Integrated care for patients with rheumatoid arthritis
Verhoef, J.

Integrated Care for Patients with Rheumatoid Arthritis

John Verhoef

Integrated Care for Patients with Rheumatoid Arthritis

Proefschrift

ter verkrijging van
de graad van Doctor aan de Universiteit Leiden,
op gezag van Rector Magnificus prof.mr. P.F. van der Heijden,
volgens besluit van het College voor Promoties
te verdedigen op woensdag 5 september 2007
klokke 16.15 uur

door

John Verhoef

geboren te Rotterdam
in 1959

Promotiecommissie

Promotoren: Prof. dr. T.W.J. Huizinga
                    Prof. dr. J.H.M. Zwetsloot-Schonk

Co-promotor: Dr. T.P.M. Vliet Vlieland

Referent: Prof. dr. A.J.P. Schrijvers (Julius Centrum UMCU, Utrecht)

Lid: Prof. dr. P.F. de Vries Robbé (UMC St Radboud, Nijmegen)

Contents

Chapter 1

General Introduction

Introduction

Rheumatoid arthritis (RA) is an autoimmune disease affecting approximately about 1%
of the adult population in Western countries. Its main feature, chronic inflammatory
arthritis, can cause irreversible joint damage and substantial functional impairment.
The cause of the disease remains obscure, but greater understanding of the underlying
mechanisms has facilitated the development of new drugs and revolutionized treatment
(1,2). Moreover, there is ample evidence that early intervention is the most effective clin-
ical strategy (3).

Despite the wide range of drugs currently available and their indisputable effective-
ness, a substantial proportion of patients with RA will have a relatively low, but persist-
ent level of disease activity (4), to a greater or lesser extent interfering with their daily
activities. This observation implies that the majority of patients will need long-term care,
not only consisting of drug therapy, but also of education, guidance and support to cope
with the consequences of the disease. Recent updates of guidelines for the management
of RA emphasize the use of non-pharmacologic modalities in addition to the use of phar-
macologic agents (5).

By tradition, management of inflammatory joint diseases is primarily provided by
rheumatologists, whereas in the case of complex problems additional physicians and
health professionals from various disciplines are called in to deliver services.

Ideally, all physicians and health professionals involved are systematically co-ordi-
nating their activities to maximize the continuity and cohesiveness of care (6). In 2003
the Netherlands Health Care Inspectorate formulated a profile of co-ordinated care,
comprising nine different aspects: accessibility, patient orientation, content, competence
and expertise, demarcation of tasks and responsibilities, accessibility of medical records,
quality control, legislation, and funding (7). Due to the growing number of individuals
with rheumatic diseases, the limited availability of health professionals and cost con-
straints, efficiency is an additional aspect that should be taken into account.

In daily practice, access to comprehensive arthritis care and the co-ordination of
services are often insufficient (8,9). To improve arthritis care service delivery and ensure
timely access to health care services, alternative strategies for team care are being devel-
oped and optimization of the traditional multidisciplinary team care model is aimed at.

Enhancing primary care service delivery in arthritis management
Considering the limited funding and human resources in many countries, where the
provision of comprehensive multidisciplinary teams is not always possible, the evolve-
ment of multi-skilled nurses (10-12) or health professionals (13,14) is promising.

The primary therapist model, used for arthritis management in Canada, consists of
a special rheumatology and cross-disciplinary training of physical therapists and occu-
pational therapists. They work in consultation with or with referral to other health pro-
fessionals when necessary. RA patients treated by a primary therapist showed signifi-
cantly greater improvement with respect to knowledge in comparison with a traditional
physical therapy or occupational therapy model. Moreover, significantly more patients

treated by a primary therapist showed improvement on at least 2 out of three outcome measures (Health Assessment Questionnaire, pain and knowledge) (13). The primary therapist model was found to be potentially cost-effective compared to traditional physical and occupational therapy (13,14).

In addition, arthritis care delivery models in which general practitioners and/or allied health professionals in primary care are involved proved to be successful (15,16). These models include educational activities as well as joint consultations, facilities to enhance contacts between rheumatologists, general practitioners and allied health professionals and the creation of collaborative treatment programmes and guidelines. The "Getting a Grip on Arthritis" programme consisted of a 2-day workshop and follow-up reinforcement activities for healthcare providers (providers) and was supported by a toolkit of written materials for providers and clients (16). The content of the intervention was designed around 10 arthritis best practices derived from published arthritis guidelines. At follow-up clients in the intervention group reported significantly higher referrals to The Arthritis Society therapy programme, and were more often provided information on type of arthritis, medications and their side effects, disease management strategies, and arthritis community resources (16).

Apart from enhanced collaboration, within all these interventions the education of health professionals regarding the management of patients with arthritis is an essential element. It has indeed been shown that from the patients' perspective health care providers (general practitioner, physical therapist, home nurse, and formal home help) had inadequate knowledge of rheumatism and inadequate quality of care co-ordination (17).

Optimization of multidisciplinary team care in arthritis management

Comprehensive rehabilitation involving a team of health professionals from various disciplines has been extensively used in patients with inflammatory arthritis over the last decades. Team care originated in the 1950's, when pharmacological and surgical treatment options were limited and bed rest, joint splinting, passive or assisted active exercise therapy, heat and cold therapy, occupational therapy and emotional support were the cornerstones of the basic treatment regimen (18). A multidisciplinary health care team can be defined as a group of health professionals from different disciplines who share common values and objectives (6,19). In arthritis care, the goals of multidisciplinary team care include preserving and improving the patient's quality of life by improving disease activity, functional ability, mental and social health and vocational status (6,20). Although team composition may vary, the more common members of a traditional multidisciplinary team in arthritis care include rheumatologists, physical therapists, occupational therapists, nurses, and social workers (8).

A comprehensive review concerning the effectiveness of inpatient and outpatient team care in patients with rheumatoid arthritis (RA), published in 1987 (21), concluded that there is indicative evidence that team care results in better outcomes, but that most studies were methodologically flawed. In a systematic review in which only controlled, clinical trials were included (22), it was shown that in comparison with regular outpatient care, inpatient multidisciplinary team care programmes in RA were more effective

with respect to disease activity and functional ability, yet more costly. Overall, the benefits of outpatient multidisciplinary team care programmes over regular outpatient care were less marked. While traditional multidisciplinary team care was initially mainly delivered in an inpatient setting, outpatient, day patient and community based settings have become more usual in recent decades. In parallel, the average duration of traditional multidisciplinary team care programmes has decreased markedly with time. Two recent, randomized controlled trials consistently demonstrated that an inpatient setting has no added benefit (23-27). Equivalent clinical effects were found, with inpatient team care being more expensive than day patient team care (23-27). Moreover, in the study by Tijhuis et al, inpatient and day patient multidisciplinary team care programmes were also compared with care provided by a clinical nurse specialist in co-operation with the rheumatologist. Clinical nurse specialist care provided equivalent clinical outcomes at significantly lower costs but with lower levels of patient satisfaction than with multidisciplinary care (25-27). It should be noted that this latter study included a selected group of patients, whose health status did not demand hospitalization. In addition, a number of uncontrolled studies describing positive effects of day patient (28,29) or inpatient multidisciplinary team care programmes (30) in RA were published.

It should be noted, however, that the interpretation of the methodological quality of studies on complex interventions such as multidisciplinary team care must be done with some caution. Some methodological "flaws" are intrinsic to the nature of complex interventions, an example of which is the difficulty with double blinding (31). Related to these methodological issues, the value of the randomized controlled trial for care research has been questioned (32,33).

The mere evaluation of clinical outcomes of complex interventions leaves unanswered the question which are the active components of a multidisciplinary team care intervention (34). The question "What's inside the team care box?" (34) is still a matter of debate. Therefore, with respect to research priorities in arthritis care, the further determination of which elements in the team care process are essential for its effectiveness is advocated (33,35). Over recent years, a number of studies have indeed focused on the processes of team care rather than its outcomes and have employed alternative research designs. With increasing levels of communication and integration of skills among health professionals, the working method of teams can nowadays often be characterized as interdisciplinary or transdisciplinary rather than multidisciplinary (36,37). In addition, the client and his or her family have been identified as the most important members of a multidisciplinary team (38). A client-centred approach, including a systematic evaluation of every aspect of the patient's health status and the joint setting of treatment goals and planning of interventions is presently common in multidisciplinary team care (39). Stucki et al. proposed to introduce the so-called "Rehab Cycle" (40). This cyclic approach should help to systematically review disease consequences, to define therapy goals, to relate problems to mediators, and to optimize treatment by relating interventions to results during the rehabilitation process. For that purpose, the value of specific tools aimed to systematically enhance the patient's role in the treatment process and/or to facilitate communication among team members. Examples of such rehabilita-

tion tools are the Rehabilitation Activities Profile (RAP) (41), the Rehabilitation Problem-Solving Form (RPS) (42), the Canadian Occupational Performance Measure (COPM) (43) and the Indicators of Rehabilitation Status (IRES-3) patient questionnaire (44,45). In a case study, the Rehabilitation Problem-Solving Form (42) enabled health professionals to use a common language to describe the patient's functioning, both from the patient's as well as the health professionals' perspectives. The usefulness of the COPM has been investigated in a multidisciplinary day treatment programme for patients with RA (43). In that study, the use of COPM did not make a significant change in the client's perception of participation in the process. However, the team members stated that the use of the COPM as a team tool had increased patient participation, was a good outcome measure, resulted in distinct goals and helped to focus on goals that were meaningful for the patient. The IRES-3 proved to be reliable, valid and sensitive to changes over time (44,45), however, its effectiveness has not yet been evaluated in multidisciplinary team care in rheumatology. In the current literature, the use of information technology (electronic medical record and other forms of information exchange by means of the Internet or e-mail) with the introduction of rehabilitation tools is limited.

These results indicate that additional evaluations of the effectiveness and costs of the use of rehabilitation tools, including the usage of information technology, in multidisciplinary team care in inflammatory arthritis are needed.

Theoretical frameworks for the evaluation of rehabilitation tools in multidisciplinary team care

For a systematic evaluation of interventions in the process of multidisciplinary team care, a theoretical framework is needed. This framework enables us to study which components and its interactions are represented in the 'team care box'. In this thesis we decided to use the work system theory of Alter (46) to define the components of team care. A work system is a system in which participants and/or machines perform business processes using information, technologies, and other resources to produce products and/or services for internal or external customers (46) (See figure 1). In our case the work system consists of everything involved in the delivery of arthritis care. It is characterized by the following components and their features:

– Business processes, representing the work performed within the work system. Each step in these processes comprises combinations of different activities such as: communication, information processing, sense making, and decision making. In the case of multidisciplinary team care the main focus will be on the communication processes during team conferences including decision making and evaluation of the health status of the patient.
– Participants are the people (team members and patients) who perform work in the business process with or without use of information technology, i.e. the multidisciplinary team members.
– Information that is used and created during the participants' work performance.
– Technologies including all tools and techniques that the participants use while doing their work, such as written or electronic information exchange tools.

–   Products and services are the combination of physical things, information, and services produced by the work system (such as: patient education, patient-centred treatment goals and patient-tailored treatment).
–   Customers are the people, external or internal to the organization, who benefit from the products and services that the work system produces, i.e. the patients.

Figure 1   Steve Alter, "The Work System Method for Understanding Information Systems and Information System Research" (46)
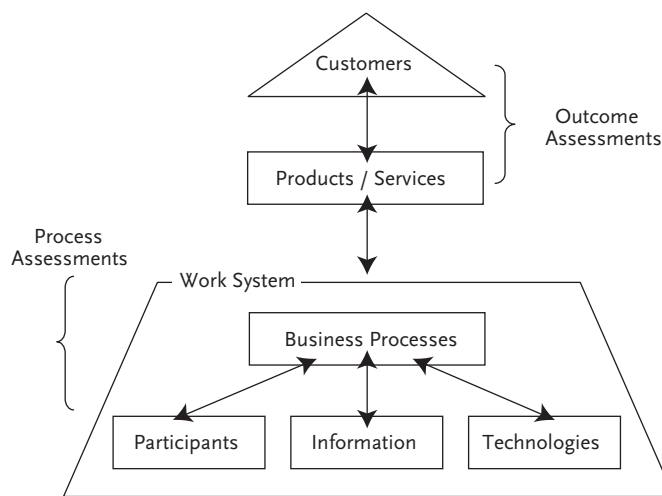
An intervention can be assessed from two main perspectives. First of all, the impact on either products or customers can be established, resulting in an outcome assessment. A second perspective focuses on the work system. Interventions will normally change more than one component of the work system. If, for example, information technology is introduced, this will definitely affect both the Information and the Business Processes components also. Each of these impacts can be assessed, resulting in process assessments.

