



# REVISTA BRASILEIRA DE REUMATOLOGIA

[www.reumatologia.com.br](http://www.reumatologia.com.br)



## Review article

# Occupational therapy in rheumatoid arthritis: what rheumatologists need to know?☆



Pedro Henrique Tavares Queiroz de Almeida<sup>a,\*</sup>, Tatiana Barcelos Pontes<sup>a</sup>,  
João Paulo Chierogato Matheus<sup>a</sup>, Luciana Feitosa Muniz<sup>b</sup>,  
Lícia Maria Henriques da Mota<sup>b</sup>

<sup>a</sup> Universidade de Brasília, Brasília, DF, Brazil

<sup>b</sup> Hospital Universitário de Brasília, Universidade de Brasília, Brasília, DF, Brazil

## ARTICLE INFO

### Article history:

Received 11 April 2014

Accepted 10 July 2014

Available online 28 November 2014

### Keywords:

Rheumatoid arthritis

Rehabilitation

Activities of daily living

Occupational therapy

## ABSTRACT

Interventions focusing on education and self-management of rheumatoid arthritis (RA) by the patient improves adherence and effectiveness of early treatment. The combination of pharmacologic and rehabilitation treatment aims to maximize the possibilities of intervention, delaying the appearance of new symptoms, reducing disability and minimizing sequelae, decreasing the impact of symptoms on patient's functionality. Occupational therapy is a health profession that aims to improve the performance of daily activities by the patient, providing means for the prevention of functional limitations, adaptation to lifestyle changes and maintenance or improvement of psychosocial health. Due to the systemic nature of RA, multidisciplinary follow-up is necessary for the proper management of the impact of the disease on various aspects of life. As a member of the health team, occupational therapists objective to improve and maintaining functional capacity of the patient, preventing the progression of deformities, assisting the process of understanding and coping with the disease and providing means for carrying out the activities required for the engagement of the individual in meaningful occupations, favoring autonomy and independence in self-care activities, employment, educational, social and leisure. The objective of this review is to familiarize the rheumatologist with the tools used for assessment and intervention in occupational therapy, focusing on the application of these principles to the treatment of patients with RA.

© 2014 Elsevier Editora Ltda. All rights reserved.

☆ Institution: Faculdade de Ceilândia – Course of Occupational Therapy; Hospital Universitário de Brasília – Rheumatology – Outpatient Clinic of Early Rheumatoid Arthritis.

\* Corresponding author.

E-mail: [pedroalmeida.to@gmail.com](mailto:pedroalmeida.to@gmail.com) (P.H.T.Q. de Almeida).

<http://dx.doi.org/10.1016/j.rbre.2014.07.008>

2255-5021/© 2014 Elsevier Editora Ltda. All rights reserved.

## Terapia ocupacional na artrite reumatoide: o que o reumatologista precisa saber?

### R E S U M O

#### Palavras-chave:

Artrite reumatoide  
Reabilitação  
Atividades cotidianas  
Terapia ocupacional

Intervenções voltadas para a educação e o autogerenciamento da artrite reumatoide (AR) pelo paciente aumentam a adesão e a eficácia da abordagem precoce. A combinação de tratamento medicamentoso e tratamento de reabilitação visa a potencializar as possibilidades de intervenção, retardar o aparecimento de novos sintomas, reduzir incapacidades, minimizar sequelas e reduzir o impacto dos sintomas sobre a funcionalidade do paciente. A terapia ocupacional é uma profissão da área da saúde que objetiva a melhoria do desempenho de atividades pelo paciente e fornece meios para a prevenção de limitações funcionais, adaptação a modificações no cotidiano e manutenção ou melhoria de seu estado emocional e participação social. Devido ao caráter sistêmico da AR o acompanhamento multidisciplinar é necessário para o adequado manejo do impacto da doença sobre os mais diversos aspectos da vida do paciente. Como membro da equipe de saúde, o terapeuta ocupacional objetiva a melhoria e manutenção da capacidade funcional do paciente, prevenir o agravamento de deformidades, auxiliar o processo de compreensão e enfrentamento da doença, fornecer meios para as atividades necessárias para o engajamento do indivíduo em ocupações significativas, favorecer sua autonomia e independência em atividades de autocuidado, laborais, educacionais, sociais e de lazer. O objetivo desta revisão é familiarizar o reumatologista com as ferramentas de avaliação e intervenção usadas na terapia ocupacional, com enfoque na aplicação desses princípios para o tratamento de pacientes com diagnóstico de AR.

© 2014 Elsevier Editora Ltda. Todos os direitos reservados.

