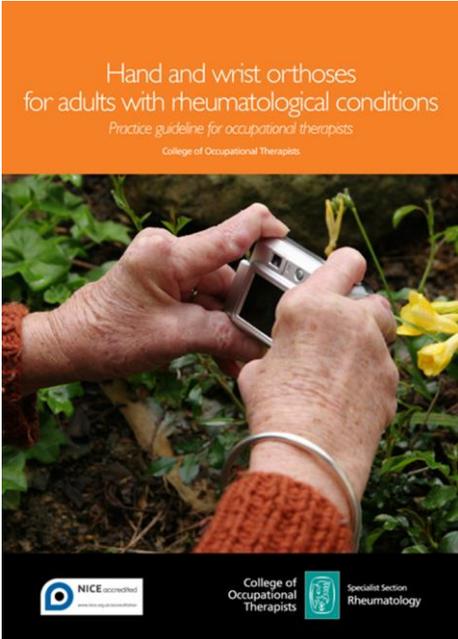


# Hand and wrist orthoses for adults with rheumatological conditions

## Practice guideline



## Quick Reference Guide



Hand and wrist orthoses  
for adults with rheumatological conditions  
Practice guideline for occupational therapists  
College of Occupational Therapists

NICE accredited  
College of Occupational Therapists  
Specialist Section  
Rheumatology

The Quick Reference Guide provides a summary of the recommendations in the College of Occupational Therapists practice guideline **Hand and wrist orthoses for adults with rheumatological conditions** (COT 2015). It is intended to be used by practitioners as an easily accessible reminder of the recommendations for intervention. It should ideally be used once the practitioner has read the full guideline document. This is important to ensure an appreciation and understanding of how the recommendations were developed and their context.

The full practice guideline together with implementation resources can be found on the College of Occupational Therapists website:  
<http://www.cot.co.uk/library-publications/cot-publications/practice-guidelines>.

College of Occupational Therapists (2015) *Hand and wrist orthoses for adults with rheumatological conditions: practice guideline for occupational therapists*. London: COT.

### 1. Introduction

The aim of this practice guideline is to provide specific evidence-based recommendations which describe the most appropriate care or action to be taken by occupational therapists working with adults who may benefit from a hand or wrist orthosis as an intervention for a rheumatological condition. Physiotherapists, hand therapists, orthotists and others who prescribe or use orthoses may also wish to refer to the guideline to inform their practice.

An orthotic intervention prescribed by an occupational therapist is usually one component of a more comprehensive joint protection and self-management programme (Hammond 2014). The recommendations are intended to be used alongside the therapist's clinical expertise in their assessment of need and implementation of interventions. The practitioner is, therefore, ultimately responsible for the interpretation of this evidence-based guideline in the context of their specific circumstances and each individual service user.

The guideline aims to support the occupational therapist's decision-making and clinical reasoning and, being based on evidence, cannot cover all aspects of occupational therapy practice with respect to the prescription of orthoses for rheumatological conditions. It is also not intended to be a guide on assessment or orthosis fabrication.

This resource provides a quick reference to the guideline recommendations, together with tables outlining the nature of the strength and quality grading categories of the recommendations. Extracts from the full guideline document on the background to the clinical condition and an overview of the occupational therapy role are also provided. Evidence-based recommendations are, however, not intended to be taken in isolation and must be considered in conjunction with the contextual information, and full guideline development methodology, described in the practice guideline document, together with current versions of professional practice documents, of which knowledge and adherence is assumed (COT 2015, p14).

The 31 studies from which the recommendations were developed are outlined in the full guideline in evidence tables (in Appendix 5). A total of 51.6% of the evidence from which the recommendations were developed was assessed as being high or moderate quality studies. 25.8% of the evidence was graded as high (A), 25.8% as moderate (B), 35.5% as low (C) and 12.9% as very low (D) quality. The overall grade of a recommendation is depicted in the guideline with a numerical, then alphabetical grade to reflect the strength of the recommendation and quality of the evidence (e.g. 1A – strong recommendation, high quality).

Research priorities identified during the development of the guideline are outlined in the full guideline document (COT 2015, p46).

## 2. Guideline recommendations

Synthesis of the evidence resulted in the emergence of recommendations for orthotic prescription in the context of three core areas:

- Rheumatoid arthritis: orthoses for activity and rest.
- Osteoarthritis: base of thumb orthoses.
- Optimising service user outcomes.