With respect to the Business processes, we will focus on the communication process during team conferences, because this is one of the core activities of multidisciplinary team care.

Communication processes will be evaluated using a theoretical model that is based on the work of Clark (47) and Te' eni (48). In this model, a communication process is decomposed into its constituting activities (See figure 2).

Figure 2   **The communication process decomposed in its constituting parts based on the work of Clark (47) and Te 'eni (48)**
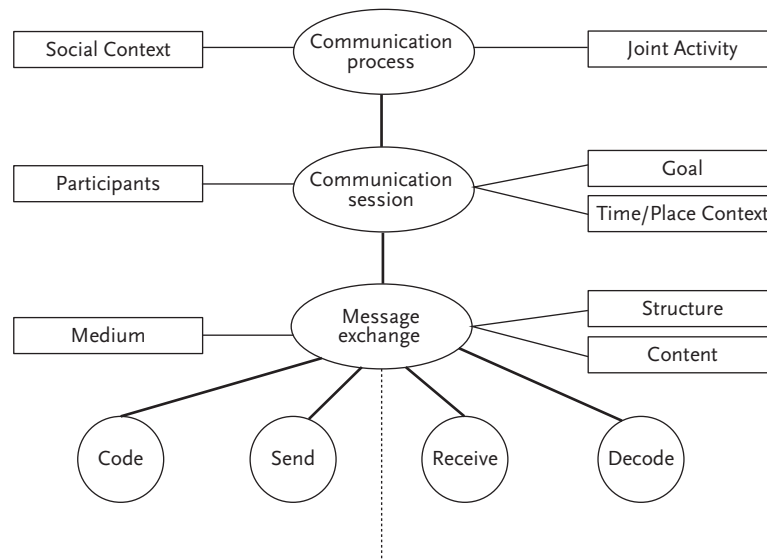
The *participants* are involved in a *joint activity* (multidisciplinary treatment of a patient with rheumatoid arthritis), and they intend to co-ordinate their actions by means of participating in a *communication process* (the team conference). Such a process can be decomposed into one or more *communication sessions* in which *messages* (with structure and content) are exchanged. Communication sessions can be characterized by their *goal* and by the *time/place context* in which they take place. In the setting of a multidisciplinary team conference all messages are exchanged at the same time and at the same place.

Aim of the present thesis

This thesis describes an example of optimization of the traditional multidisciplinary team care model and evolving arthritis care models with emphasis on the question how theoretical models of the system theory and communication can be used to analyse, evaluate, and optimize care delivery. With respect to the team care model we used a rehabilitation tool, for which we developed an accompanying computer application. This thesis contributes to the use of theoretical models, measurement instruments, and information technology applications to rationalize the attempts to innovate patient-centred team care in rheumatology.

The three main goals of this thesis are:

A. To describe the feasibility of a system of networks and continuing education for primary care physical therapists regarding arthritis care (Chapter 2).

B. To evaluate the impact of the introduction of a rehabilitation tool (the Rehabilitation Activities Profile), including a computer application, in multidisciplinary team care in rheumatology with respect to clinical effectiveness, patient satisfaction, team members' satisfaction and measurement properties (Chapters 3, 4 and 5).
C. To develop and apply a measurement instrument to evaluate the communication during multidisciplinary team conferences in an arthritis team care setting (Chapters 6 and 7).

The following points are dealt with in the respective chapters:

Chapter 2 evaluates the feasibility of the development of a system of networks and continuing education for primary care physical therapists in rheumatology.

Chapter 3 reports the results of an evaluation of the clinical effectiveness and patient satisfaction regarding the introduction of the Rehabilitation Activities Profile in patients with RA admitted for multidisciplinary team care by means of a pre-test post-test study design.

Chapter 4 describes team members' satisfaction with team functioning, team conferences, and administrative load before and after the introduction of the Rehabilitation Activities Profile (RAP).

Chapter 5 is a study of the validity and responsiveness of the RAP as a measurement instrument in multidisciplinary team care in RA patients.

Chapter 6 reports the feasibility of a theory-based observation instrument to assess the communication process during team conferences in a multidisciplinary team care setting in rheumatology.

Chapter 7 describes the effect of the introduction of the RAP on the contents of communication during multidisciplinary team conferences in a multidisciplinary team care setting in rheumatology.

Finally, a summary of the results and conclusions and a general discussion are offered in **chapter 8**.

References

1. Choy EH, Panayi GS. Cytokine pathways and joint inflammation in rheumatoid arthritis. N Engl J Med 2001;344:907-16.
2. Olsen NJ, Stein CM. New drugs for rheumatoid arthritis. N Engl J Med 2004;350:2167-79.
3. Quinn MA, Cox S. The evidence for early intervention. Rheum Dis Clin North Am 2005;31:575-89.
4. Sesin CA, Bingham CO. Remission in rheumatoid arthritis: wishful thinking or clinical reality? Semin Arthritis Rheum 2005;35:185-96.
5. American College of Rheumatology Subcommittee on rheumatoid arthritis guidelines. Guidelines for the management of rheumatoid arthritis: 2002 update. Arthritis Rheum 2002;46:328-46.
6. Petersson IF. Evolution of team care and evaluation of effectiveness. Curr Opin Rheumatol 2005;17:160-3.
7. Netherlands Health Care Inspectorate. In: The State of Health Care (Summary). Coordination of care (seamless care) for chronically ill patients, The Haque; 2003:69-73.
8. MacKay C, Devitt R, Soever L, Badley EM. An exploration of comprehensive interdisciplinary models for arthritis. Working report 2005-03. Arthritis Community Research & Evaluation Unit (ACREU), Toronto, 2005.
9. Kirwan JR. New modes of practice. Curr Opin Rheumatol 2004;16:125-9.
10. Hill J, Bird HA, Harmer R, Wright V, Lawton C. An evaluation of the effectiveness, safety and acceptability of a nurse practitioner in a rheumatology outpatient clinic. Br J Rheumatol 1994;33:283-8.
11. Hill J. Patient satisfaction in a nurse-led clinic. J Adv Nurs 1997;25:347-54.
12. Hill J, Thorpe R, Bird H. Outcomes for patients with RA: a rheumatology nurse practitioner clinic compared to standard outpatient care. Musculoskeletal care 2003;1:5-20.
13. Li LC, Davis AM, Lineker S, Coyte PC, Bombardier C. Effectiveness of the primary therapist model for rheumatoid arthritis rehabilitation: a randomized controlled trial. Arthritis Rheum 2006;55:42-52.
14. Li LC, Maetzel A, Davis AM, Lineker SC, Bombardier C, Coyte PC. Primary therapist model for patients referred for rheumatoid arthritis rehabilitation: a cost-effectiveness analysis. Arthritis Rheum 2006;55:402-10.
15. Boonen A, Svensson B. Joint consultation: a joint venture towards improving effectiveness of health care. Eur J Intern Med 2003;14:146-7.
16. Glazier RH, Badley EM, Lineker SC, Wilkins AL, Bell MJ. Getting a Grip on Arthritis: an educational intervention for the diagnosis and treatment of arthritis in primary care. J Rheumatol 2005;32:137-42.
17. Jacobi CE, Boshuizen HC, Rupp I, Dinant HJ, van den Bos GA. Quality of rheumatoid arthritis care: the patient's perspective. Int J Qual Health Care 2004;16:73-81.
18. Zeller JW, Waine H, Jellinek K. Sanatorium management of rheumatoid arthritis. JAMA 1963;186:1143-9.
19. Halstead LS. Team care in chronic illness: a critical review of literature of past 25 years. Arch Phys Med Rehabil 1976;57:507-11.
20. DeLisa JA, Currie DM, Martin GM. Rehabilitation medicine. Past, present and future. In: DeLisa JA and Gans BM (editors). Rehabilitation medicine: principles and practice. 3rd ed. Lippincott-Raven Publishers, Philadelphia, 1998:p.3-32.
21. Spiegel JS, Spiegel TM, Ward NB. Are rehabilitation programs for rheumatoid arthritis patients effective? Semin Arthritis Rheum 1987;16:260- 70.
22. Vliet Vlieland TPM, Hazes JMW. Efficacy of multidisciplinary team care programs in rheumatoid arthritis. Semin Arthritis Rheum 1997;27:110-22.

23. Lambert CM, Hurst NP, Lochhead A, McGregor K, Hunter M, Forbes J. A pilot study of the economic cost and clinical outcome of day patient vs inpatient management of active rheumatoid arthritis. Br J Rheumatol 1994;33:383-8.

24. Lambert CM, Hurst NP, Forbes JF, Lochhead A, Macleod M, Nuki G. Is day care equivalent to inpatient care for active rheumatoid arthritis? Randomised controlled clinical and economic evaluation. BMJ 1998;316:965-9.

25. Tijhuis GJ, Zwinderman AH, Hazes JMW, van den Hout WB, Breedveld FC, Vliet Vlieland TPM. A randomized comparison of care provided by a clinical nurse specialist, inpatient team care and day patient team care in rheumatoid arthritis. Arthritis Rheum 2002;47:525-31.

26. Tijhuis GJ, Zwinderman AH, Hazes JMW, Breedveld FC, Vliet Vlieland TPM. The two-year follow-up of a randomised controlled trial of a clinical nurse specialist intervention, inpatient and day patient team care in rheumatoid arthritis. J Adv Nurs 2003;41:34-43.

27. Van den Hout WB, Tijhuis GJ, Zwinderman AH, Hazes JMW, Breedveld FC, Vliet Vlieland TPM. Cost-effectiveness and cost-utility analysis of multidisciplinary care in patients with rheumatoid arthritis: a randomised comparison of clinical nurse specialist care, inpatient team care, and day patient care. Ann Rheum Dis 2003;62:308-15.

28. Prier A, Barenboim F, Karneff A, Molars S, Beauvais C, Dumontier C, et al. Multidisciplinary day hospital treatment of rheumatoid arthritis patients. Evaluation after two years. Rev Rhum Engl Ed 1997;64:443-50.

29. Jacobsson LT, Frithiof M, Olofsson Y, Runesson I, Strombeck B, Wikstrom I. Evaluation of a structured multidisciplinary day program in rheumatoid arthritis. Scand J Rheumatol 1998;27:117-24.

30. Maravic M, Bozonnat MC, Sevezan A, Gasqueres D, Pastor J, Pere M, et al. Preliminary evaluation of medical outcomes (including quality of life) and costs in incident RA cases receiving hospital-based multidisciplinary management. Joint Bone Spine 2000;67:425-33.

31. Vliet Vlieland TP. Managing chronic disease: evidence-based medicine or patient centred medicine? Health Care Anal 2002;10:289-98.

32. Vliet Vlieland TP. CARE: International conference on multidisciplinary care in rheumatoid arthritis. Int J Adv Rheumatol 2003;1:34-6.

33. Petersson IF, Bremander AB, Klareskog L, Stenstrom C. Who cares about team care? Ann Rheum Dis 2005;64(suppl):644.

34. Yelin EH. What's inside the team care box? Is it the parts, the connections, the attention, or the Gestalt? J Rheumatol 1991;18:1647-8.

35. Petersson IF. Evolution of team care and evaluation of effectiveness. Curr Opin Rheumatol 2005;17:160-3.

36. Haig AJ, Lebreck DB. Measurement of change in rehabilitation team dynamics with the team assessment profile (TAP). Int J Rehabil Health 2000;3:71-83.

37. Smits SJ, Falconer HJ, Bowen SE, Strasser DC. Patient-focused rehabilitation team cohesiveness in veterans administration hospitals. Arch Phys Med Rehabil 2003;84:1332-8.