## Introduction

Rheumatoid arthritis (RA) is a systemic autoimmune disease characterized by impairment of the peripheral joints, especially hands and feet.<sup>1</sup> A prevalence of up to three times higher among women is observed, with increasing incidence after the age of 25 years, with greater involvement of populations between 35 and 55 years.<sup>2</sup>

Although there is no consensus on the etiology of RA, it is observed that the combination of inflammation and synovial hypertrophy favor cartilage and bone destruction, promoting joint damage and instability,<sup>3</sup> predominantly affecting the joints of the wrist and metacarpophalangeal and proximal interphalangeal joints of upper limbs.<sup>4</sup> For these reasons, the treatment of patients diagnosed with RA should be started as soon as possible, aiming to reduce the inflammatory activity of the disease and even to obtain remission of symptoms.<sup>5</sup>

Despite advances in the pharmacological treatment achieved in the last 30 years, especially with the advent of disease-modifying anti-rheumatic drugs (DMARDs),<sup>6</sup> the chronicity of RA implies interventions aimed to the education and self-management of the disease to favor the treatment, increasing the adherence and effectiveness of an early approach.<sup>7,8</sup>

The combination of drug treatment and rehabilitation therapy aims to maximize the possibilities of intervention,<sup>9</sup> delay the onset of new symptoms, reduce disability, minimize sequelae and diminish the impact of symptoms on functionality of the patient.<sup>10,11</sup>

Occupational therapy (OT) is a health care profession which aims at improving the performance of activities by the patient, providing a means for the prevention of functional limitations,

adaptation to lifestyle changes and maintenance or improvement of his/her emotional state and social participation.<sup>12</sup>

The aim of this review is to familiarize the rheumatologist with the assessment and intervention tools used in occupational therapy, focusing on the application of these principles to the treatment of patients diagnosed with RA.

## Multidisciplinary treatment – practice of occupational therapy

Due to the characteristic joint impairment of RA, the functionality of the patient is reduced not only by the painful condition, but also by those motor constraints associated.<sup>13</sup> The difficulty in performing daily tasks is one of the main complaints of patients with the disease<sup>14,15</sup> causing restrictions in most of their areas of performance<sup>16</sup>: from simple activities related to self-care and home maintenance to complex work tasks, the patient presents limitations in doing many of his/her activities of daily living (ADLs).<sup>17</sup>

It is observed that such restrictions affect not only the performance of the activities independently and autonomously, but has a negative impact on the emotional state, social relationships and quality of life of the patient.<sup>7,18</sup>

Given the participation constraints and the importance of engaging in productive activities for the maintenance of physical and psychosocial health of this population, the occupational therapist is an integral part of the multidisciplinary team of care for patients with RA, being concerned with the performance of ADLs and the inclusion of the patient in meaningful occupations for his/her everyday life.<sup>19,20</sup>

Due to the multiplicity of involvements motivated by the disease and the singularity represented by the daily activities

**Table 1 – Standardized instruments for the functional assessment of patients with RA.**

Assessment tool	Objective	Data collection method
Disabilities of Arm, Shoulder and Hand (DASH)	Measures the level of functional impact resulting from the impairment of the upper limb to perform activities of daily living related to self-care, mobility, home maintenance and recreation. The device has optional modules specific to assess the impairment of work activities and the practice of sport and musical activities.	Structured, self-administered questionnaire. Score from 0 to 100 points, indicating increasing disability due to involvement of upper limbs. <sup>24,25</sup>
Sequential Occupational Dexterity Assessment (SODA)	Assesses the patient's performance on twelve tasks, performed unilaterally and bilaterally, including writing, handling objects and pieces of clothing and hand hygiene.	Structured test. Scored by the therapist, according to the patient's performance on the tasks described. <sup>26,27</sup>
Health Assessment Questionnaire (HAQ)	Measures the level of functionality based on the difficulty reported by the patient to perform activities in eight areas, including reaching, self-care, mobility and object holding.	Standardized questionnaire consisting of 20 questions, scored from 0 to 3, indicating increasing disability. <sup>28,29</sup>
Canadian Occupational Performance Measure (COPM)	Assesses the patient's perception of the importance of ADLs in self-care, productivity and leisure areas, as well as his/her satisfaction on the implementation and performance of these tasks.	Qualitative questionnaire in a format of semi-structured interview. Provides two scores (for performance and satisfaction), allowing the patient's pre- and post-intervention evaluation. <sup>30,31</sup>
Handgrip dynamometry – JAMAR® Dynamometer	Assesses handgrip strength by measuring the maximum force exerted by the patient when pressing a hydraulic dynamometer.	Standardized test, measured in pounds or kg/F. Requires standardization of postures and grip forms utilized during the evaluation. <sup>32,33</sup>
Digital pinch dynamometry – Pinch Gauge® Dynamometer	Measures the digital pinch strength of the patient with three types of tweezers, using the fingers I, II and III, representing both fine movement (opposition between fingers I and II) and grip strength (lateral grip).	Standardized test, measured in pounds or kg/F. Requires standardization of postures and grip forms utilized during the evaluation. <sup>32,33</sup>
Manual Dexterity and Function Testing	Measure manual dexterity through the manipulation of objects and utensils common to ADLs. Examples: Jebsen-Taylor function test, Purdue Pegboard, O'Connor Finger Dexterity.	Standardized tests, generally using as a parameter for evaluation the time required for manipulation of objects during the course of systematic tasks. <sup>27</sup>
Hospital Anxiety and Depression Scale (HADS)	Evaluates the occurrence of symptoms of anxiety and depression among patients.	Standardized questionnaire containing seven questions to assess anxiety and seven for depression, scored from 0 to 3. The final score is the sum of the points; results >7 suggest states of anxiety and/or depression. <sup>18</sup>

for each patient, the first step toward the realization of an effective therapeutic intervention is to obtain relevant data on the state of the disease and its impact on the patient's ADLs. The evaluation is an ongoing process, which enables the monitoring of treatment and the interventions needed, as well as the modification of these during periods of exacerbation and remission.<sup>21</sup>