### Rheumatoid arthritis: orthoses for activity and rest

#### Functional wrist orthoses

- |    |  |    |
|----|--|----|
| 1. | <b><i>It is recommended</i></b> that a functional wrist orthosis should be prescribed for service users experiencing wrist pain as a result of rheumatoid arthritis. | 1A |
|    | <i>(Haskett et al 2004 [B]; Pagnotta et al 2005 [C]; Ramsey et al 2014 [A]; Thiele et al 2009 [C]; Veehof et al 2008a [B])</i>                                       |    |

#### Resting/night orthoses

- |    |   |    |
|----|---|----|
| 2. | <b><i>It is suggested</i></b> that where a night or resting orthosis is being considered as potentially beneficial to reduce symptoms for a service user with rheumatoid arthritis, both subjective and objective measures are used for the monitoring and review of effectiveness. | 2B |
|    | <i>(Adams et al 2008 [B]; Silva et al 2008 [A])</i>   |    |

#### Orthoses for swan neck deformity

- |    |   |    |
|----|---|----|
| 3. | <b><i>It is suggested</i></b> , when considering an orthosis for swan neck deformity, that a potential positive effect on dexterity should be balanced by possible adverse effects such as pressure and paraesthesia. | 2C |
|    | <i>(Spicka et al 2009 [D]; van der Giesen et al 2010 [D]; van der Giesen et al 2009 [C]; Zijlstra et al 2004 [C])</i>   |    |

## Evidence overview

### Functional wrist orthoses

The evidence for the use of functional wrist orthoses for people with rheumatoid arthritis is strong with respect to the reduction of pain, as particularly evidenced by the systematic review undertaken by Ramsey et al (2014). A decrease in pain was a consistent outcome across the studies, as measured using visual analogue scales. The reduction of symptoms, such as pain, is also a key motivator for adherence to wearing an orthosis. Risks associated with wearing a functional wrist orthosis were not specifically reported in the studies, but a potential negative impact on dexterity was highlighted.

## Resting/night orthoses

The effectiveness of a resting or night-positioning orthosis is not definitive. While the outcomes from two studies are potentially divergent in direction of benefit, it is important to note the different inclusion criteria and any variations in orthosis design and hand positioning. A positive impact on hand pain, grip and pinch strength, upper limb function and functional status was reported for participants with a mean of 9–10 years' disease duration, although the benefits beyond three months were not researched. Participants with early rheumatoid arthritis did not, however, obtain the same improvement in outcomes as determined by objective measures, although where the orthosis was used there was perceived effectiveness by participants. The evidence reviewed does not enable a specific recommendation to be made with respect to the prescription of a resting or night-positioning orthosis for service users with rheumatoid arthritis. The two studies do, however, identify the importance of using subjective service user perspectives and objective outcome measures to monitor progress and effectiveness of any orthosis prescribed.

## Orthoses for swan neck deformity

Some evidence exists to support prescription of an orthosis to improve dexterity where correctable swan neck deformity exists for people with rheumatoid arthritis. Impact on other dimensions, such as dexterity-related pain and function, is weaker. Inherent with the use of silver ring splints or Oval-8® ring orthoses is the potential for some adverse side effects, and the range of both positive and negative factors influencing choice should be considered as part of the orthotic prescription process. The recipients of an orthosis for swan neck deformity need to be carefully selected, as factors such as long-standing deformity may mean an orthosis is not tolerated.

## Osteoarthritis: base of thumb orthoses

### Orthoses to reduce pain and/or improve function

4. **It is recommended** that an orthosis should be prescribed for service users experiencing pain and/or functional difficulties with activities of daily living as a result of thumb base osteoarthritis. 1A

*(Bani et al 2014 [C]; Bani et al 2013a [C]; Bani et al 2013b [A]; Becker et al 2013 [B]; Boudstedt et al 2009 [C]; Egan and Brousseau 2007 [B]; Gomes Carreira et al 2010 [B]; Hermann et al 2014 [B]; Kjekken et al 2011a [A]; Kjekken et al 2011b [A]; Maddali-Bongi et al 2014 [C]; Moe et al 2009 [A]; Rannou et al 2009 [A]; Sillem et al 2011 [B]; Wajon and Ada 2005 [A]; Weiss et al 2004 [C])*

### Orthoses to improve grip and pinch strength

5. **It is suggested** that an orthosis can improve the grip/pinch strength for some people with thumb base osteoarthritis. 2C