38. Madigan A, Fitzgerald O. Multidisciplinary patient care in rheumatoid arthritis: evolving concepts in nursing practice. Baillieres Best Pract Res Clin Rheumatol 1999;13:661-74.

39. Stucki, G. Understanding disability. Ann Rheum Dis 2003;62:289-90.

40. Stucki G, Sangha O. Principles of rehabilitation. In: Klippel JH & Dieppe PA (eds). Rheumatology. 2nd ed. London, United Kingdom, Mosby, 1998:p.3.11.1-3.11.14.

41. Van Bennekom CAM, Jelles F, Lankhorst GJ. Rehabilitation Activities Profile: the ICIDH as a framework for a problem-oriented assessment method in rehabilitation medicine. Disabil Rehabil 1995;17:169-75.

42. Steiner WA, Ryser L, Huber E, Uebelhart D, Aeschlimann A, Stucki G. Use of the ICF model as a clinical problem-solving tool in physical therapy and rehabilitation medicine. Phys Ther 2002;82:1098-107.

43. Wressle E, Lindstrand J, Neher M, Marcusson J, Henriksson C. The Canadian Occupational Performance Measure as an outcome measure and team tool in a day treatment program. Disabil Rehabil 2003; 25:497-506.

44. Schochat T, Pilz C, Neuner R. The Indicators of Rehab Status questionnaire version 3 (IRES-3) in 1818 rehabilitees with musculoskeletal Diseases. Rehabilitation (Stuttg) 2003;42:236-44. In German.

45. Buhrlen B, Gerdes N, Jackel WH. Development and psychometric testing of a patient questionnaire for medical rehabilitation (IRES-3). Rehabilitation (Stuttg) 2005;44:63-74. In German.

46. Alter S. The work system method for understanding information systems and information system research. Communications of the Association for Information Systems 2002;9:90-104.

47. Clark HH. Using Language, Cambridge University Press, 1996.

48. Te'eni D. Review: A cognitive-affective model of organisational communication for designing IT. MIS Quarterly 2001;25:251-312.

Chapter 2

A system of networks and continuing education for physical therapists in rheumatology: a feasibility study

J. Verhoef[1], F.G.J. Oosterveld[2,3], R. Hoekman[2], M. Munneke[1,4], D.C.G. Boonman[1],
M. Bakker[5], W. Otten[6], J.J. Rasker[7,8], H.M. de Vries-van der Zwan[9],
T.P.M. Vliet Vlieland[1,10].

1   Department of Physical Therapy, Leiden University Medical Center, Leiden;
2   Department of Physical Therapy, Medisch Spectrum Twente, Enschede;
3   Institute for Allied Health Care, Saxion University of Professional Education, Enschede;
4   Department of Neurology, University Medical Center St Radboud, Nijmegen;
5   University of Professional Education Leiden , Leiden;
6   Department of Medical Decision Making, Leiden University Medical Center, Leiden;
7   Department of Communication Studies, Faculty Behavioural Sciences, University Twente, Enschede;
8   Department of Rheumatology, Medisch Spectrum Twente Hospital, Enschede;
9   Coordination Center for Chronic Diseases, Leiden;
10 Department of Rheumatology, Leiden University Medical Center, Leiden, The Netherlands.

Abstract

Purpose
To evaluate the feasibility of regional physical therapy networks including continuing education in rheumatology. The aim of these networks was to improve care provided by primary care physical therapists by improving specific knowledge, technical and communicative skills and the collaboration with rheumatologists.

Methods
In two regions in The Netherlands continuing education (CE) programmes, consisting of a 5-day postgraduate training course followed by bimonthly workshops and teaching practices, were organized simultaneously. Network activities included consultations, newsletters and the development of a communication guideline. Endpoint measures included the participation rate, compliance, quality of the CE programme, teaching practices, knowledge, network activities, communication, number of patients treated and patient satisfaction.

Results
Sixty-three physical therapists out of 193 practices (33%) participated in the project. They all completed the education programmes and were formally registered. All evaluations of the education programmes showed positive scores. Knowledge scores increased significantly directly after the training course and at 18 months. A draft guideline on communication between physical therapists and rheumatologists was developed, and 4 newsletters were distributed. A substantial proportion of physical therapists and rheumatologists reported improved communication at 18 months. The mean number of patients treated by physical therapists participating in the networks increased significantly. Patients' satisfaction scores within the networks were significantly higher than those from outside the networks at 18 months.

Conclusions
Setting up a system of networks for continuing education for physical therapists regarding the treatment of patients with rheumatic diseases is feasible. Further research will focus on the effectiveness of the system and its implementation on a larger scale.

Introduction

Physical therapy is a frequently applied treatment in patients with rheumatic diseases. In patients with rheumatoid arthritis (RA), about 25-40% of the patients are being treated by a physical therapist over a period of one year (1,2). Home-based physical therapy has proved to be an effective treatment strategy in patients with inflammatory rheumatic diseases (3-5). The majority of patients with rheumatic conditions are treated by physical therapists in private practices in primary care. Referrals are made either by the rheumatologists or by the general practitioner. Patients in need of more intensive or comprehensive care are admitted to inpatient, outpatient or day patient facilities for multidisciplinary team care, including physical therapy.

Despite the fact that rheumatoid arthritis and osteoarthritis are the most common conditions treated by physical therapists (6), it has been observed that treatment of patients with rheumatic diseases by physical therapists is hampered by a lack of specific knowledge and technical and communicative skills. In RA patients, 54.7% rated the physical therapists' rheumatic expertise as not up to the patients' standard (7). Moreover, inadequate quality ratings for physical therapists were observed regarding information on the course of the disease, home adjustments and aids and the assurance of a good co-ordination of care (7). Concerning the latter aspect, physical therapists are judged more and more by patients and other health professionals not only with respect to their professional skills but also regarding their ability to co-operate with a range of care providers from different disciplines (8). This co-operation is often considered as insufficient by RA patients and their families (9). Insufficient knowledge and skills of health professionals regarding specific conditions is a common problem in healthcare. With the ongoing new developments in medical and non-pharmacological treatment of many conditions, continuing education (CE) has been accepted as a prerequisite for the maintenance and improvement of quality of care. In physical therapy practice, CE has developed considerably during the last decade, as a significant part of quality systems. Important characteristics for CE to be effective comprise a small-group format with a learner-directed agenda of topics, information from various sources including local opinion leaders and opportunity for practice and feedback (10,11). This format finds its basis in the social constructivist theory (12,13). According to this theory, learning is not only seen as an individual responsibility. Rather, knowledge is constructed when individuals engage in talk and activity about shared problems or tasks. Few studies have evaluated continuing education programmes for physical therapists so far (14). Experiences with a postgraduate training programme for physical and occupational therapists treating patients with RA revealed that the large majority of participants had changed their assessment and management of people with arthritis as a result of the course (15). Moreover, the training enhanced their communication with other health professionals.

Apart from the elements related to CE programmes described above, a large variety of interventions to improve professional practice have been investigated, such as traineeships outside the regular practice setting, patient-participation, local consensus processes

and financial incentives (16,17). Often several interventions are combined in strategies targeted at improving the performance of health care professionals.

Given the results of various interventions employed to improve professional practice, we used a multifaceted approach (16) to improve physical therapy in primary care for patients with rheumatic conditions. The intervention aimed to point at those aspects of care that were judged as insufficient by patients: knowledge, technical and communicative skills and collaboration among health professionals. A regional, small group format for CE was chosen as the backbone of the intervention. The group was clearly designated as a network to make it recognizable for patients, rheumatologists and other health professionals. Moreover, the network designation and additional activities other than CE were employed to underline the purpose of the intervention with respect to the enhancement of communication among physical therapists and rheumatologists as an important part of professional practice.

The evaluation of the intervention focused on its feasibility and consisted of intermediate or process endpoint measures such as participation rate, compliance, quality of the CE programme, teaching practices, knowledge, execution of network activities, communication, number of patients with rheumatic conditions who were treated. In addition, an evaluation of patients' satisfaction was included. By instituting the intervention in two regions in the Netherlands, the impact of regional differences regarding rheumatological care on the feasibility of the intervention could be studied.

Methods

Design
In two regions in the Netherlands (Leiden; region I and Enschede; Region II), networks of primary health care physical therapists within the catchment area of two rheumatological centres were set up. A 2-year continuing education programme and various strategies to enhance collaboration among primary health care physical therapists and rheumatologists were the key elements of the project. The networks were called FYRANET, a Dutch acronym for Physical Therapy, Rheumatic Conditions and Networks.

Recruitment of physical therapists
In November 1999, an information letter including an invitation for an information meeting was sent by regular mail to the 133 and 60 primary care physical therapists private practices established in the Leiden and Enschede regions, respectively. Given the fact that the maximum number of participants per region was to be 45, and a geographically equal spread of participants over the region was aimed at, only one physical therapist per primary care practice could subscribe.

The CE programme
The CE programme was organized simultaneously in both regions and consisted of a basic 5-day postgraduate course, followed by bimonthly workshops (Table 1). Faculty was

recruited from the two rheumatological centres and included 6 rheumatologists, 2 orthopaedic surgeons, 18 physical therapists, 2 occupational therapists, 2 rheumatological nurse specialists and 2 social workers. Problem-based learning activities (18) were a major part of the CE programme. The basic programme focused on examination and treatment of patients with various rheumatic diseases by means of lectures, demonstrations, case presentations and case work-ups. Three additional workshops were dedicated to communication between the physical therapist and people with chronic diseases and other health care providers. Education on involvement of patients in physical therapy goal setting was part of the content of these seminars (19). All CE activities were certified by the Dutch professional organization of physical therapists, the Royal Dutch Society for Physiotherapy (KNGF). Participants shared in the costs for organizing and performing the CE activities, including quality certification.

Network activities
After the basic course had been completed, the participating physical therapists were formally installed as a network in both regions. A list of their addresses was distributed among rheumatologists, general practitioners, orthopaedic surgeons, clinical nurse specialists, and local patient organizations, in order to inform them about the possibility of referring patients to the network physical therapists. Membership was to be continued if participants took part in at least 80% of the CE activities. From this moment bimonthly workshops and teaching practices were organized. The teaching practices within the two rheumatological centres consisted of bedside teaching by a physical therapist and a rheumatologist (Table 1).

Additional activities to enhance communication among physical therapists and rheumatologists included:
– A helpdesk enabling telephone or e-mail consultations of physical therapists or rheumatologists connected to the rheumatological centres. This facility was aimed at promotion of discussion on complex patient cases.
– Regular distribution of newsletters containing information about the network and other regional activities, congress announcements and new developments in physical therapy and other treatments for patients with rheumatic diseases.
– Three local focus group sessions (20) were organized regarding the exchange of information among physical therapists and rheumatologists in the two regions.

Table 1   Contents of a CE programme in connection with regional physical therapy networks in rheumatology (adapted from Stokes, et al. (15))

	Presentation method	Topics	Hours
Basic training course (3 months period)	Lectures	Pathophysiology; Clinical features and pharmacological, surgical and non-pharmacological management of various rheumatic diseases	15
		Management of hand and foot problems in RA	8
	Demonstrations, case presentations and case work-ups	Clinical examination and treatment modalities in various rheumatic diseases	7
Teaching practice	Bedside teaching by physical therapist and rheumatologist	Individual and group exercise therapy; Group hydrotherapy; Clinical examination and treatment by a rheumatologist	8
Workshops (bimonthly, over a period of 24 months)	Lectures	Communication between health care providers and patients; Joint replacement; Hand problems; Thermotherapy; Intensive exercise therapy in RA; Case presentation RA	14
	Demonstrations, case presentations and case work-ups in connection with the lectures	Problem-oriented approach and goal setting in complex RA patients	10
		Grand total	62

Assessment methods

As the evaluation of the project was primarily aimed at the assessment of its feasibility, mainly process measures (participation rate, compliance, feedback on organization, didactics and contents of the CE programme, teaching practices, knowledge, execution of network activities, communication, number of patients with rheumatic conditions who were treated) were included. In addition, a comparison of patients' satisfaction with physical therapy inside and outside the networks was done. All assessments were done by a physical therapist and movement scientist (JV) who was not involved in the training course as a teacher.

Characteristics of participants
At the start of the project, of all participating physical therapists age, sex and years of practical experience were recorded.