### Assessment in occupational therapy

The evaluation aims at obtaining data relating to the physical, emotional and social state of the patient, as well as the impact of the disease on his/her ADLs, providing objective data on the patient's occupational performance that allow monitoring of his/her evolution during treatment.<sup>22</sup>

Historically, occupational therapists combine the use of semi-structured interviews and standardized tools for gathering information to enable the establishment of a baseline for the therapy: disease status and functional limitations, expansion of the understanding of the contexts of a patient's life, identification of his/her priorities, monitoring of the disease and the effectiveness of proposed interventions.<sup>21</sup> The selection of assessment methods should take into consideration the main complaints of the patient and their relevance to the clinical presentation.<sup>23</sup> Table 1 illustrates some of the standardized assessment tools that comprise the evaluation of patients with RA by the occupational therapist.

Independent of the choice of instruments for assessment, is important that the information obtained is related to the occupational performance of the patient, i.e., the data must aim not only to measure the intensity of a particular symptom

(fatigue, pain, functional capacity), but also the influence of this on the patient's ability to engage and perform tasks relevant to his/her day-to-day.<sup>12,21</sup>

## Interventions of occupational therapy

### Patient guidance and education – changing habits to cope with illness

The transmission of knowledge and the understanding of the patient about his/her condition do not guarantee, by itself, any change of attitudes necessary for the management of complications arising from a chronic disease; so that OT has as main objective the voluntary change of habits, extended to all areas of the patient's performance and not only to those activities afflicted by pain or biomechanical imbalances driven by the disease.<sup>24</sup>

The multidisciplinary interventions for patients with RA aim to control pain and fatigue, aiming their functional improvement by combining different modalities of treatment.

Among some of the interventions focused on patient adjustment and empowerment concerning the disease, the techniques of joint protection and energy conservation are examples of changes in habits, by the way of conducting ADLs, which promote changes not only on functional capacity, but also on the psychological well-being, personal control and self-acceptance – fundamental concepts for improving the quality of life of the patient.<sup>34</sup>

### Joint protection and energy conservation

Joint protection techniques are a set of guidelines and preventive strategies used in the management of pain and fatigue,<sup>35</sup> associated with other symptoms in patients with RA, which aim to apply ergonomic and biomechanical principles while performing ADLs to protect joint structures of normal and abnormal forces that may contribute to the installation of deformities or aggravate deformities already present.<sup>36,37</sup>

This approach was first described in 1965,<sup>38</sup> through the analysis of motor impairments motivated by the inflammatory process common to RA and its combination with biomechanical principles, aiming to minimize the action of forces that favored the development of joint deviations and deformities during performing daily tasks,<sup>39</sup> for example, hyperextension of the metacarpophalangeal joint of the finger I, ulnar deviation of metacarpophalangeal joints of the fingers II–V and installation of deformity standards, such as swan neck, hammer toe or buttonhole toe, through involvement of distal interphalangeal joints.<sup>40</sup>

Due to the importance and constancy necessary for the accomplishment of ADLs, modifications in their performance allow a significant reduction in joint stress and energy expenditure, facilitating or enabling the participation of the patient in meaningful occupations.<sup>36,37</sup> Table 2 illustrates the main guidelines of the concepts of joint protection and energy conservation.

By modifying work methods and environments, use of assistive devices (assistive technologies) and inclusion of breaks in the routine, the objective here is the reduction of

**Table 2 – Principles of joint protection and energy conservation.**

#### Joint protection

- Respect the pain – Use it as a sign to change the activity
- Distribute the load on more than one joint
- Reduce the strength and the effort required to perform some activity, changing the way to perform it, using assistive devices or reducing the weight of utensils
- Use each joint in its most stable and functional anatomical plane
- Avoid positions or forces in directions that favor deformities
- Always use the stronger and larger joint to work
- Avoid staying in the same position for a prolonged time
- Avoid holding objects with excessive force
- Avoid awkward postures and inappropriate ways to pick up and handle objects
- Maintain muscle strength and range of motion

#### Energy conservation

- Adjust your day balancing moments of activity and rest, alternating light and heavy tasks and performing activities at a slower pace
- Plan the conduction of your activities: prioritize important tasks, use equipment to reduce the effort and delegate tasks when necessary
- When tired, avoid starting tasks that cannot be interrupted immediately
- Modify the environment according to practices of joint protection and ergonomics

pain at rest and during movement, by minimizing nociceptive stimuli on the inflamed joint capsules, decreasing the force incident on the joints and controlling energy expenditure during daily activities, enabling joint preservation and improvement or maintenance of the patient's functionality.<sup>41</sup>

Moreover, conducting activities to strengthen the periarticular muscles and maintain joint range of motion, especially in the upper limbs, are also resources that contribute to the maintenance or improvement of the patient's functional capacity,<sup>42,43</sup> allowing a better performance and preservation of joint structures impaired by RA.