*(Bani et al 2014 [C]; Bani et al 2013a [C]; Bani et al 2013b [A]; Becker et al 2013 [B]; Hermann et al 2014 [B]; Maddali-Bongi et al 2014 [C]; Sillem et al 2011 [B]; Wajon and Ada 2005 [A]; Weiss et al 2004 [C])*

## Evidence overview

A number of studies have been undertaken to explore the impact of orthoses on the symptoms of base of thumb osteoarthritis. The studies, while not all high quality, have frequently considered pain as the primary outcome measure, with function, grip and pinch strength often as secondary outcome measures. The evidence that orthoses have an impact on pain has been consistent in terms of direction of the outcomes, with an improvement being reported in 94% of the studies described (50% of those being statistically significant). One study identified no change in pain. The impact of an orthosis on function was considered in 11 studies, 5 (45%) of which were statistically significant in favour of an improvement in function, with one identifying no change. Risks or adverse outcomes

associated with these orthoses were rarely referred to in the studies. Changes in grip and pinch strength outcomes have been less consistent, with one study identifying a decrease in grip, and statistical significance being rare for both measures.

## Optimising service user outcomes

### Measuring outcomes

6. **It is recommended** that validated, standardised assessment and outcome measures are used pre- and post-provision of an orthosis to monitor progress and evaluate effectiveness. 1A

*(Bani et al 2014 [C]; Bani et al 2013a [C]; Bani et al 2013b [A]; Boudstedt et al 2009 [C]; De Boer et al 2008 [C]; Gomes-Carreira et al 2010 [B]; Haskett et al 2004 [B]; Kjekken et al 2011a [A]; Pagnotta et al 2005 [C]; Rannou et al 2009 [A]; Sillem et al 2011 [B]; Silva et al 2008 [A]; van der Giesen et al 2009 [C]; Veehof et al 2008a [B]; Wajon and Ada 2005 [A]; Weiss et al 2004 [C]; Zijlstra et al 2004 [C])*

### Orthosis design and wearing regimen

7. **It is suggested** that given the inconsistent evidence of a superior orthosis fabrication/design, or wearing regimen, the orthosis selected should maximise occupational performance and service user choice. 2A

*(Bani et al 2013b [A]; Becker et al 2013 [B]; Haskett et al 2004 [B]; Sillem et al 2011 [B]; Thiele et al 2009 [C]; van der Giesen et al 2009 [C]; Wajon and Ada 2005 [A]; Weiss et al 2004 [C])*

### Service user experiences

8. **It is recommended** that to optimise adherence to wearing a prescribed orthosis, the occupational therapist should discuss with the service user potential benefits and limitations; practicalities of use and comfort; provide the opportunity to try on orthoses prior to issue; and routinely arrange follow-up review of the intervention. 1C

*(De Boer et al 2008 [C]; Gooberman-Hill et al 2013 [D]; McKee and Rivard 2004 [D]; Veehof et al 2008b [C])*

## Evidence overview

### Measuring outcomes

The evidence across the studies indicated that pain and function outcomes can be determined using self-reported measures such as the VAS or NRS for pain, and the DASH or AUSCAN for function. Measures can also be used to objectively determine performance for dexterity, grip and pinch strength. The combination of subjective (self-reported) and objective performance measures can provide reliable, valid and responsive information about the outcomes of orthotic intervention, and contribute to evidence of effectiveness.

### Orthosis design and wearing regimen

A wide range of prefabricated orthoses are available commercially; others are custom-made. These may be fabricated from a variety of materials, including thermoplastics, neoprene, leather and hybrid combinations. Research studies have compared a number of these orthoses, for both osteoarthritis and rheumatoid arthritis. While some orthoses showed a greater effect on pain reduction, and others were preferred by participants, there is no consistent evidence of a superior orthosis design. Furthermore, the variance of wearing regimen is particularly evident within the evidence.

### **Service user experiences**

Research that involves service user perspectives can provide a richness which, when taken into account, can have the potential to enhance wearing of an orthosis in practice and, as such, can improve the outcomes sought by the individual. Views expressed that were common to the studies included the importance of the support provided by the orthosis, its comfort and appearance, and ease of use, with 'perceived need' being a key driver for adherence of wearing. The range of potential issues influencing wearing of an orthosis implies that follow-up review of an orthosis is necessary to enable these to be addressed. Orthoses that are worn are more likely to result in effective outcomes for service users and, by association, more efficient use of occupational therapy service resources.