Evaluation of the CE programme and teaching practices
The physical therapists' compliance with the various activities of the CE programme and teaching practices were recorded by means of an attendance list. The basic course and subsequent workshops were evaluated by means of a questionnaire. This questionnaire was based on a questionnaire already in use for evaluation of other CE activities and comprised 16 items, divided into the domains organization (n=2), didactics (n=9) and contents (n=5). Participants were asked for their extent of agreement with various statements using a 6-point Likert scale (range 1 = "strongly disagree" to 6= "strongly agree").

The participants' satisfaction with the visits to a rheumatologist's consulting hours and the physical therapist's bedside teaching was assessed by means of a 10 cm horizontal visual analogue scale, with the labels 0 = "as worse as can be" on the left side and 10="as good as can be" on the right side. Moreover, participants had the opportunity to provide written comments.

Professional knowledge
At the beginning and the end of the basic course and 18 months thereafter, the participants completed a knowledge questionnaire. The format of this questionnaire was already in use at the University of Professional Education Leiden. The questionnaire comprised 91 and 65 multiple choice questions in Regions I and II, respectively, with 59 questions being analogous in both regions. All questions were of one type: multiple choice (4 choices) with one correct answer, with the answer category 'don't know' matching every question. The test covered the whole spectrum of the course topics and was composed by the faculty of the course. To promote acceptance, the test was filled in anonymously. As the number of questions varied between the two regions, the final score of every participant was expressed as a percentage (number of correct answers / total number of questions). The same questionnaire was used at all three time points. To discriminate between the levels of knowledge of the participating physical therapists and experts in the field we administered the questionnaire to a reference group of 14 Dutch physical therapists working in various specialised rheumatology clinics or departments.

Network activities
The institutional care physical therapists used a diary to record the number of times they were consulted by the primary care physical therapist by telephone or e-mail for discussing specific and complex patient cases. Furthermore, all newsletters that were distributed, the script of the CE programme and the minutes of the local focus group sessions were gathered.

Communication among health professionals
Eighteen months after the networks had been installed, a communication questionnaire was sent to all participating physical therapists and to the rheumatologists of the two medical centres. The self-developed questionnaire comprised questions regarding the quantity and quality of mutual communication at that moment as compared with 18 months before.

Number of patients with rheumatic conditions treated by primary care physical therapists
To compare any changes in the number of patients treated by physical therapists within the networks and by physical therapists outside the networks data from the major health insurance companies in the regions of Leiden and Enschede ('Zorg en Zekerheid' and 'Amicon', respectively) were used. First, physical therapists working in the two regions were divided into participating in the network or not. Then, three diagnoses concerning inflammatory arthritis (rheumatoid arthritis, ankylosing spondylitis and aseptic poly-arthritis) and two periods were defined (Period 1: October 1999 to June 2000 and Period 2: October 2000 to June 2001). In both periods, the total number of patients with one of these three diagnoses treated by a physical therapist was counted for every physical therapist working in the region. All data were provided anonymously.

Patient satisfaction
Eighteen months after the networks had been installed, all 63 participating physical therapists were asked to give a satisfaction questionnaire to one of their patients with RA. Moreover, 2 rheumatologists working outside the regions in which the networks had been instituted were asked to deliver 60 additional satisfaction questionnaires to patients who were treated by a physical therapist in their region. Of these 60 questionnaires, forty were actually handed over to patients. All patients had RA according to the 1987 American Rheumatism Association criteria (21) and had been treated by a physical therapist for 6 weeks or more. The questionnaires were filled in and sent back anonymously to the principal investigator (JV), to avoid social desirable answering. The design of the questionnaire was similar to a multidimensional questionnaire that has been developed to evaluate RA patients' satisfaction with multidisciplinary care (22). This questionnaire appeared to be reliable and showed face and construct validity (22). Its contents are in accordance with a multidimensional instrument developed to measure satisfaction with physical therapy (23). The questionnaire comprised 36 statements covering the following 8 domains: knowledge, technical skills, information, empathy, involvement in goal setting, autonomy, co-ordination among health professionals and effectiveness of treatment. Patients indicated their extent of agreement with the statements on a 5-point Likert scale (0="totally disagree", 4="totally agree"). The subscores of 6 domains ranged from 0 to 16 and the subscores of two domains ranged from 0 to 24 (see Table 4). The total score ranged from 0 (totally unsatisfied) to 144 (totally satisfied). The satisfaction questionnaire also comprised an overall satisfaction report mark, which ranged between 0 (completely dissatisfied) to 10 (completely satisfied). Reliability analysis of the 77 questionnaires that were returned revealed that internal consistency of the

total satisfaction scale comprising all 36 items was excellent with Cronbach's alpha (24) being 0.95. Cronbach's alpha ranged between 0.68 and 0.85 for the 8 domain scales. Spearman rank-order correlation between the total questionnaire score and the overall satisfaction report mark was 0.65 (p<0.001). Regarding the measurement of patient satisfaction, the Medical Ethics Committees of both hospitals were consulted and approved of the study. As the satisfaction study was strictly anonymous and did not include data on the patients' health status, written informed consent was not to be obtained.

Statistical analysis
Measures with a normal distribution were expressed as means and SD, otherwise, medians and ranges are presented. Characteristics of the participants in both regions were compared by means of Mann-Whitney U or Chi-Square tests where appropriate. Knowledge questionnaire scores at the different time points and satisfaction questionnaire scores between the two groups of patients were compared by means of Mann-Whitney U tests. As the knowledge questionnaires were filled in anonymously, paired comparisons were impossible. Change scores regarding the number of patients with inflammatory rheumatic conditions treated by physical therapists in the two regions were computed by subtracting the number of patients in period 1 from the number of patients in period 2. Differences between periods 1 and 2 were analysed by the Wilcoxon Signed Rank test within the groups of physical therapists who did and who did not participate in the networks. Comparisons regarding the change scores between physical therapists who did and who did not participate in the networks were done by the Mann-Whitney U test. The comparisons of the satisfaction scores were adjusted for multiple comparisons by means of applying Bonferroni adjusted significance levels (p ≤ 0.005).

Results

In the Leiden region 42 physical therapists out of 133 practices (32%) and in the Enschede region 21 physical therapists out of 60 practices (35%) participated in the project. Age and years of practical experience differed significantly between the regions. The median age was 40.5 (range 24-54) and 49.0 (range 38-54) years and the median number of years of practical experience 14.5 (range 1-30) and 23.0 (range 14-29) years in regions I and II, respectively (both *P* values <0.001; Mann-Whitney U test). In regions I and II, 62% and 48% of the participants were female, respectively (p=0.418; Chi-Square test). All 63 participating physical therapists were actively involved in the networks 18 months after the start. In the two regions, the total number of rheumatologists and rheumatologists in training varied slightly, and was 22 on average during the intervention period.

Organization of the CE programme and teaching practices
Fifty-seven of the 63 participants (90%) attended all 5 days of the basic course, 5 participants (8%) 4 days, whereas 1 participant had an exemption from the basic course. Fifty-one (81%) of the participants filled in the evaluation form regarding the course. In both

regions, the participants' median satisfaction ratings of the basic course were 5.0 (range 2-6) for organization, didactics and content. Eight and 9 additional workshops were organized in regions I and II, respectively. The median attendance rate was 94% (range 25-100) with median satisfaction ratings being 5.0 (range 2-6) for all workshops, pertaining to organization, didactics and content. All 63 participants attended both the consulting hours of a rheumatologist and the bedside teaching practice of a physical therapist working in a rheumatological centre. The median rating scores for the teaching practices were 6.7 (range 1.1-8.8) for the visit to the rheumatologist and 6.6 (range 2.2-9.8) for the visit to the physical therapist. Thirty-six (57%) and 45 (73%) of the 63 participants indicated that the visits to the rheumatologist and the physical therapist, respectively, had changed their views on the treatment of patients with rheumatic diseases. Written suggestions for improvement of the teaching practices included demonstrations of hydrotherapy and group exercise therapy and attendance of a multidisciplinary team conference. For all of the abovementioned results, there were no significant differences between regions I and II (data not shown).

Professional knowledge
At least 55 of the participants (87%) filled in all three knowledge questionnaires. The median scores of correctly answered questions by the participants at the different time points are shown in Figure 1. The level of knowledge increased significantly from 37% (range 18-47%) at the start of the basic course to 54% (range 27-77%) immediately afterwards (p<0.001). The level of knowledge was maintained until 18 months after the basic course (median score 55%, range 33-79%). There were no significant differences between the results of the two regions (data not shown).

The median score of the expert group was significantly different (p<0.001) from the level of knowledge of the participants at the start of the basic course (median score 58%, range 45-74%), substantiating the ability of the questionnaire to discriminate between groups with different levels of knowledge.

Figure 1   **Knowledge questionnaires have been administered at the start (T0), at the end (T1) of the training course, and repeated 18 months later (T2). The same questionnaire was used in order to compare the level of knowledge. The questionnaire also has been administered to an expert group of physical therapists (at moment T2). The results (percentage of correct answers) are shown in the boxplots.**
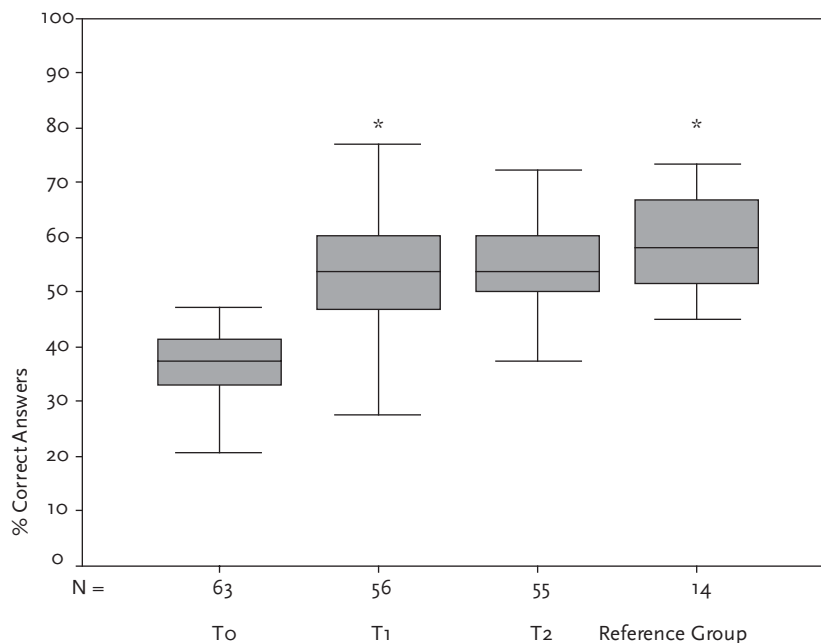
Network activities

The information from the diaries used by the institutional care physical therapists showed that the number of contacts (by telephone or e-mail) initiated by primary care physical therapists participating in the networks was about two per month on average in both regions. Newsletters were distributed to all participants with a frequency of one newsletter per 6 months. During the local focus group sessions 4 rheumatologists, 4 physical therapists, 2 rheumatological nurse specialists and 4 representatives of the local patient organizations discussed with the aim of developing a draft communication guideline. Major bottle-necks identified in the communication between rheumatologists and physical therapists and between primary care physical therapists and physical therapists in institutional care included:

– The rheumatologist's accessibility by telephone.
– The contents of the written referral by the rheumatologist.
– The contents of the physical therapist's report about the treatment course.

These aspects were subsequently addressed in a draft guideline which was to be further implemented after the intervention period.

Communication between physical therapists and rheumatologists
Fifty-one of the 63 physical therapists (81%) and 14 of the 22 rheumatologists(64%) filled in the questionnaire on the impact of the intervention on the extent and quality of communication (Table 2). A considerable number of the physical therapists thought that the number of referrals (n=23;45%) and contacts (n=21;39%) had increased, whereas 15 (29%) of them found the quality of communication had improved. About half of the rheumatologists perceived an increase in quantity and quality of communication with physical therapists.