Practical examples of some of the techniques of joint protection and energy conservation<sup>44</sup> are illustrated in Fig. 1.

Randomized trials with high levels of evidence on the effectiveness of methods of joint protection and energy conservation showed significant improvement with respect to pain reduction among patients receiving the guidelines for changes in their ADLs.<sup>45–47</sup> Improvement in fatigue and increased social participation,<sup>47</sup> reduction of morning stiffness, lower incidence of deformities in the hands<sup>48</sup> and improved functionality<sup>49</sup> were observed, even among patients with severe RA state.<sup>50</sup>

### Modifying activities and work environments

Although most functional assessments have focused on the difficulty presented by the patient while performing self-care and mobility activities, dysfunctions related to work activities represent a serious consequence of RA.<sup>51</sup>

The rate of retirement for reasons related to RA can vary from 7% of cases in the first year after diagnosis up to 39% of patients with over 15 years of diagnosis in the absence of treatment targeted to labor difficulties<sup>51</sup>; with respect to North American and European populations, is expected that up to



**Fig. 1 – Examples of modifications in performing activities of daily living. The items on the left indicate movement patterns in which the position of the joints of the wrist and fingers enhance mechanical forces toward deformities commonly observed among patients with RA. The illustrations on the right suggest modifications that favor the use of other, more stable, joints, or the distribution of the load among multiple joints, avoiding painful and potentially harmful positions.**

one third of patients will abandon the work during the first three years of the disease.<sup>52</sup>

Abandonment of employment is a last resort, face to the limitations encountered by patients with RA: before retirement, increases of stress levels, job changes, restrictions on workload, loss of promotion opportunities and greater frequency of absenteeism and of job changes are observed more often among this population.<sup>53</sup> It is estimated that the reduction in productivity motivated by RA caused losses of approximately 7000 Euros/year per patient,<sup>54</sup> and up to 25% of the working period may be affected by conditions related to the disease.<sup>55</sup>

The early treatment conducted by a multidisciplinary team is an effective method to minimize complications related to work, maintaining the work capacity of these patients for a period of time similar to that found among the healthy population.<sup>51,55</sup>

Given the multiplicity of situations and perceptions about work activity reported by patients, individualized strategies are indicated as the best approach to labor difficulties, including a specific evaluation of the situation and of the workplace.<sup>52</sup>

Changes for a better performance of the activity may include the organization of the tasks that compose the work activity, changing shifts, and a fair division of the workload throughout the day<sup>56</sup>; ergonomic modifications such as new furniture and changes in the workplace, ensuring a proper

joint positioning during activity, replacement of fixtures by other of smaller weight or with better handgrip<sup>57</sup> and guidance on stress management and acquisition of strategies (coping) to handle with the workload.<sup>58</sup>

Although some review studies show no high level evidence on the effectiveness of specific ergonomic interventions to reduce problems related to upper limbs,<sup>59</sup> there is satisfactory evidence to support such interventions with respect to patients with RA,<sup>57</sup> suggesting improvement in functionality, pain and satisfaction with the work in the long term, when compared to individuals who did not get these interventions.

### **Assistive technologies – orthotics and adaptations**

The concept of assistive technology includes devices, guidelines and practices that aim to maintain, enhance or facilitate the performance of self-care, instrumental, educational, employment or social activities.<sup>60</sup>

Among the range of instruments available to patients with RA, the adaptations of utensils and the use of orthotics are some of the major resources to promote improved grip, biomechanical alignment and joint stress reduction, as well as to allow the development of activities and occupations, contributing to the patient's functionality and autonomy.<sup>61</sup>

The adaptation of utensils requires a thorough analysis of the activity performed by the patient, in order to determine what are the main challenges encountered and possible solutions to be proposed. Such modifications may include from changes in the way of conducting the activity (such as guidance on joint protection and energy conservation) to changes in the shape, weight and size of utensils.

Thicker handles and adaptations to facilitate or replace the handgrip strength, for example, elastic or neoprene strips, favor the handling of cutlery, writing instruments and personal hygiene materials, such as toothbrushes and hair combs.

The replacement of drinking glasses for mugs, the use of modified cutting boards, soap and detergent dispensers and clotting adaptations are examples of simple devices which promote important functional changes to the patient.<sup>62-64</sup> Examples of adaptations to promote improvement in performing ADLs are illustrated in Fig. 2.

Orthoses (splints) are resources used by therapists to promote better joint support, reduce pain and optimize functional performance of the patient.<sup>65</sup> Although several models are available, clinical reasoning used for prescribing an orthosis involves the needs for each case; the same orthosis can be prescribed for multiple objectives.

Among the most common indications, pain control, decreased morning stiffness, mechanical support for joints, encouragement of joint motion and functionality, and certain postoperative situations (where the combination of joint alignment, immobilization and application of traction forces is required) can be cited.<sup>66-68</sup> Some models of orthoses commonly indicated are illustrated in Fig. 3.