## **3. Policy and service delivery context**

Pain and disability are a key focus for the management of rheumatological conditions. Arthritis Research UK in their parliamentary guide to musculoskeletal conditions state that 'untreated arthritis, regardless of the cause, can lead to pain, disability and lost quality of life' (Arthritis Research UK 2012, p4). Chronic pain, experienced as a result of musculoskeletal conditions, can have a significant impact on an individual including their activities of daily living, work, social and leisure activities (Hammond et al 2008, p158).

The rheumatological conditions covered by this guideline are considered to be long-term conditions with impact on the individual and on the health and social care systems. The National Audit Office in 2009 reported that rheumatoid arthritis costs the NHS an estimated £5.6 billion a year in healthcare costs, with the majority of this in the acute sector (National Audit Office [NAO] 2009, p5). Similar estimates (£5.2 billion) have been identified for osteoarthritis, reflecting particularly the cost of hip and knee joint replacements (Oxford Economics 2010, p15). The report '*The economic costs of arthritis for the UK economy*' estimates that the indirect costs of arthritis (osteoarthritis and rheumatoid arthritis) on society are £14.8 billion. This includes the cost of permanent retirement, absenteeism, reduced productivity and informal care (Oxford Economics 2010, p24). When indirect costs are added to direct costs (hospital and other medical care), and 'quality of life' costs, the total cost of arthritis is estimated at £30.7 billion per annum (Oxford Economics 2010, p28).

Service delivery must, therefore, be seen in the context of the prevalence of osteoarthritis and rheumatoid arthritis, a rising older population, an increase in those with long-term or multiple conditions, and the associated increase in need for care and support (Great Britain. Parliament. Select Committee on Public Service and Demographic Change 2013).

The National Institute for Health and Care Excellence (NICE) defines a number of clinical pathways, one of which is for musculoskeletal conditions. The musculoskeletal pathway identifies a number of sub-pathways, and there are NICE pathways for both rheumatoid arthritis and osteoarthritis (NICE 2014a). The commissioning and delivery of services in England and Wales is expected to take into account the clinical guideline (NICE 2013a) and quality standard for rheumatoid arthritis (NICE 2013b), and the clinical guideline for osteoarthritis (NICE 2014b). In Scotland there is a clinical guideline for the management of early rheumatoid arthritis (SIGN 2011).

## **4. Background to clinical condition**

Osteoarthritis is the most common form of arthritis, and is normally associated with later life. Data collected by the Arthritis Research UK Primary Care Centre at Keele University identified the prevalence of consultation, with a general practitioner, for osteoarthritis in those aged 45 years or over in the UK as 33%. Hand and wrist consultation prevalence is estimated at 6%, representing 1.56 million people. Women aged 45–64 years are more than twice as likely as men in that age group to have consulted their general practitioner regarding hand or wrist osteoarthritis – an estimated 620,000 women aged 45–64 years in the UK (Arthritis Research UK 2013, p31).

Rheumatoid arthritis is the second most common form of arthritis, and can affect adults of any age, although 40–60 years of age is the most common for rheumatoid arthritis to develop (Scott and Bosworth 2014). The National Audit Office estimated in 2009 that 580,000 people had rheumatoid arthritis (NAO 2009, p5) which, when extrapolated, is approximately 690,000 people in the UK population. Rheumatoid arthritis is the most common inflammatory arthritis, with prevalence being two to four times greater in women (1.16%) than men (0.44%) (Symmons et al 2002). The involvement of the wrist and metacarpophalangeal joints is approximately 90% and 95% respectively (Smith 2013).

## 5. The occupational therapy role

This practice guideline focuses on orthoses, but this is just one intervention that occupational therapists can offer individuals with rheumatological conditions involving the hand and wrist. The prescription of an orthosis should not be seen in isolation but within the context of a comprehensive assessment and individually tailored intervention plan.

## 6. Potential impact of the recommendations

### Desired outcomes

- Service users perceive benefits of wearing an orthosis.
- Measurable effectiveness determined by benefits and outcomes which may include:
  - Reduced pain.
  - Improved grip.
  - Improved pinch strength.
  - Improved function.
  - Improved dexterity.