Table 2   Opinions of physical therapists and rheumatologists regarding referrals and communication 18 months after the institution of regional physical therapy networks including a CE programme

Physical Therapists (N=51)	Number	(%)
Increase of referrals from rheumatologists	23/51	(45)
Increase of number of rheumatologists with whom contacts	21/51	(39)
Increase of number of written or telephone contacts with rheumatologists	21/51	(41)
Improvement of quality of communication with rheumatologists	15/51	(29)
Rheumatologists (N=14)		
Increase of referrals to network physical therapists	7/14	(50)
Increase of number of physical therapists with whom contact	6/14	(43)
Increase of number of written or telephone contacts with physical therapists	7/14	(50)
Improvement of quality of communication with physical therapists	8/14	(57)

Results are expressed as the number (percentage) of physical therapists or rheumatologists agreeing with the various statements in a questionnaire.

Number of patients with rheumatic conditions treated by primary care physical therapists
The health insurance companies could provide data regarding 51 of the 63 primary care physical therapists participating in the networks and 198 primary care physical therapists that did not participate in the networks. The total number of physical therapists involved in this analysis is larger than the total number of physical therapists who were initially invited to participate in the project, because the health insurance companies used a different definition of the circumscription of the regions.

The mean number of patients treated over a period of 9 months by primary care physical therapists who participated in the networks increased significantly after the institution of the networks (p=0.029), whereas the mean number of patients treated by primary care physical therapists outside the networks did not change (p=0.63). The mean difference of number of patients between the two periods regarding physical therapists who did and did not participate in the networks was statistically significant (p=0.03) (Table 3).

Table 3   **Mean number of patients (standard deviation) treated by physical therapists within the networks and by physical therapists outside the networks before the start of the FYRANET project (Period 1: October 1999-June 2000) and from 4 months after the start of the project (Period 2: October 2000-June 2001), including the mean differences (standard deviation) between the two periods**

	Period 1: October 1999- June 2000	Period 2: October 2000- June 2001	Mean- difference (SD)	*P* value within groups	*P* value between groups
Mean number of patients treated by physical therapists within networks (SD) (N=51)	4.4 (5.1)	5.5 (4.7)	1.1 (3.6)	0.029	0.03
Mean number of patients treated by physical therapists outside networks (SD) (N=198)	3.5 (3.8)	3.5 (4)	-0.1 (2.8)	0.63	

Patient satisfaction with physical therapy

The results of the patient satisfaction questionnaire are shown in Table 4. Fifty-one patients treated by physical therapists participating in the network and 26 patients treated by physical therapists who did not participate in a network returned the questionnaire (response rates 80% and 67%, respectively). Except for the domains involvement in goal setting, co-ordination and effectiveness and the overall report mark, the satisfaction scores within the various domains were significantly higher in the group of patients who were treated by a physical therapist participating in the network than in the group of patients who were not. With respect to the domain involvement in goal setting, patients in the network group were more satisfied than patients treated by a physical therapist working outside the network, however, the result did not reach statistical significance (p=0.051). In addition, the total scores of perceived satisfaction and the overall satisfaction report mark were significantly better in the group of patients who were treated by a physical therapist participating in the network.

Table 4   **Satisfaction with physical therapy in patients treated by physical therapists participating in a network (Network; n=51) and in patients treated by physical therapists who did not participate in a network (Outside network; n=26)**

Domain (subscore range)	Number of Items	Network n=51		Outside network n=26		P value
Knowledge (0-16)	4	13	(8-16)	9	(4-16)	<0.001*
Technical skills (0-16)	4	13	(6-16)	10	(5-15)	<0.001*
Information (0-16)	4	12	(8-16)	8	(5-15)	<0.001*
Empathy (0-16)	4	13	(5-16)	12	(3-16)	<0.001*
Involvement goal setting (0-24)	6	20	(10-24)	18	(11-24)	0.051
Autonomy (0-16)	4	13	(8-16)	12	(4-16)	0.002*
Co-ordination (0-24)	6	15	(9-24)	13	(9-22)	0.025
Effectiveness (0-16)	4	12	(4-16)	12	(8-16)	0.950
Total Score (0-144)	36	109	(80-142)	93	(62-127)	0.001*
Overall Satisfaction Report Mark (0-10)		8.3	(1.3)	7.7	(0.8)	0.017

Results are presented as medians and ranges (domain scores and total score) or as means and standard deviations (overall satisfaction report mark).

* Statistically significant with the Bonferroni adjusted significance level set at $P \leq 0.005$.

Discussion

Despite the fact that physical therapy is a common intervention in patients with rheumatic diseases (1,2), a considerable number of patients finds the physical therapist's rheumatic expertise as not up to the patients' standard (7). The results of this study demonstrate that setting up a system of regional networks in connection with continuing education for physical therapists regarding the treatment of patients with rheumatic diseases is feasible. The participation rate was high (32-35% of all primary care practices) and compliance with the CE programme and network activities was excellent. All 63 participating physical therapists were actively involved in the networks 18 months after the start. In addition, positive results with respect to physical therapists' knowledge, communication between physical therapists and rheumatologists, the number of patients with a rheumatic condition treated by primary care physical therapists within the networks and patient satisfaction were found.

The CE programme we developed and executed resembled a Canadian postgraduate training programme on rheumatoid poly-arthritis for physical and occupational therapists (15). In that programme as well as in ours, a small group format was employed and lectures, demonstrations, case presentations, workshops, case work-ups and field practice were included, and it was executed in various provinces in Canada. In both programmes, the involvement of local rheumatologists was promoted to enhance commu-

nication among physical therapists and rheumatologists. Two years after the networks had been set up, a considerable proportion of physical therapists and rheumatologists indicated that mutual communication had improved, whereas patients treated by physical therapists participating in the networks indeed experienced a greater involvement in the treatment and a better co-ordination of care than patients treated by physical therapists who did not participate in the network, supporting the validity of a regional strategy.

Our CE programme differed from the Canadian programme on two major points: First, the Canadian programme was designed as a single intervention, whereas our aim was to set up an ongoing programme with a multifaceted approach (16) that keeps pace with the rapid developments in rheumatological care. For that purpose, additional workshops were organized every two months after the initial course. In order to keep compliance with the programme high, accreditation of the ongoing programme was obtained from the Royal Dutch Society for Physiotherapy (KNGF). Second, involvement of patients in physical therapy goal setting and co-ordinated care were leading threads throughout the course and in special workshops in our programme. Determining treatment based on mutual goals of patient and physical therapist has previously been found to be an essential prerequisite for patient compliance in rheumatology (25). For that purpose, specific methods and tools to address the patients' perspective and enhance their participation in the decision-making process were discussed in the CE programme. Examples of such tools are the Rehabilitation Problem-Solving Form (26) and the Canadian Occupational Performance Measure (COPM) (27).

With respect to the effectiveness of educational programmes, the abovementioned Canadian programme has been examined in a randomised controlled trial in which a comparison with traditional physical therapy was made. In that trial, 91 patients with RA were included (28). Apart from a better salicylate compliance in the experimental group, there were no differences in disease activity and functional ability between the two groups at 4 and 12 months. The authors attributed this lack of effectiveness to incomplete compliance along the therapeutic chain, in which the primary care physician played a major role. Our study focused on the feasibility rather than effectiveness and for that purpose process endpoint measures that were thought to be directly related to the educational intervention were used.

The endpoint measures employed in the present study are in line with the view that the evaluation of educational interventions should include at least four dimensions: satisfaction of participants, learning (knowledge and skills), behavioural change (transfer of knowledge and skills to workplace) and outcomes (impact on patients) (29). The programme showed positive outcomes on all four dimensions. Regarding participants' satisfaction with the CE programme and related activities, response rates were good (≥ 70%). Most of the questionnaires employed were already used in the evaluation of other CE activities. Two questionnaires (teaching practices, communication) were self-developed, and their clinimetrical properties have not been determined. The patient satisfaction questionnaire has been validated in RA patients in a previous study (22).

With respect to patient satisfaction, the results of this study indicated that patients treated by a physical therapist who participated in a network were more satisfied than the patients who were treated by a primary care physical therapist who was not connected to a network. These results have to be interpreted with some caution, as there is a possibility that the network physical therapists distributed the questionnaires to a selection of patients who were extremely satisfied with the treatment, whereas the rheumatologists did not. On the other hand, the choice of the physical therapists was limited, because the number of RA patients treated by these physical therapists was relatively small. Moreover, the questionnaires could be filled in anonymously and were returned to an independent researcher. In addition, unknown differences among the regions could be the basis of the differences in satisfaction found.

Ideally, a satisfaction study should have been carried out in connection with an effectiveness study. To draw firm conclusions about clinical effectiveness, another study design would be required, e.g. a controlled study comparing regions in which a network is instituted with regions where no networks are installed. These data would have to be collected in a longitudinal study with baseline and follow-up data. Other measures than the patients' subjective general opinion of effectiveness are needed, such as measures of pain, joint mobility, muscle force, aerobic capacity and functional ability. More data regarding the comparability of the patients' sociodemographic characteristics and health status in the two groups would be needed. In addition, concurrent treatment such as changes in medication would have to be recorded and taken into account. In the present project, a controlled trial could however not be accomplished, because of constrained time and resources.

The absence of a control group also limits the validity of the endpoint measures knowledge and communication. As the same knowledge questionnaire was used at the three time points, a learning effect cannot be ruled out. The use of different sets of questionnaires could have solved this problem.

A matter of concern for the transfer of knowledge and skills to the actual working situation and for the continuation of the networks may be the fact that the number of patients with rheumatic conditions treated per physical therapist were, although increasing, relatively low. The low number of patients is, however, in line with the prevalence of inflammatory rheumatic conditions in The Netherlands. The prevalence of inflammatory rheumatic conditions is about 2.2% (30) of the total population of about 16,000,000 people in The Netherlands. Twenty-five percent of these patients are being seen by a physical therapist over a one-year period (1,2). With a total of 18,000 physical therapists and exercise therapists in our country, the average number of patients with an inflammatory rheumatic condition treated by a physical therapist over one year is expected to be about 4.9.

Given this relative low number of patients, continuously bringing the networks to the notice of patients, rheumatologists, physical therapists and other health professionals is a major challenge for the future. Another challenge is keeping the CE programme up to the standard of clinically relevant contents and maintaining official certification related to the quality rules of the Royal Dutch Society for Physiotherapy. By June 2004,

four years after the start of the networks, 62 of the 63 participants are still actively involved in the networks with the attendance rate of the various activities being ≥ 75%. Apparently, the CE programme is interesting and it is conceivable that knowledge and skills can be translated to other patient groups.

In conclusion, setting up a system of regional networks in connection with continuing postgraduate educational programmes for physical therapists in rheumatology is feasible. Future research should further assess the effectiveness, the long-term compliance and implementation on a larger scale. We think that the results of this project can be of use for other regions in order to start developing rheumatological networks in connection with CE as well as for networks with other patient groups or even other health professionals.

Acknowledgements

References

1. Van Jaarsveld CH, Jacobs JW, Schrijvers AJ, Heurkens AH, Haanen HC, Bijlsma JW. Direct cost of rheumatoid arthritis during the first six years: a cost-of-illness study. Br J Rheumatol 1998;37:837-47.

2. Jacobi CE, Triemstra M, Rupp I, Dinant HJ, van den Bos GAM. Health care utilization among rheumatoid arthritis patients referred to a rheumatology center: unequal needs, unequal care? Arthritis Rheum 2001;45:324-30.

3. Stenstrom CH, Arge B, Sundbom A. Home exercise and compliance in inflammatory rheumatic diseases – a prospective clinical trial. J Rheumatol 1997;24:470-6.

4. Bell MJ, Lineker SC, Wilkins A, Goldsmith CH, Badley EM. A randomized controlled trial to evaluate the efficacy of community based physical therapy in the treatment of people with rheumatoid arthritis. J Rheumatol 1998;25:231-7.

5. Lineker SC, Bell MJ, Wilkins AL, Badley EM. Improvements following short term home based physical therapy are maintained at one year in people with moderate to severe rheumatoid arthritis. J Rheumatol 2001;28:165-8.

6. Rijken PM, Dekker J. Clinical experience of rehabilitation therapists with chronic diseases: a quantitative approach. Clin Rehabil 1998;12:143-50.

7. Jacobi CE, Boshuizen HC, Rupp I, Dinant HJ, van den Bos GAM. Quality of professional health care: patients' views. Int J Qual Health Care 2004;16:73-81.