Although to date there is no conclusive evidence on the effectiveness of orthoses for improved functionality and handgrip strength,<sup>65</sup> some studies suggest that the use of orthotics for hands and wrists positioning during inflammatory phases



**Fig. 2 – Adapted utensils. The proposed adjustments are based on the principles of joint protection and energy conservation, with distribution of mechanical loads and promoting the use of larger joints during activities.**



**Fig. 3 – Examples of orthoses for upper limbs, suggested for patients with RA.**

promote improvement in pain and morning stiffness for the patient.<sup>68,69</sup>

Braces used for stabilization of the interphalangeal joints also exhibit significant levels of evidence in reducing pain, although no significant changes on hand function or strength during its use have been observed.<sup>70</sup>

## Conclusions

Due to the systemic nature of RA, a multidisciplinary follow-up is necessary for the proper management of the impact of the disease on various aspects of life of the patient. As a member of the health team, the occupational therapist aims to improve and maintain his/her patient's functional

capacity, preventing the worsening of deformities, aiding in the process of understanding and coping with the disease, and providing means for carrying out the activities required for the engagement of the individual in meaningful occupations, contributing to his/her autonomy and independence in self-care, labor, educational, social and leisure activities.

It is important that the rheumatologist become aware of the general principles of therapy, so that he/she can suggest their use more consciously, as an additional tool in the treatment of patients diagnosed with RA.

## Conflict of interest

The authors declare no conflicts of interest.