### Risk management

#### ***A comprehensive assessment:***

The evidence reviewed did not indicate when it might be inappropriate to prescribe an orthosis; however, the prescription of any orthosis must be based on a comprehensive assessment, taking into account the nature of the service user's individual clinical condition – that is, 'the underlying disease process and the possible associated hand impairment and functional limitations' (Bradley and Adams 2013, p203) and their occupational performance needs. The individual's general medical status may also impact on orthosis prescription: for example, service users with diabetes may have less tolerance for an orthosis due to impaired sensation or circulatory impairment. Cognitive ability should also be considered, including the service user's capacity for understanding how to use the orthosis correctly and how to recognise and respond to discomfort or other indications of possible adverse effects in a timely and appropriate manner.

#### ***An orthosis as part of a comprehensive intervention programme:***

The potential impact of an orthosis in the re-direction of force to other joints unconstrained within the orthosis, especially if they are also affected by the underlying pathology, must also be taken into account. Orthoses should not, therefore, be considered in isolation. A more comprehensive occupational therapy programme, including joint protection techniques and education, may be required (Bradley and Adams 2013, p192).

#### ***Appropriate orthosis assessment and fitting:***

The provision and fitting of an orthosis is a specific skill which requires clinical expertise with respect to anatomy and biomechanics of the wrist and hand. To optimise user adherence and functionality, there is a need for appropriate assessment and fitting. An inappropriately selected and fitted orthosis may be ineffectual and increase the risks. Individuals who may benefit from an orthosis should therefore be referred to an appropriately trained health professional. In the context of prescribing an orthosis, factors such as skin condition, correct fitting, and environment where the orthosis will be

used (particularly in relation to environmental or work hazards) all need to be part of the decision-making process.

**Monitoring for side effects:**

Clinical reasoning is essential to determine the balance of expected outcomes with potential risks or possible adverse effects. This is particularly important given that the nature of the evidence does not support routine provision, and non-adherence with a prescribed wearing regimen was reported in a number of the studies included in the evidence.

Adverse outcomes from orthotic prescription/use were minimal in the studies reviewed, but orthoses were not without side effects, as reported by service users. Potential side effects should, therefore, be discussed with the service user and monitored during the period of intervention.

The service user perspectives established in one functional wrist orthosis study, for example, made reference to side effects: unpleasant feelings such as tingling, or pressure points due to tight fit (Veehof 2008b). The importance of reducing any risks was identified in the Veehof et al study (2008b), stating that orthosis use should be reviewed one week after prescription to evaluate the perceived benefits and barriers to orthosis wearing, including comfort, fit and adherence.

Silver ring splints and oval 8 orthoses may have side effects for some individuals (intolerance of the orthosis, pressure of the orthosis on bony edges, rheumatoid nodules and paraesthesia), and the risk of these should be discussed with the service user and carefully assessed and monitored following orthotic prescription (van der Giesen et al 2010, Zijlstra et al 2004).

**Other considerations:**

Additional considerations which were not necessarily identified within the evidence, but should be taken into account, are the durability of an orthosis over time, and the responsibility of maintenance and replacement of an orthosis in the long term, particularly if the service user is no longer being seen for review or has been discharged from the service.

## 6. Recommendation Grade Guide

Strength of grade (after Guyatt et al 2008)

Strength	Grade	Benefits and risks	Implications
<b>Strong</b>	1 'It is recommended...'	Benefits appear to outweigh the risks (or vice versa) for the majority of the target group.	Most service users would want or <b>should</b> receive this course of intervention or action.
<b>Conditional</b>	2 'It is suggested...'	Risks and benefits are more closely balanced, or there is more uncertainty in likely service user values and preferences.	The majority of service users would want this intervention, but not all, and therefore they should be supported to arrive at a decision for intervention consistent with the benefits and their values and preferences.

GRADE quality of evidence grading (after GRADE Working Group 2004)

Quality of evidence	Grading	Characteristics	Confidence
<b>High</b>	A	Based on consistent results from well-performed randomised controlled trials, or overwhelming evidence of an alternative source e.g. well-executed observational studies with strong effects.	True effect lies close to that of the estimate of the effect. Further research very unlikely to change confidence in the estimate of the effect.