8. Higgs J, Hunt A, Higgs C, Neubauer D. Physiotherapy education in the changing international healthcare and educational contexts. Adv Physiotherapy 1999;1:17-26.

9. Riemsma RP, Taal E, Brus HLM, Rasker JJ, Wiegman O. Co-ordinated individual education with an arthritis passport for patients with rheumatoid arthritis. Arthritis Care Res 1997;10:238-49.

10. Peloso PM, Stakiw KJ. Small-group format for continuing medical education: a report from the field. J Contin Educ Health Prof 2000;20:27-32.

11. Pereles L, Lockyer J, Fidler H. Permanent small groups: group dynamics. learning, and change. J Contin Educ Health Prof 2002;22:205-13.

12. Cobb P, Where is the mind? Constructivist and sociocultural perspectives on mathematical development. Educ Res 1994;23:13-20.

13. Merriam SB, Caffarella RS. Learning in adulthood: a comprehensive guide. 2nd ed. San Francisco: Jossey-Bass; 1999.

14. Strohschein J, Hagler P, May L. Assessing the need for change in clinical education practices. Phys Ther 2002;82:160-72.

15. Stokes BA, Helewa A, Lineker SC. Total assessment of rheumatoid polyarthritis- a postgraduate training program for physical and occupational therapists: a 20 year success story. J Rheumatol 1997;24:1634-8.

16. Oxman AD, Thomson MA, Davis DA, Haynes RB. No magic bullets: a systematic review of 102 trials of interventions to improve professional practice. Can Med Assoc J 1995;153:1423-31.

17. Weingarten SR, Henning JM, Badamgarav E, Knight K, Hasselblad V, Gano Jr A, et al. Interventions used in disease management programmes for patients with chronic illness – which ones work? Meta-analysis of published reports. Br Med J 2002;325:925-32.

18. Saarinen-Rahiika H, Binkley JM. Problem-based learning in physical therapy: a review of the literature and overview of the McMaster University experience. Phys Ther 1998;78:195-207.

19. Baker SM, Marshak HH, Rice GT, Zimmerman GJ. Patient participation in physical therapy goal setting. Phys Ther 2001;81:1118-26.

20. Kitzinger J. Qualitative Research: introducing focus groups. Br Med J 1995;311:299-302.

21. Arnett FC, Edworth SM, Bloch DA, McShane DJ, Fries JF, Cooper NS, et al. The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. Arthritis Rheum 1988;31:315-24.

22. Tijhuis GJ, Kooiman CG, Zwinderman AH, Hazes JMW, Breedveld FC, Vliet Vlieland TPM. Validation of a novel satisfaction questionnaire for patients with rheumatoid arthritis receiving outpatient clinical nurse specialist care, inpatient or day patient team care. Arthritis Rheum 2003;49:193-9.

23. Goldstein MS, Elliott SD, Guccione AA. The development of an instrument to measure satisfaction with physical therapy. Phys Ther 2000;80:853-63.

24. Nunally J. Psychometric Theory. New York: McGraw-Hill, 1978.

25. Moncur C. Physical therapy competencies in rheumatology. Phys Ther 985;65:1365-72.

26. Steiner WA, Ryser L, Huber E, Uebelhart D, Aeschlimann A, Stucki G. Use of the ICF model as a clinical problem-solving tool in physical therapy and rehabilitation medicine. Phys Ther 2002;82:1098-107.

27. Wressle E, Lindstrand J, Neher M, Marcusson J, Henriksson C. The Canadian Occupational Performance Measure as an outcome measure and team tool in a day treatment programme. Disabil Rehabil 2003;25:497-506.

28. Helewa A, Smythe HA, Goldsmith CH. Can specially trained physical therapists improve the care of patients with rheumatoid arthritis? A randomised health care trial. J Rheumatol 1993;21:70-9.

29. Fritsche L, Greenhalgh T, Falck-Ytter Y, Neumayer H-H, Kunz R. Do short courses in evidence based medicine improve knowledge and skills? Validation of Berlin questionnaire and before and after studies in evidence based medicine. Br Med J 2002;325:1338-41.

30. Miedema HS, Rasker JJ. Reumatische aandoeningen. In: Willems JHBM, Croon NHTH, Koten JW, editors. Handboek Arbeid en Belastbaarheid. Houten: Bohn Stafleu Van Loghum; 1998. In Dutch.

Chapter 3

Effectiveness of the introduction of an International Classification of Functioning, Disability and Health-based rehabilitation tool in multidisciplinary team care in patients with rheumatoid arthritis

J. Verhoef[1,2], P.J. Toussaint[2], J.H.M. Zwetsloot-Schonk[2], F.C. Breedveld[3], H. Putter[4], T.P.M. Vliet Vlieland[3].

1   Department of Physical Therapy;
2   Clinical Informatics;
3   Department of Rheumatology;
4   Department of Medical Statistics, Leiden University Medical Center, The Netherlands.

Abstract

Objective
 To investigate whether the use of an International Classification of Functioning, Disability and Health (ICF)-based instrument to structure multidisciplinary care improves clinical effectiveness and satisfaction in patients with rheumatoid arthritis (RA) admitted for multidisciplinary team care.

Methods
Consecutive patients with RA admitted to an inpatient or day patient multidisciplinary team care ward were included during a 12-month period before (period I) and after (period II) the introduction of an ICF-based rehabilitation tool (Rehabilitation Activities Profile (RAP)). Patients were assessed at admission, discharge, and six weeks thereafter. The primary outcome measure was a patient-oriented measure of functional ability (McMaster Toronto Arthritis Patient Preference Disability Questionnaire (MACTAR)), whereas secondary outcome measures included measures of physical and mental functioning, quality of life, disease activity, and patient satisfaction. Change scores between periods were compared using analysis of covariance.

Results
A total of 80 and 85 patients were included in periods I and II, respectively. Concerning the improvement of the MACTAR score and all other secondary clinical outcome measures, there was no significant difference between the 2 periods. Patient satisfaction with care was slightly higher in period II than in period I, with the differences regarding the total score of a multidimensional satisfaction questionnaire and the domains focusing on individual problems and empathy reaching statistical significance.

Conclusion
The introduction of the RAP did not change clinical effectiveness but had a modest beneficial impact on patient satisfaction with care in patients with RA admitted for multidisciplinary team care.

Introduction

Although medical treatment has improved markedly over the last few decades, many patients with rheumatoid arthritis (RA) find their performance of activities of daily living and participation in society to be considerably impaired. Rehabilitative management strategies, including care provided by a team of health professionals from various disciplines, are often needed to support patients in living with the consequences of the disease (1).

Despite the proven benefits of multidisciplinary team care (2), a number of weaknesses have been identified, such as the absence of common treatment goals, too little focus on daily activities and societal participation, and a lack of active participation of the patient regarding treatment priorities (3). To overcome these problems, various rehabilitation tools have been developed, such as the Canadian Occupational Performance Measure (COPM) (4), the Rehabilitation Problem-Solving Form (RPS-Form) (5), the Indicators of Rehabilitation Status version 3 (IRES-3) patient questionnaire (6,7), and the Rehabilitation Activities Profile (RAP) (8).

The RAP is based on a precursor of the International Classification of Functioning, Disability and Health (ICF) (9) (Figure 1), the International Classification of Impairments, Disabilities, and Handicaps (10). The ICF offers a globally agreed upon framework and classification to define health status in terms of 1) body functions and body structures, 2) activities and participation, and 3) contextual factors, including environmental and personal factors (11) (Figure 1). By using the ICF, the RAP aims to assist a team of health professionals in the structured and comprehensive assessment of a patient regarding activity limitations and participation restrictions, including the patient's view regarding the personal impact of these limitations and restrictions.

Apart from the assessment, the RAP guides health professionals through the process of setting common treatment goals and provides the means for a systematic evaluation of outcomes for individual patients (8). This structured approach fits in well with the so-called "rehab cycle", which was proposed by Steiner et al. to be used in rheumatology (5). This cycle involves the systematic identification of the patient's problems and needs; the definition of therapy goals; the planning, implementation, and co-ordinaton of interventions; and the assessment of the effects of these interventions.

By using rehabilitation tools such as the RAP, it is expected that clinical effectiveness regarding the achievement of individual treatment goals on the level of activities and participation and patient satisfaction concerning aspects such as patient orientedness, autonomy, and coherence among interventions executed by various health professionals will increase. However, evidence regarding the effectiveness of the implementation of rehabilitation tools is scarce. The IRES-3 has not yet been evaluated, whereas evaluations of the RPS Form and the COPM in patients with RA concerned a single case study (5) and an observational study (4), respectively. In a recent, larger study on the clinical effectiveness of the RAP in patients with various conditions, no effect on clinical effectiveness was seen (12).

Given the lack of data on the effectiveness of the introduction of ICF-based rehabilitation tools in multidisciplinary care in rheumatology, the purpose of this study was to determine the impact of the RAP on the improvement of individual limitations on the level of activities and participation in the rheumatology setting. Moreover, the effectiveness regarding other clinical outcomes as well as patient satisfaction were studied.

Patients And Methods

Design
We conducted a prospective cohort study with a pretest/posttest nonequivalent groups design (13) comparing the outcomes of multidisciplinary team care and patient satisfaction with care in a 12-month period where the rehabilitation tool was not used (January 2001to December 2001) with the outcomes in a 12-month period after the rehabilitation tool had been implemented (January 2003 to December 2003).

Patients
Patients were consecutively recruited at the inpatient and day patient multidisciplinary team care wards of the Rheumatology Rehabilitation Clinic of the Leiden University Medical Center. Inclusion criteria were as follows: RA as defined by the 1987 American College of Rheumatology (formerly the American Rheumatism Association) criteria (14), >18 years of age, and sufficient physical and emotional status to take part in assessments and complete questionnaires (judged by the treating rheumatologist). Exclusion criteria were: admission after total joint replacement surgery or for merely medical complications of RA.

The medical ethics committee of the Leiden University Medical Center approved the study protocol and all patients gave written informed consent.

Multidisciplinary team care
The effectiveness and costs of multidisciplinary team care in this setting have been described in previous studies (15,16). In both the pretest and the posttest periods, all patients were treated by a multidisciplinary team comprising a rheumatologist, an occupational therapist, a physical therapist, a social worker and nurses in both the inpatient and day patient care wards. Day patient team care was provided between 10:00 AM and 4:00 PM. Inpatients and day patients followed prescribed treatment programmes, tailored to individual needs.

The Rehabilitation Activities Profile and its implementation
Before the introduction of the RAP, all team members contributed to weekly initial and followup team conferences of every patient in a fixed order (rheumatologist, nurse, physical therapist, occupational therapist and social worker). General treatment goals were set at the end of the initial team conferences, but were neither systematically discussed with the patient nor evaluated during followup team conferences. During the initial

team conferences team members used their own records, whereas for the followup team conferences minutes of the previous team conference were also available.

The RAP was introduced in January 2002 and was fully implemented in January 2003. The RAP consists of 5 domains: communication (ICF component 2, chapter 3), mobility (ICF component 2, chapter 4), personal care (ICF component 2, chapter 5), occupation (ICF component 2, chapters 6, 8, and 9) and relationships (ICF component 2, chapter 7 and ICF component 3, chapter 3) (8). These domains are divided into 21 items, which comprise 71 subitems (Appendix A). For every (sub)item, 2 aspects are determined: the health professionals' judgment regarding the extent of an activity limitation or participation restriction and the patient's perceived problem with that limitation or restriction (8). For the present study, each item and its corresponding subitems were allocated to 2 health professionals from different disciplines according to their specific expertise. Other team members were encouraged to make a contribution to any (sub)item if this would provide additional information. A yes/no format was used for both the activity limitation and participation restriction scores and the patient's perceived problem scores.

For the present study, an electronic RAP report form was developed. In this form, the observations of ≥2 team members were recorded for every (sub)item and were delivered on paper to all team members before the team conference. During the initial team conference of a newly admitted patient, the RAP report form directed the team members towards the definition of shared goals. These goals were discussed with the patient by the rheumatologist afterwards and were adjusted if needed. During the weekly followup team conferences, progress regarding the achievement of the shared goals was discussed and recorded by means of structured followup electronic report forms.

