor issue Study 2: After 1 year compliance remained the same and perceived benefits from splinting was again the major factor determining compliance. Discomfort in wearing the splint was negligible in the study
De Boer et al., 2008 (40)	*n*=240, 185 female, 55 male Mean age: 63 years Disease duration: Mean=9 years Follow up: N/A	A multi-centre cross sectional study using questionnaires, semi-structured interviews and a clinical assessment to determine the usage of functional wrist splints in patients with RA	Presence of hand and wrist complaints and usage of functional wrist othoses: semi-structured interview Joint tenderness: 28-joint count Disease characteristics: Dutch Arthritis impact\measurement Scale II (AIMS II), Disease Activity Score (DAS28), Erythrocyte Sedimentation Rate General pain & fatigue: VAS 0–100 mm Physical & mental functioning: validated Dutch RAND 36-item Health Survey Coping: Coping with Rheumatic Stressors questionnaire (CORS) Satisfaction: Dutch version of the Quebec User Evaluation of Satisfaction with Assistive Technology (D-Quest)	128 (53%) possessed splints, 74/128 (58%) were actually using them. Used mainly during housekeeping and cycling/driving. Main reasons for use were relief of pain and joint protection. Main reason for non-use were no need and problems with ease of use. Factors significantly associated with usage included the presence of wrist and hand complaints, worse physical functioning and greater satisfaction with comfort of the wrist orthoses
Nicholas et al., 1982 I (38)	*n*=36, 25 female, 11 male. Age: not stated Disease duration: taken but not stated Follow up: irregularly seen at routine clinic visits or when repairs required for splints	Patients asked to wear splints for ADL, when resting at night, to remove splints to wash the skin covered by the splint and to perform active range of motion exercises for the wrist and fingers Nb: splint type not explicit	Frequency of use: patient report Putting on/taking off: patient report Intention to continue wearing: patient report	29/36 (80.5%) wore the splints at least part of every day. 18/36 stated wearing a few hours every day. 10/36 reported wearing at night. 3/36 only wore when in pain Men wore their splints less frequently then women Most who responded indicated that they wore splints while performing light or heavy housework but not while performing hygienic or personal ADL. 5/36 reported that splints reduced ability to perform tasks 7/36 reported intention to continue to wear for relief of pain. 16/36 reported intention to continue to wear for wrist support Only 3 patients were working and 2 wore on the job. One fourh of patients who could drive wore for driving

Stewart & Maas, 1990 (41)	Patients $n=88$, 60 female, 28 male Mean age: 58 years, range 15–83 years Disease duration: Mean, 176 months, range 5–45 years Follow up: N/A	RA patients from 3 major hospitals who had been wearing 1 of 4 wrist-splint types for at least 2 weeks: Elastic Leather Dorsal thermoplastic Palmar thermoplastic	Questionnaire to RA patients to gain information regarding wearer and prescriber perceptions of splint suitability: Information regarding personal details, splint usage, perceived effectiveness of the splint during 24 daily activities and 12 items related to splint design and quality collected	The 4 splint groups differed significantly on two discriminant functions based on the 24 selected variables Sex, use of a walking stick and being a homemaker contributed most to the first discriminant function Significant differences were found between the 4 when comparing the wearers' indicated use of splints for dressing, hanging clothes, sweeping, dusting and reading Results support view that certain splints are better suited to specific patient characteristics and daily tasks
QUALITATIVE				
Stern et al., 1997 (44)	$n=42$, 22 female, 20 male Mean age: 56.50 years (SD 13.60: range 30–76 years) Disease duration: Mean 11.05 years (SD 11.03: range 0.3–51 years) Follow up: N/A	Cross-over design using 3 commercial orthoses for 1 week with a 1-week wash out between each	Patients' functional uses of 3 commercial wrist orthoses Describe patients' preference patterns for the orthoses Clarify orthotic attributes that are viewed positively and negatively Private semi-structured interview	Three splints reduced pain similarly, but comfort and sense of security during functional tasks only found is orthoses were comfortable and well fitting. Most preferred the padded short forearm orthois. Common complaints about the 2 elastic orthoses included chafing at the thumb web space and proximal closures. Longer forearm often perceived as providing unnecessarily high levels of wrist support
Veehof et al., 2008 (43)	$n=18$, 78% female ($n=14$), 22% male ($n=4$) Mean age: 56.3 (SD 16.4) years Mean (SD) time interval between splint prescription and interview: 6.0 (SD 3.5) months Follow up: N/A	A qualitative descriptive study to gain insight into the determinants of the use of wrist working splints among patients with RA Patients who had received a fabric (commercially available) wrist working splint from their rheumatologist	Description of the prescription and knowledge, splint use, advantages and disadvantages of splint wearing, appearance, comfort and fit of the splint and social environment:experiences, knowledge and opinions of patients with regards to the use of their splints In depth semi-structured interviews	Majority of patients indicated their splint use was dependent on the seriousness of symptoms (pain swelling or tingling). Important reasons to wear splints were reduction of these symptoms, wrist support and immobilisation of the wrist. Important reasons to stop wearing the splint were reduced functional abilities while using the splint and the performance of dirty or wet activities

BTE: Baltimore Therapeutic Equipment; VAS: visual analogue scale; SD standard deviation; ANOVA: analysis of variance; MANOVA: multivariate analysis of variance; RA: rheumatoid arthritis; ADL: activities of daily living.