<b>Moderate</b>	B	Based on randomised controlled trials where there are serious flaws in conduct, inconsistency, indirectness, imprecise estimates, reporting bias or some other combination of these limitations, or from other study designs with special strengths.	True effect likely to be close to the estimate of the effect but there could be a substantial difference. Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.
<b>Low</b>	C	Based on observational evidence, or from controlled trials with several very serious limitations.	True effect may be substantially different from the estimate of the effect. Further research is very likely to have an important impact on confidence in the estimate of the effect and is likely to change the estimate.
<b>Very low</b>	D	Based on case studies or expert opinion.	Any estimate of effect is very uncertain and may be far from the true effect.

## Evidence References

Adams J, BurrIDGE J, Mullee M, Hammond A, Cooper C (2008) The clinical effectiveness of static resting splints in early rheumatoid arthritis: a randomized controlled trial. *Rheumatology*, 47(10), 1548–1553.

Bani MA, Arazpour M, Hutchins SW, Layeghi F, Bahramizadeh M, Mardani MA (2014) A custom-made neoprene thumb carpometacarpal orthosis with thermoplastic stabilization: an orthosis that promotes function and improvement in patients with the first carpometacarpal joint osteoarthritis. *Prosthetics and Orthotics International*, 38(1), 79–82.

Bani MA, Arazpour M, Kashani RV, Mousavi ME, Maleki M, Hutchins SW (2013a) The effect of custom-made splints in patients with the first carpometacarpal joint osteoarthritis. *Prosthetics and Orthotics International*, 37(2), 139–144.

Bani MA, Arazpour M, Hutchins SW, Layeghi F, Bahramizadeh M, Mardani MA (2013b) Comparison of custom-made and prefabricated neoprene splinting in patients with the first carpometacarpal joint osteoarthritis. *Disability and Rehabilitation: Assistive Technology*, 8(3), 232–237.

Becker SJ, Bot AG, Curley SE, Jupiter JB, Ring D (2013) A prospective randomized comparison of neoprene vs thermoplast hand-based thumb spica splinting for trapeziometacarpal arthrosis. *Osteoarthritis and Cartilage*, 21(5), 668–675.

Boustedt C, Nordenskiöld U, Lundgren Nilsson A (2009) Effects of a hand-joint protection programme with an addition of splinting and exercise: one-year follow-up. *Clinical Rheumatology*, 28(7), 793–799.

de Boer IG, Peeters AJ, Ronday HK, Mertens BJA, Breedveld FC, Vliet Vlieland TPM (2008) The usage of functional wrist orthoses in patients with rheumatoid arthritis. *Disability and Rehabilitation*, 30(4), 286–295.

Egan MY, Brousseau L (2007) Splinting for osteoarthritis of the carpometacarpal joint: a review of the evidence. *American Journal of Occupational Therapy*, 61(1), 70–78.

Gomes Carreira AC, Jones A, Natour J (2010) Assessment of the effectiveness of a functional splint for osteoarthritis of the trapeziometacarpal joint of the dominant hand: a randomized controlled study. *Journal of Rehabilitation Medicine*, 42(5), 469–474.

Gooberman-Hill R, Jinks C, Bouças SB, Hislop K, Dziedzic KS, Rhodes C. . . Adams J (2013) Designing a placebo device: involving service users in clinical trial design. *Health Expectations*, 16(4), e100–e110.

Haskett S, Backman C, Porter B, Goyert J, Palejko G (2004) A cross-over trial of custom-made and commercially available wrist splints in adults with inflammatory arthritis. *Arthritis Care & Research*, 51(5), 792–799.

Hermann M, Nilsen T, Eriksen CS, Slatkowsky-Christensen B, Haugen IK, Kjekken I (2014) Effects of a soft prefabricated thumb orthosis in carpometacarpal osteoarthritis. *Scandinavian Journal of Occupational Therapy*, 21(1), 31–39.