## REFERENCES

1. Mota LMH, Cruz BA, Brenol CV, Pereira IA, Rezende-Fronza LS, Bertolo MB, et al. Consenso 2012 da Sociedade Brasileira de Reumatologia para o tratamento da artrite reumatoide. *Revista Brasileira de Reumatologia*. 2012;52:152-74.
2. Lipsky PE. Rheumatoid arthritis. In: Fauci AS, Langford CA, editors. *Harrison's rheumatology*. 2nd ed. McGraw-Hill Professional; 2010. p. 82-99.
3. Pitzalis C, Kelly S, Humby F. New learnings on the pathophysiology of RA from synovial biopsies. *Curr Opin Rheumatol*. 2013;25:334-44. PubMed PMID: 23492740. Epub 2013/03/16. eng.
4. Beasley J. Osteoarthritis and rheumatoid arthritis: conservative therapeutic management. *J Hand Ther*. 2012;25:163-71, quiz 72. PubMed PMID: 22326361. Epub 2012/02/14. eng.
5. Mota LMHd, Laurindo IMM, Santos Neto LLd. Artrite reumatoide inicial: conceitos. *Revista da Associação Médica Brasileira*. 2010;56:227-9.
6. Firestein GS. Etiology and pathogenesis of rheumatoid arthritis. In: Firestein GS, Budd RC, Gabriel SE, McInnes IB, O'Dell JR, editors. *Kelley's Textbook of Rheumatology II*. 9th ed. Philadelphia: Elsevier Saunders; 2013. p. 1059-108.
7. Ottenvall Hammar I, Hakansson C. The importance for daily occupations of perceiving good health: perceptions among women with rheumatic diseases. *Scand J Occup Ther*. 2013;20:82-92. PubMed PMID: 22784433. Epub 2012/07/13. eng.
8. Primdahl J, Wagner L, Holst R, Horslev-Petersen K. The impact on self-efficacy of different types of follow-up care and disease status in patients with rheumatoid arthritis - a randomized trial. *Patient Educ Couns*. 2012;88:121-8. PubMed PMID: 22386009. Epub 2012/03/06. eng.
9. Marion CE, Balfe LM. Potential advantages of interprofessional care in rheumatoid arthritis. *J Manage Care Pharm*. 2011;17 Suppl. B:S25-9. PubMed PMID: 22073937. Epub 2011/12/07. eng.
10. Hammond A, Niedermann K. Patient education and self management. In: Dziedzic K, Hammond A, editors. *Rheumatology - evidence-based practice for physiotherapists and occupational therapists*. United Kingdom: Elsevier; 2010. p. 78-93.
11. Hand C, Law M, McColl MA. Occupational therapy interventions for chronic diseases: a scoping review. *Am J Occup Ther*. 2011;65:428-36. PubMed PMID: 21834458. Epub 2011/08/13. eng.
12. Hammond A. What is the role of the occupational therapist? *Best Pract Res Clin Rheumatol*. 2004;18:491-505.
13. Lutze U, Archenholtz B. The impact of arthritis on daily life with the patient perspective in focus. *Scand J Caring Sci*. 2007;21:64-70. PubMed PMID: 17428216. Epub 2007/04/13. eng.
14. Nyman A, Lund ML. Influences of the social environment on engagement in occupations: the experience of persons with rheumatoid arthritis. *Scand J Occup Ther*. 2007;14:63-72. PubMed PMID: 17366079. Epub 2007/03/17. eng.
15. Reinseth L, Espnes GA. Women with rheumatoid arthritis: non-vocational activities and quality of life. *Scand J Occup Ther*. 2007;14:108-15.
16. Mathieux R, Marotte H, Battistini L, Sarrazin A, Berthier M, Miossec P. Early occupational therapy programme increases hand grip strength at 3 months: results from a randomised, blind, controlled study in early rheumatoid arthritis. *Ann Rheum Dis*. 2009;68:400-3. PubMed PMID: 19015209. Epub 2008/11/19. eng.
17. Malcus-Johnson P, Carlqvist C, Stureson AL, Eberhardt K. Occupational therapy during the first 10 years of rheumatoid arthritis. *Scand J Occup Ther*. 2005;12:128-35. PubMed PMID: 16389738. Epub 2006/01/05. eng.
18. Mella LFB, Bertolo MB, Dalgalarondo P. Depressive symptoms in rheumatoid arthritis. *Revista Brasileira de Psiquiatria*. 2010;32:257-63.
19. Engel JM. Physiotherapy and ergotherapy are indispensable. Concrete prescription of remedies - without recourse. *Z Rheumatol*. 2012;71:369-80.
20. Adams J, Burrige J, Mullee M, Hammond A, Cooper C. Correlation between upper limb functional ability and structural hand impairment in an early rheumatoid population. *Clin Rehabil*. 2004;18:405-13.
21. Sands A, Goodacre L. Occupational therapy assessment and outcome measurement. In: Goodacre L, McArthur M, editors. *Rheumatology practice in occupational therapy*. 1st ed. Oxford: Wiley-Blackwell; 2013.
22. McDonald HN, Dietrich T, Townsend A, Li LC, Cox S, Backman CL. Exploring occupational disruption among women after onset of rheumatoid arthritis. *Arthritis Care Res (Hoboken)*. 2012;64:197-205. PubMed PMID: 22006430. Epub 2011/10/19. eng.
23. Feldman DE, Bernatsky S, Levesque JF, Van MT, Houde M, April KT. Access and perceived need for physical and occupational therapy in chronic arthritis. *Disabil Rehabil*. 2010;32:1827-32. PubMed PMID: 20345251. Epub 2010/03/30. eng.
24. Aktekin LA, Eser F, Baskan BM, Sivas F, Malhan S, Oksuz E, et al. Disability of arm shoulder and hand questionnaire in rheumatoid arthritis patients: relationship with disease activity, HAQ, SF-36. *Rheumatol Int*. 2011;31:823-6. PubMed PMID: 20680284. Epub 2010/08/04. eng.
25. Orfale AG, Araújo PMP, Ferraz MB, Natour J. Translation into Brazilian Portuguese, cultural adaptation, and evaluation of the reliability of the disabilities of the arm, shoulder and hand questionnaire. *Braz J Med Biol Res*. 2005;38:293-302.
26. Van Lankveld W, van't Pad Bosch P, Bakker J, Terwindt S, Franssen M, van Riel P. Sequential occupational dexterity assessment (Soda): a new test to measure hand disability. *J Hand Ther*. 1996;9:27-32. PubMed PMID: 8664936. Epub 1996/01/01. eng.
27. Oku EC, Pinheiro GRC, Araújo PMP. Instrumentos de avaliação funcional da mão em pacientes com artrite reumatoide. *Fisioterapia em Movimento*. 2009;22:221-8.
28. Ferraz MB, Oliveira LM, Araujo PM, Atra E, Tugwell P. Crosscultural reliability of the physical ability dimension of the health assessment questionnaire. *J Rheumatol*. 1990;17:813-7. PubMed PMID: 2388204. Epub 1990/06/01. eng.
29. Corbacho MI, Daputo JJ. Avaliação da capacidade funcional e da qualidade de vida de pacientes com artrite reumatoide. *Revista Brasileira de Reumatologia*. 2010;50:31-43.
30. Law M, Baptiste S, McColl M, Opzoomer A, Polatajko H, Pollock N. The Canadian occupational performance measure: an outcome measure for occupational therapy. *Can J Occup Ther*. 1990;57:82-7. PubMed PMID: 10104738. Epub 1990/04/01. eng.
31. Meesters J, Pont W, Beart-Van De Voorde L, Stamm T, Vliet Vlieland T. Do rehabilitation tools cover the perspective of patients with rheumatoid arthritis? A focus group study using the ICF as a reference. *Eur J Phys Rehabil Med*. 2013;23. PubMed PMID: 23698472. Epub 2013/05/24. Eng.
32. Fraser A, Vallow J, Preston A, Cooper RG. Predicting "normal" grip strength for rheumatoid arthritis patients. *Rheumatology (Oxford)*. 1999;38:521-8. PubMed PMID: 10402072. Epub 1999/07/13. eng.
33. Kennedy D, Jerosch-Herold C, Hickson M. The reliability of one vs. three trials of pain-free grip strength in subjects with rheumatoid arthritis. *J Hand Ther*. 2010;23:384-90, quiz 91. PubMed PMID: 20971419. Epub 2010/10/26. eng.
34. Vliet Vlieland TP, Pattison D. Non-drug therapies in early rheumatoid arthritis. *Best Pract Res Clin Rheumatol*.