All team members and administrative assistants were trained (1.5 days) regarding the background of the RAP, the formulation of common treatment goals, and the use of the RAP report forms.

Assessments
Clinical assessments were performed at admission (baseline), discharge, and 6 weeks thereafter during both 12 month periods. Patient satisfaction was measured within 2 weeks after discharge. All clinical assessments were executed by 1 trained investigator who was not involved in the treatment (JV).

Sociodemographic and disease characteristics
Sociodemographic and disease characteristics recorded at baseline were age, disease duration, sex, rheumatoid factor, presence of erosions, current medication, status of living (i.e., living alone), education level (low: up to and including lower technical and vocational training; medium: up to and including secondary technical and vocational training; and high: up to and including higher technical and vocational training and university), employment status, and previous admission to a rehabilitation clinic.

Medical treatment
Data on the number of treatment days and the use of nonsteroidal antiinflammatory drugs (NSAIDs), disease-modifying antirheumatic drugs (DMARDs), oral corticosteroids (prednisone), and intraarticular or intramuscular injections with corticosteroids (yes/no) were gathered from the medical records.

Primary outcome measure
To measure improvements in individual activity limitations, the McMaster Toronto Arthritis Patient Preference Disability Questionnaire (MACTAR) (17) was administered. The MACTAR is a semistructured interview consisting of status questions and transitional questions to record and evaluate activity limitations relevant to the individual patient (17,18). These activities were obtained from and ranked by the patient at each assessment. The baseline weighted MACTAR score ranges between 39 and 59 and the weighted followup score ranges between 21 and 77, whereas changes from baseline of the weighted score could range from –38 (maximal deterioration) to 38 (maximal improvement).

Secondary outcome measures
- *Functional ability.* Functional ability was measured by means of the Health Assessment Questionnaire (19), comprising 20 questions regarding 8 domains of activities of daily living, with a total score ranging from 0 (no functional limitations) to 3 (serious functional limitations).
- *Quality of life and psychological functioning.* Quality of life was measured with the Rheumatoid Arthritis Quality of Life (RAQoL) questionnaire (20). This questionnaire consists of 30 yes/no questions and ranges from 0 to 30, with a lower score indicating higher quality of life.
- Psychological functioning was measured with the psychological health scale of the Dutch Arthritis Impact Measurement Scales (21). The scale score ranges from 0 to 10, with a higher score indicating a poorer psychological health status (22).
- *Disease activity.* Disease activity was measured with the Disease Activity Score in 28 joints (DAS28), a composite index including the number of swollen and tender joints, a visual analog scale (VAS) for the patients' global assessment of disease activity, and erythrocyte sedimentation rate (ESR). The DAS28 score was calculated according to the following formula: $0.56(\sqrt{\text{number of tender joints}}) + 0.28(\sqrt{\text{number of swollen joints}}) + 0.70 \ln(\text{ESR}) + 0.014(\text{VAS patients' global assessment of disease activity})$ (23). DAS28 end point scores <3.2 are considered to represent low disease activity, 3.2-5.1 represent moderate disease activity, and >5.1 represent high disease activity (24).
- *Patient satisfaction.* Patient satisfaction was measured with a multidimensional questionnaire based on a previously validated 28-item questionnaire to evaluate RA patients' satisfaction with multidisciplinary care (25). For the present study the original domains knowledge, empathy, and continuity were used (6 items). In addition, 24 extra items were added to the original domains autonomy, information, co-ordi-

naton among health professionals, patient-centered care (formerly: efficiency), and effectiveness (34 items), resulting in a final questionnaire comprising 40 statements that was scored on a 5-point Likert scale (where 0 = totally disagree and 4 = totally agree). For every domain, the scores of the items were added and divided by the total number of items in that domain, yielding a score ranging from 0 (totally unsatisfied) to 4 (completely satisfied) for every domain. Adding the scores of all 40 items and dividing the sum by 1.6 transformed the total score to a score ranging from 0 (totally unsatisfied) to 100 (completely satisfied).

Statistical analysis

The study was designed using the MACTAR score as the primary outcome measure, with an estimated mean ± SD difference in weighted MACTAR change score of 3 ± 6 between the 2 periods, a difference that is considered to be clinically relevant (26). According to this estimation, with a power of 0.80 and P value less than 0.05 (2-tailed test), 63 patients per period would be required. Taking into account a 10% dropout rate, a minimum of 70 patients per period were to be recruited.

All measures were expressed as medians and ranges, or means and standard deviations where appropriate. Differences between patients' characteristics and the use of medical treatment at baseline and during admission between the 2 periods were analysed using the chi-square test, Fisher's exact test, or the Mann-Whitney U test where appropriate.

Cronbach's alpha was used to estimate the internal consistency of the 8 domains of the patient satisfaction questionnaire and the total internal consistency of all 40 items.

For all clinical outcome measures, changes between baseline and discharge and between baseline and 6 weeks after discharge were computed and presented as the crude mean difference in change between both periods with a 95% confidence interval. Change scores of the clinical outcome measures and the patient satisfaction scores were compared between the 2 periods using analysis of covariance. Baseline variables that were statistically significantly different between the periods were entered as covariates. To account for possible confounding due to unknown differences between the inpatient and day patient team care settings, the setting was also entered as a covariate. For the analysis of every variable, all covariates were entered into the model first. Covariates were removed from the model if their effects were not statistically significant; otherwise adjusted P values were used.

All analyses were based on the intent-to-treat principle. In case of patients lost to followup, all available data were used. All statistical analyses were performed using SPSS software, version 11.5 (SPSS, Chicago, IL) with P values less than or equal to 0.05 considered to be statistically significant.

Results

In total, 88 patients (period I) and 98 patients (period II) were eligible for screening. Eight (9%) and 13 (13%) patients declined participation in periods I and II, respectively, resulting in 80 and 85 patients who were finally included.

Twenty-six patients, equally distributed over periods I and II, did not complete the study. In period I, 14 patients (18%) were lost to followup at discharge (n = 5) or at 6 weeks after discharge (n = 9) for the following reasons: logistics problem (n = 4), referral to other department (n = 2), refusal of further participation (n = 6), deceased (n = 1), and surgery (n = 1). In period II, 12 patients (14%) were lost to followup at discharge (n = 6) or at 6 weeks after discharge (n = 6) for the following reasons: referral to other department (n = 1), refusal of further participation (n = 5), worsened health status (n = 3), cardiac disease (n = 1), moved (n = 1), surgery (n = 1), and unknown reason (n = 1).

The baseline clinical and sociodemographic characteristics and previous admissions for multidisciplinary team care of the patients admitted in periods I and II are shown in Table 1.

Table 1   **Baseline clinical and sociodemographic characteristics of patients with RA admitted for multidisciplinary team care in a period before (I) and a period after (II) the introduction of the Rehabilitation Activities Profile[**]**

Characteristic	Period I (n=80)		Period II (n=85)		*P* value[1]
Age, median (range) years	65	(23-86)	61	(22-83)	0.76
Duration of RA, median (range) years	8	(0.3-47)	6	(0.1-43)	0.20
Female sex	49	(61)	65	(77)	0.05*
Positive rheumatoid factor	57	(71)	58	(73)	0.99
With erosions	59	(74)	49	(61)	0.11
Current use of medication					
NSAID	59	(74)	55	(66)	0.33
DMARD	58	(73)	69	(81)	0.26
Prednisone	21	(26)	15	(18)	0.25
Living alone	24	(30)	21	(25)	0.56
Education level[2]:					
Low	63	(79)	62	(73)	0.49
Medium	8	(10)	11	(13)	0.73
High	9	(11)	12	(14)	0.75
With paid employment	18	(23)	17	(20)	0.84
With previous admission to rehabilitation clinic	33	(41)	38	(45)	0.77

[**] Values are the number (percentage) unless otherwise indicated. RA = rheumatoid arthritis; NSAID = nonsteroidal antiinflammatory drug; DMARD =disease-modifying antirheumatic drug.
* Statistical significance with a significance level of $P \leq 0.05$.
[1] Chi-square or Mann-Whitney U test, where appropriate.
[2] Low = up to and including lower technical and vocational training; Medium: up to and including secondary technical and vocational training; High: up to and including higher technical and vocational training and university.

Apart from the greater proportion of women in period II compared with period I, no statistically significant differences between the periods were found. Twenty-two patients in period I and 16 patients in period II were not taking DMARDs at admission. In period I, 10 patients had recently been diagnosed with RA, and 12 patients who had been taking DMARDs stopped recently because of ineffectiveness and/or side effects. In period II, there were 5 patients newly diagnosed with RA and 11 patients who had taken DMARDs but had recently stopped.

Table 2   **Number of treatment days, unit of admission, and use of medication in patients with RA admitted for multidisciplinary team care in a period before (I) and a period after (II) the introduction of the Rehabilitation Activities Profile***

	Period I (n=80)	Period II (n=85)	P value[1]
Median number of treatment days (range)	10 (3-40)	10 (1-31)	0.41
Unit of admission			
Day patient care	52 (65)	56 (66)	0.99
Inpatient care	28 (35)	29 (34)	
Medical treatment			
NSAIDs			
Stable	34 (61)	40 (75)	
Dose or application change	4 (7)	2 (4)	0.30
Start new NSAIDs	18 (32)	11 (21)	
DMARDs			
Stable	26 (33)	28 (36)	
Dose or application change	21 (27)	28 (36)	0.23
Start new DMARDs	32 (40)	22 (28)	
Prednisone			
Stable	6 (23)	10 (45)	
Dose or application change	14 (54)	5 (23)	0.08
Start Prednisone	6 (23)	7 (32)	
Intramuscular or intraarticular corticosteroid injections	27 (34)	21 (25)	0.27

* Values are the number (percentage) unless otherwise indicated. See Table 1 for definitions.
[1] Chi-square test, Fisher's exact test, or Mann-Whitney U test, where appropriate; significance level $P \leq 0.05$.

Medical treatment during admission in both periods is shown in Table 2. Overall, the duration of treatment; the distribution of the patients over the inpatient and day patient wards; and the proportions of patients in whom treatment with NSAIDs, DMARDs, or oral corticosteroids was instituted or changed or in whom injections with corticosteroids were administered were similar in both periods. Of the 22 and 16 patients in periods I and II who were not receiving a DMARD at baseline, 22 and 11 patients started with ≥ 1 DMARDs during admission, respectively.

Table 3 Clinical outcome data at baseline and crude mean change scores at discharge and 6 weeks after discharge in patients with RA admitted for multidisciplinary team care in a period before (period I; n=80) and after (period II; n=85) the introduction of the Rehabilitation Activities Profile*

		Baseline Mean (SD)[1]	Change score at discharge, mean (95% CI)[2]	P value, difference between periods I and II[3]	Change score 6 weeks after discharge, mean (95% CI)[2]	P value, difference between periods I and II[3]
Primary outcome measure						
MACTAR (weighted)	Period I	48.16 (3.77)	12.03 (10.08;13.98)	0.89	9.89 (7.12;12.65)	0.58
	Period II	47.27 (3.57)	13.23 (11.60;14.86)		12.11 (9.63;14.58)	
Secondary outcomes measures						
HAQ (0-3)	Period I	1.40 (0.74)	-0.17 (-0.28;-0.05)	0.85	-0.18 (-0.3;-0.02)	0.93
	Period II	1.39 (0.66)	-0.15 (-0.24;-0.07)		-0.18 (-0.3;-0.07)	
RAQoL questionnaire (0-30)	Period I	16.13 (6.51)	-0.70 (-1.90; 0.49)	0.56	-0.63 (-2.25;1.00)	0.59
	Period II	17.43 (5.87)	-1.38 (-2.11;-0.65)		-1.79 (-3.08;-0.50)	
D-AIMS2, psychological scale (0-10)	Period I	4.31 (1.70)	-0.63 (-0.91;-0.35)	0.64	-0.58 (-1.01;-0.15)	0.96
	Period II	4.47 (1.70)	-0.57 (-0.87;-0.26)		-0.61 (-0.94;-0.28)	
Disease Activity Score in 28 joints	Period I	5.49 (1.39)	-0.88 (-1.16;-0.60)	0.09	-0.68 (-0.99;-0.36)	0.69
	Period II	5.45 (1.43)	-0.58 (-0.80;0.36)		-0.73 (-1.02;-0.44)	

* RA = rheumatoid arthritis; 95% CI = 95% confidence interval; MACTAR = McMaster Toronto Arthritis Patient Preference Disability Questionnaire; HAQ = Health Assessment Questionnaire; RAQoL = Rheumatoid Arthritis Quality of Life; D-AIMS2 = Dutch Arthritis Impact Measurement Scales-2.