- Kjeken I, Darre S, Smedslund G, Hagen KB, Nossun R (2011a) Effect of assistive technology in hand osteoarthritis: a randomised controlled trial. *Annals of the Rheumatic Diseases*, 70(8), 1447–1452.
- Kjeken I, Smedslund G, Moe RH, Slatkowsky-Christensen B, Uhlig T, Hagen KB (2011b) Systematic review of design and effects of splints and exercise programs in hand osteoarthritis. *Arthritis Care & Research*, 63(6), 834–848.
- Maddali-Bongi S, Del Rosso A, Galluccio F, Sigismondi F, Matucci-Cerinic M (2014) Is an intervention with a custom-made splint and an educational program useful on pain in patients with trapeziometacarpal joint osteoarthritis in a daily clinical setting? *International Journal of Rheumatic Diseases*, Mar 6. [Epub ahead of print].
- McKee P, Rivard A (2004) Orthoses as enablers of occupation: client-centred splinting for better outcomes. *Canadian Journal of Occupational Therapy*, 71(5), 306–314.
- Moe RH, Kjeken I, Uhlig T, Hagen KB (2009) There is inadequate evidence to determine the effectiveness of nonpharmacological and nonsurgical interventions for hand osteoarthritis: an overview of high-quality systematic reviews. *Physical Therapy*, 89(12), 1363–1370.
- Pagnotta A, Korner-Bitensky N, Mazer B, Baron M, Wood-Dauphinee S (2005) Static wrist splint use in the performance of daily activities by individuals with rheumatoid arthritis. *The Journal of Rheumatology*, 32(11), 2136–2143.
- Ramsey L, Winder RJ, McVeigh JG (2014) The effectiveness of working wrist splints in adults with rheumatoid arthritis: a mixed methods systematic review. *Journal of Rehabilitative Medicine*, 46(6), 481–492.
- Rannou F, Dimet J, Boutron I, Baron G, Fayad F, Mace Y. . . Poiraudou S (2009) Splint for base-of-thumb osteoarthritis: a randomized trial. *Annals of Internal Medicine*, 150(10), 661–669.
- Sillem H, Backman CL, Miller WC, Li LC (2011) Comparison of two carpometacarpal stabilizing splints for individuals with thumb osteoarthritis. *Journal of Hand Therapy*, 24(3), 216–225.
- Silva AC, Jones A, Silva PG, Natour J (2008) Effectiveness of a night-time hand positioning splint in rheumatoid arthritis: a randomized controlled trial. *Journal of Rehabilitation Medicine*, 40(9), 749–754.
- Spicka C, Macleod C, Adams J, Metcalf C (2009) Effect of silver ring splints on hand dexterity and grip strength in patients with rheumatoid arthritis: an observational pilot study. *Hand Therapy*, 14(2), 53–57.
- Thiele J, Nimmo R, Rowell W, Quinn S, Jones G (2009) A randomized single blind cross-over trial comparing leather and commercial wrist splints for treating chronic wrist pain in adults. [Online] *BMC Musculoskeletal Disorders*. Available at: <http://www.biomedcentral.com/content/pdf/1471-2474-10-129.pdf>
- van der Giesen FJ, Nelissen RGHH, van Lankveld WJ, Kremers-Selten C, Peeters AJ, Stern EB. . . Vliet Vlieland TPM (2010) Swan neck deformities in rheumatoid arthritis: a qualitative study on the patients' perspectives on hand function problems and finger splints. *Musculoskeletal Care*, 8(4), 179–188.
- van der Giesen FJ, van Lankveld WJ, Kremers-Selten C, Peeters AJ, Stern EB, Le Cessie S. . . Vliet Vlieland TPM (2009) Effectiveness of two finger splints for swan neck deformity in patients with rheumatoid arthritis: a randomized crossover trial. *Arthritis Care & Research*, 61(8), 1025–1031.
- Veehof MM, Taal E, Heijnsdijk-Rouwenhorst LM, van de Laar MA (2008a) Efficacy of wrist working splints in patients with rheumatoid arthritis: a randomized controlled study. *Arthritis & Rheumatism*, 59(12), 1698–1704.
- Veehof MM, Taal E, Willems MJ, van de Laar MA (2008b) Determinants of the use of wrist working splints in rheumatoid arthritis. *Arthritis & Rheumatism*, 59(4), 531–536.
- Wajon A, Ada L (2005) No difference between two splint and exercise regimens for people with osteoarthritis of the thumb: a randomised controlled trial. *Australian Journal of Physiotherapy*, 51(4), 245–249.
- Weiss S, Lastayo P, Mills A, Bramlet D (2004) Splinting the degenerative basal joint: custom-made or prefabricated neoprene? *Journal of Hand Therapy*, 17(4), 401–406.
- Zijlstra TR, Heijnsdijk-Rouwenhorst L, Rasker JJ (2004) Silver ring splints improve dexterity in patients with rheumatoid arthritis. *Arthritis & Rheumatism*, 51(6), 947–951.