- 2009;23:103-16. PubMed PMID: 19233050. Epub 2009/02/24. eng.
35. Niedermann K, Hammond A, Forster A, de Bie R. Perceived benefits and barriers to joint protection among people with rheumatoid arthritis and occupational therapists. A mixed methods study. *Musculoskeletal Care*. 2010;8:143-56. PubMed PMID: 20803632. Epub 2010/08/31. eng.
  36. Hammond A. Joint protection. In: Goodacre L, McArthur M, editors. *Rheumatology practice in occupational therapy*. 1st ed. Oxford: Willey-Blackwell; 2013. p. 111-32.
  37. Noordhoek J, Loschiavo FQ. Intervenção da terapia ocupacional no tratamento de indivíduos com doenças reumáticas utilizando a abordagem da proteção articular. *Revista Brasileira de Reumatologia*. 2005;45:242-4.
  38. Cordery JC. Joint protection; a responsibility of the occupational therapist. *Am J Occup Ther*. 1965;19:285-94. PubMed PMID: 5832168. Epub 1965/09/01. eng.
  39. Cordery JC. Joint deformity in rheumatoid arthritis. *Am J Occup Ther*. 1965;19:243-8. PubMed PMID: 5832161. Epub 1965/09/01. eng.
  40. Kozlow JH, Chung KC. Current concepts in the surgical management of rheumatoid and osteoarthritic hands and wrists. *Hand Clin*. 2011;27:31-41. PubMed PMID: 21176798. Pubmed Central PMCID: PMC3053090. Epub 2010/12/24. eng.
  41. Niedermann K, Buchi S, Ciurea A, Kubli R, Steurer-Stey C, Villiger PM, et al. Six and 12 months' effects of individual joint protection education in people with rheumatoid arthritis: a randomized controlled trial. *Scand J Occup Ther*. 2012;19:360-9. PubMed PMID: 21936735. Epub 2011/09/23. eng.
  42. Hochberg MC, Altman RD, April KT, Benkhalti M, Guyatt G, McGowan J, et al. American College of Rheumatology 2012 recommendations for the use of nonpharmacologic and pharmacologic therapies in osteoarthritis of the hand, hip, and knee. *Arthritis Care Res (Hoboken)*. 2012;64:465-74. PubMed PMID: 22563589. Epub 2012/05/09. eng.
  43. Larkin L, Kennedy N. Correlates of physical activity in adults with rheumatoid arthritis: a systematic review. *J Phys Act Health*. 2013;19. PubMed PMID: 23963816. Epub 2013/08/22. Eng.
  44. Almeida PHTQ, Sime MM, Mendes JB, Bittencourt G, Ferrigno ISV. Como proteger suas articulações - Manual de proteção articular e conservação de energia para pacientes com doenças reumatológicas. São Carlos: Universidade Federal de São Carlos; 2012.
  45. Christie A, Jamtvedt G, Dahm KT, Moe RH, Haavardsholm EA, Hagen KB. Effectiveness of nonpharmacological and nonsurgical interventions for patients with rheumatoid arthritis: an overview of systematic reviews. *Phys Ther*. 2007;87:1697-715. PubMed PMID: 17906290. Epub 2007/10/02. eng.
  46. Hammond A, Bryan J, Hardy A. Effects of a modular behavioural arthritis education programme: a pragmatic parallel-group randomized controlled trial. *Rheumatology (Oxford)*. 2008;47:1712-8. PubMed PMID: 18815153. Epub 2008/09/26. eng.
  47. Hammond A, Freeman K. The long-term outcomes from a randomized controlled trial of an educational-behavioural joint protection programme for people with rheumatoid arthritis. *Clin Rehabil*. 2004;18:520-8. PubMed PMID: 15293486. Epub 2004/08/06. eng.
  48. Steultjens EM, Dekker J, Bouter LM, Van Schaardenburg D, Vvan Kuyk MA, Van den Ende CH. Occupational therapy for rheumatoid arthritis. *Cochrane Database Syst Rev*. 2004;CD003114. PubMed PMID: 14974005. Epub 2004/02/20. eng.
  49. Masiero S, Boniolo A, Wassermann L, Machiedo H, Volante D, Punzi L. Effects of an educational-behavioral joint protection program on people with moderate to severe rheumatoid arthritis: a randomized controlled trial. *Clin Rheumatol*. 2007;26:2043-50. PubMed PMID: 17404783. Epub 2007/04/04. eng.
  50. Nilsson I, Fitinghoff H, Lilja M. Continuing to work after the onset of rheumatoid arthritis. *Work*. 2007;28:335-42. PubMed PMID: 17522454. Epub 2007/05/25. eng.
  51. Tiippana-Kinnunen T, Paimela L, Peltomaa R, Kautiainen H, Laasonen L, Leirisalo-Repo M. Work disability in Finnish patients with rheumatoid arthritis: a 15-year follow-up. *Clin Exp Rheumatol*. 2013. PubMed PMID: 24143915. Epub 2013/10/23. Eng.
  52. Macedo AM, Oakley SP, Panayi GS, Kirkham BW. Functional and work outcomes improve in patients with rheumatoid arthritis who receive targeted, comprehensive occupational therapy. *Arthritis Rheum*. 2009;61:1522-30. PubMed PMID: 19877106. Epub 2009/10/31. eng.
  53. Bansback N, Zhang W, Walsh D, Kiely P, Williams R, Guh D, et al. Factors associated with absenteeism, presenteeism and activity impairment in patients in the first years of RA. *Rheumatology (Oxford)*. 2012;51:375-84. PubMed PMID: 22179728. Epub 2011/12/20. eng.
  54. Puolakka K, Kautiainen H, Pekurinen M, Mottonen T, Hannonen P, Korpela M, et al. Monetary value of lost productivity over a five year follow up in early rheumatoid arthritis estimated on the basis of official register data on patients' sickness absence and gross income: experience from the FIN-RACo trial. *Ann Rheum Dis*. 2006;65:899-904. PubMed PMID: 16291811. Pubmed Central PMCID: PMC1798230. Epub 2005/11/18. eng.
  55. Puolakka K, Kautiainen H, Mottonen T, Hannonen P, Korpela M, Hakala M, et al. Early suppression of disease activity is essential for maintenance of work capacity in patients with recent-onset rheumatoid arthritis: five-year experience from the FIN-RACo trial. *Arthritis Rheum*. 2005;52:36-41. PubMed PMID: 15641055. Epub 2005/01/11. eng.
  56. Herrera-Saray P, Pelaez-Ballestas I, Ramos-Lira L, Sanchez-Monroy D, Burgos-Vargas R. Usage problems and social barriers faced by persons with a wheelchair and other aids qualitative study from the ergonomics perspective in persons disabled by rheumatoid arthritis and other conditions. *Reumatol Clín*. 2013;9:24-30. PubMed PMID: 22854174. Epub 2012/08/03. eng.
  57. Baldwin D, Johnstone B, Ge B, Hewett J, Smith M, Sharp G. Randomized prospective study of a work place ergonomic intervention for individuals with rheumatoid arthritis and osteoarthritis. *Arthritis Care Res (Hoboken)*. 2012;64:1527-35. PubMed PMID: 22511570. Epub 2012/04/19. eng.
  58. Daker-White G, Donovan J, Campbell R. Redefined by illness: meta-ethnography of qualitative studies on the experience of rheumatoid arthritis. *Disabil Rehabil*. 2013. PubMed PMID: 24001261. Epub 2013/09/05. Eng.
  59. Hoe VC, Urquhart DM, Kelsall HL, Sim MR. Ergonomic design and training for preventing work-related musculoskeletal disorders of the upper limb and neck in adults. *Cochrane Database Syst Rev*. 2012;8:CD008570. PubMed PMID: 22895977. Epub 2012/08/17. eng.
  60. Tuntland H, Kjekken I, Nordheim L, Falzon L, Jamtvedt G, Hagen K. The Cochrane review of assistive technology for rheumatoid arthritis. *Eur J Phys Rehabil Med*. 2010;46:261-8. PubMed PMID: 20485228. Epub 2010/05/21. eng.
  61. Wilson DJ, Mitchell JM, Kemp BJ, Adkins RH, Mann W. Effects of assistive technology on functional decline in people aging with a disability. *Assist Technol: Off J Resna*. 2009;21:208-17. PubMed PMID: 20066887. Epub 2010/01/14. eng.
  62. Noordhoek J, Loschiavo FQ. Instrumento adaptador para facilitar abertura de latas. *Revista Brasileira de Reumatologia*. 2006;46:347-8.



63. Noordhoek J, Torquetti A. Adaptação para facilitar descascar alimentos. *Revista Brasileira de Reumatologia*. 2007;47:52.
64. Noordhoek J, Torquetti A. Adaptações para osteoartrite de mãos. *Revista Brasileira de Reumatologia*. 2008;48:100-1.
65. Egan M, Brosseau L, Farmer M, Ouimet MA, Rees S, Wells G, et al. Splints/orthoses in the treatment of rheumatoid arthritis. *Cochrane Database Syst Rev*. 2003;1:CD004018. PubMed PMID: 12535502. Epub 2003/01/22. eng.
66. Egan MY, Brosseau L. Splinting for osteoarthritis of the carpometacarpal joint: a review of the evidence. *Am J Occup Ther*. 2007;61:70-8. PubMed PMID: 17302107. Epub 2007/02/17. eng.
67. Formsma SA, Van der Sluis CK, Dijkstra PU. Effectiveness of a MP-blocking splint and therapy in rheumatoid arthritis: a descriptive pilot study. *J Hand Ther*. 2008;21:347-53. PubMed PMID: 19006761. Epub 2008/11/14. eng.
68. Veehof MM, Taal E, Heijnsdijk-Rouwenhorst LM, Van de Laar MA. Efficacy of wrist working splints in patients with rheumatoid arthritis: a randomized controlled study. *Arthritis Rheum*. 2008;59:1698-704. PubMed PMID: 19035420. Epub 2008/11/28. eng.
69. Silva AC, Jones A, Silva PG, Natour J. Effectiveness of a night-time hand positioning splint in rheumatoid arthritis: a randomized controlled trial. *J Rehabil Med*. 2008;40:749-54. PubMed PMID: 18843428. Epub 2008/10/10. eng.
70. Silva PG, Lombardi I Jr, Breitschwerdt C, Poli Araujo PM, Natour J. Functional thumb orthosis for type I and II boutonniere deformity on the dominant hand in patients with rheumatoid arthritis: a randomized controlled study. *Clin Rehabil*. 2008;22:684-9. PubMed PMID: 18678568. Epub 2008/08/06. eng.