## Supporting information references

- Arthritis Research UK (2013) *Osteoarthritis in general practice. Data and perspectives*. Chesterfield: Arthritis Research UK.
- Arthritis Research UK (2012) *Understanding arthritis: a parliamentary guide to musculoskeletal health*. Chesterfield: Arthritis Research UK. Available at: <http://arma.uk.net/wp-content/uploads/pdfs/Arthritis-Research-UK-Sep2012-Understanding-Arthritis.pdf>
- Bradley S, Adams J (2013) Rheumatology splinting. In: L Goodacre, M McArthur, eds. *Rheumatology practice in occupational therapy: promoting lifestyle management*. Chichester: Wiley-Blackwell. 189–206.
- College of Occupational Therapists (2015) *Hand and wrist orthoses for adults with rheumatological conditions: practice guideline for occupational therapists*. London: COT.
- GRADE Working Group (2004) Grading quality of evidence and strength of recommendations. *British Medical Journal*, 328(7454), 1490–1494.
- Great Britain. Parliament. Select Committee on Public Service and Demographic Change (2013) *Ready for ageing?* (HL paper, session 2012/13; 140). London: Stationery Office. Available at: <http://www.publications.parliament.uk/pa/ld201213/ldselect/ldpublic/140/14003.htm>
- Guyatt GH, Oxman AD, Kunz R, Falck-Ytter Y, Vist GE, Liberati A, Schünemann HJ, GRADE Working Group (2008) Going from evidence to recommendations. *British Medical Journal*, 336(7652), 1049–1051.
- Hammond A (2014) The Elizabeth Casson Memorial Lecture 2014: changing ways; changing times. *British Journal of Occupational Therapy*, 77(8), 392–399.
- Hammond A, Reeve L, McArthur M (2008) Occupational therapy in musculoskeletal chronic pain management. In: British Society for Rheumatology and IASP Musculoskeletal Taskforce. *British Society for Rheumatology and IASP Musculoskeletal Pain Taskforce guidelines for the integrated management of musculoskeletal pain symptoms (IMMsPS)*. [s.l]: [s.n.]. 158–166. Available at: [http://www.hope-academic.org.uk/painresearch/Guidelines\\_for\\_the\\_Management\\_of\\_Musculoskeletal\\_Pain\\_FINA.pdf](http://www.hope-academic.org.uk/painresearch/Guidelines_for_the_Management_of_Musculoskeletal_Pain_FINA.pdf)
- National Audit Office (2009) *Services for people with rheumatoid arthritis*. London: Stationery Office.
- National Institute for Health and Care Excellence (2014a) *Musculoskeletal conditions overview*. London: NICE. Available at: <http://pathways.nice.org.uk/pathways/musculoskeletal-conditions>
- National Institute for Health and Care Excellence (2014b) *Osteoarthritis: care and management in adults* (NICE Clinical Guideline 177). London: NICE. Available at: <http://www.nice.org.uk/guidance/cg177>
- National Institute for Health and Care Excellence (2013a) *Rheumatoid arthritis: the management of rheumatoid arthritis in adults* (NICE Clinical Guideline 79). London: NICE. Available at: <https://www.nice.org.uk/guidance/cg79>
- National Institute for Health and Care Excellence (2013b) *Quality standard for rheumatoid arthritis* (NICE Quality Standard 33). London: NICE. Available at: <https://www.nice.org.uk/guidance/qs33>
- Oxford Economics (2010) *The economic costs of arthritis for the UK economy*. Oxford: Oxford Economics. Available at: <https://www.oxfordeconomics.com/publication/open/222531>
- Scott DGI, Bosworth A (2014) *What is RA?* Maidenhead: National Rheumatoid Arthritis Society. Available at: <http://www.nras.org.uk/what-is-ra-article>
- Scottish Intercollegiate Guidelines Network (2011) *Management of early rheumatoid arthritis: a national clinical guideline*. Edinburgh: SIGN. Available at: <http://www.sign.ac.uk/pdf/sign123.pdf>
- Smith R (2013) *The upper limb in primary care: part 2: wrist, hand*. Issue 2 (Hands On Series 7). Chesterfield: Arthritis Research UK. Available at: <http://www.arthritisresearchuk.org/health-professionals-and-students/reports/hands-on/hands-on-spring-2013.aspx>
- Symmons D, Turner G, Webb R, Asten P, Barrett E, Lunt M. . . Silman A (2002) The prevalence of rheumatoid arthritis in the United Kingdom: new estimates for a new century. *Rheumatology*, 41(7), 793–800.