[1] All P values regarding differences between absolute baseline values >0.05 (unpaired Student's t-test).

[2] All P values <0.05, except for RAQoL, period I (paired sample t-test).

[3] P values refer to analysis of covariance with the following covariates: sex, baseline value, and clinical setting and its interaction with period.

For the 5 patients in period II who were not receiving a DMARD at baseline and did not start during admission, treatment with DMARDs was planned but postponed because of medical reasons. In 3 of these 5 patients, oral prednisone was started during admission.

The baseline clinical outcome data and changes from baseline at discharge and 6 weeks thereafter in the two periods are shown in Table 3. Patients improved significantly between admission and discharge and 6 weeks thereafter according to all outcome measures in both periods, except for the RAQoL in period I.

Concerning the primary outcome measure, the MACTAR, there were no statistically significant differences in improvement between the 2 periods. With respect to the secondary clinical outcome measures, the magnitude of improvement was also in the same range in the 2 periods, with no statistically significant differences.

The results regarding patient satisfaction with care are presented in Table 4. Sixty-three patients in period I (79%) and 74 patients in period II (87%) completed the satisfaction questionnaire.

Reliability analysis demonstrated that Cronbach's alpha was 0.95 for the total questionnaire and 0.54, 0.57, and 0.67 for the original domains continuity, empathy, and knowledge, respectively. Regarding the extended domains, Cronbach's alpha was 0.85 for autonomy, 0.84 for information, 0.86 for co-ordinaton among health professionals, 0.85 for patient-centered care, and 0.82 for effectiveness.

Except for the effectiveness domain, where similar results were achieved in the 2 periods, patient satisfaction was slightly higher in period II than in period I for all domains. For the domains patient-centered care and empathy, as well as the total satisfaction score, the differences between the 2 periods reached statistical significance.

Table 4   **Rheumatoid arthritis patients' satisfaction with multidisciplinary team in a period before (I) and after (II) the introduction of the Rehabilitation Activities Profile[*]**

Domains (score range)	No. of items	Period I (n=63)	Period II (n=74)	P value[#]
Patient-centered care (0-4)	8	3.0 (0.7)	3.3 (0.6)	0.037**
Autonomy (0-4)	10	2.9 (0.6)	3.1 (0.6)	0.235
Information (0-4)	6	3.0 (0.8)	3.2 (0.6)	0.385
Knowledge (0-4)	2	3.3 (0.8)	3.5 (0.6)	0.104
Empathy (0-4)	2	3.0 (0.8)	3.3 (0.7)	0.036**
Co-ordinaton (0-4)	4	3.2 (0.7)	3.3 (0.6)	0.351
Effectiveness (0-4)	6	2.8 (0.8)	2.8 (0.8)	0.691
Continuity (0-4)	2	2.6 (1.0)	2.9 (1.0)	0.146
Total score (0-100)	40	74.2 (13.9)	78.9 (13.3)	0.046**

[*] Values are the mean (SD) unless otherwise indicated.
[#] P values refer to analysis of covariance with the following covariates: sex and clinical setting and its interaction with period.
** Statistical significance with a significance level of $P \leq 0.05$.

Discussion

This prospective cohort study demonstrated that the introduction of an ICF-based rehabilitation tool did not change improvement of individual limitations on the level of activity and participation in patients with RA admitted for multidisciplinary team care. The same result was obtained for all other secondary measures of clinical effectiveness; however, the rehabilitation tool appeared to slightly improve various aspects of patient satisfaction with care.

Over recent years, a number of tools have been developed to support rehabilitation health professionals providing multidisciplinary care, examples of which are the COPM (4), RPS Form (5), IRES-3 (6,7), and RAP (8). Their overall aims of these tools are to structure the multidisciplinary team care process by providing methods for a systematic assessment and for the setting and evaluation of shared treatment goals. These tools explicitly include those aspects of health status that are relevant for the functioning of individual patients. Therefore, all of the tools have the ICF component activities and participation as their main focus. Moreover, the working methods connected with these tools do generally enhance the active participation of the patient in the goal setting and treatment process.

So far, evidence regarding the effectiveness of rehabilitation tools is scanty. The only available evaluation of substantial size was, similar to the present study, concerned with the RAP (12). That study compared the outcomes of 3 groups of patients with miscellaneous disorders in 8 rehabilitation centers who were treated by multidisciplinary teams that were either using the RAP, partially using the RAP, or not using the RAP. Overall, no effect of the use of the RAP on improvement of functional status, perceived health, and total length of stay was observed. According to the authors, the lack of effectiveness could probably be ascribed to an insufficient level of implementation of the RAP. Insufficient implementation does not seem to apply to the present study, because the RAP was fully implemented in both settings before the second assessment period started. The most important explanation for the absence of effectiveness of the introduction of the RAP could be the lack of contrast between the 2 periods regarding the primary focus of the study: the improvement of individual limitations on the level of activities and participation. Overall, the improvements of functional status between admission and discharge in the period before the introduction of the RAP were similar to those obtained in previous studies of multidisciplinary team care (15,27). However, with respect to improvement of MACTAR score, the results in period I were considerably better than those previously obtained in the same setting (15). This latter finding could imply that with respect to the focus of care on patients' priorities regarding their personal activity limitations, advances had already been made over time, leaving relatively little room for improvement. Another explanation for the lack of effectiveness could be the relatively short period of followup (6 weeks after discharge) in the present study. It is conceivable that improvements on the level of individual limitations concerning activities and participation can only be seen after a period of sufficient length. For some patients and

some activities, a period of 6 weeks may be too short to fully profit from gains in bodily functions or from acquired skills.

In the present study, we found a modest positive effect of the introduction of the RAP on patient satisfaction. Given the favorable satisfaction scores before the RAP had been introduced, a further improvement could have been hard to achieve. Because patient satisfaction has not been included in studies on the effectiveness of rehabilitation tools, comparisons with other studies are difficult. In addition, instruments that measure patient satisfaction with multidisciplinary care are scarce (2). An existing questionnaire that was specifically developed for measuring satisfaction with multidisciplinary care in patients with RA (25) lacked statements about dealing with patients' specific problems, patient-centered care, and individual expectations, elements that were relevant for the present study and indeed showed a modest effect of the intervention. This finding could indicate that for some research questions, the methodology of previously developed satisfaction instruments can be used, but that the development of specific items, tailored to the study population and the intervention, is needed. It remains undisputable that the psychometric properties of any new or adjusted questionnaire should be examined. In our study, the psychometric properties of the adjusted questionnaire were similar to or slightly better than those of the questionnaire on which it was based (25).

This study has a number of limitations. Because neither a parallel groups design nor a randomization procedure was used, unknown differences between the patient populations or changes in the multidisciplinary care process other than those attributed to the introduction of the RAP can not be totally ruled out. In addition, data for the medical treatment were gathered retrospectively from the medical records. Therefore, incomplete documentation could have resulted in missing information. However, it is unlikely that this may have affected the group comparisons, because data collection was performed in both groups in the same manner. Concerning the generalizability of our study results, it must be kept in mind that regarding the provision of multidisciplinary care in rheumatology, team composition may vary among institutions. For example, the absence of a psychologist in the team could have resulted in an underestimation of limitations of mental functions.

In conclusion, although the introduction of an ICF-based rehabilitation tool did not change improvement of individual limitations on the level of activities or participation nor of any other clinical outcome measures, it did, to a limited extent, improve various aspects of patient satisfaction with multidisciplinary care in patients with RA. For future research it is important that the contrast between settings where rehabilitation tools are used or not used is sufficiently large. Moreover, a considerable followup period is recommended, because the impact on the level of activities and participation may only be visible after a period of sufficient length.

In addition, the effect of the introduction of an ICF-based tool on satisfaction of the health professionals as well as the economic consequences need to be further investigated.

Acknowledgments

Appendix A   Overview of the linking of the 21 Rehabilitation Activities Profile (RAP) items to the ICF component 'Activities and Participation', including the presence of the 21 RAP items in the comprehensive ICF core set for rheumatoid arthritis

RAP Domains with the titles of the 21 items	ICF chapters (cursive) and categories 2nd level of the ICF component 'Activities and Participation' (d110-d999)	ICF category codes 2nd level	ICF comprehensive core set RA
Communication	*Communication (Chapter 3)*	d310-d399	-
1. Expressing	Communicating-producing	d330-d349	-
2. Comprehending	Communicating-receiving	d310-d329	-
Mobility	*Mobility (Chapter 4)*	d410-d499	+
3. Maintaining posture	Maintaining a body position	d415	+
4. Changing posture	Changing basic body position	d410	+
5. Walking	Walking	d450	+
6. Using wheelchair	Moving around using equipment	d465	+
7. Climbing stairs	Moving around	d455	+
8. Using transport	Using transportation	d470	+
Personal care	*Self-care (Chapter 5)*	d510-d599	+
9. Sleeping	Self-care, other specified[1]	d598	+
10. Eating and drinking	Eating / drinking	d550/d560	+
11. Washing and grooming	Washing oneself	d510	+
12. Dressing	Dressing	d540	+
13. Undressing	Dressing	d540	+
14. Maintaining continence	Toileting	d530	+
Occupation [2]	*Domestic life (Chapter 6), Major life area (Chapter 8), Community, social and civic life (Chapter 9)*	d610-d699, d810-d899, d910-d999	+
15. Providing for meals	Preparing meals/doing housework	D630	-
16. Household activities	Doing housework	D640	-
17. Professional activities	*Major life areas (Chapter 8)*	d810-d899	+
18. Leisure activities	Recreation and leisure	d920	+
Relationships	*Interpersonal interactions and relationships (Chapter 7) and Support and relationships (Chapter 3 from ICF component 'Environmental Factors')*	d710-d799 and e310-325	+
19. Partner	Intimate relationships; immediate family	d770 and e310	+
20. Child(ren)	Family relationships; immediate family	d760 and e310	+
21. Friends/ acquaintances	Informal social relationships; friends/ acquaintances, peers, colleagues, neighbours, and community members	d750 and e320/ e325	-

[1] In the ICF, the RAP item 'sleeping' is represented by code b1349 from the ICF component 'body functions', which is 'sleep functions, unspecified'. In the ICF chapter 'self-care', sleeping is not specified.

[2] The RAP Domain 'occupation' is not represented in one ICF chapter. The ICF component 'Activities and Participation' represents three RAP items (15, 16, and 18) by the ICF chapters 6, 8 and 9. The RAP item 'Professional activities' (17) is represented by the ICF chapter 'major life areas' (chapter 8).

References

1.   Davis RM, Wagner EG, Groves T. Advances in managing chronic disease: research, performance measurement, and quality improvement are key. BMJ 2000;320:525-6.
2.   Vliet Vlieland, TP. Multidisciplinary team care and outcomes in rheumatoid arthritis [review]. Curr Opin Rheumatol 2004;16:153-6.
3.   Jelles F, Van Bennekom CA, Lankhorst GJ. The interdisciplinary team conference in rehabilitation medicine. Am J Phys Med Rehabil 1995;74:464-5.
4.   Wressle E, Lindstrand J, Neher M, Marcusson J, Henriksson C. The Canadian Occupational Performance Measure as an outcome measure and team tool in a day treatment programme. Disabil Rehabil 2003;25:497-506.
5.   Steiner WA, Ryser L, Huber E, Uebelhart D, Aeschlimann A, Stucki G. Use of the ICF model as a clinical problem-solving tool in physical therapy and rehabilitation medicine. Phys Ther 2002;82:1098-107.
6.   Schochat T, Pilz C, Neuner R. The Indicators of Rehab Status questionnaire version 3 (IRES-3) in 1818 rehabilitees with musculoskeletal diseases. Rehabilitation (Stuttg) 2003;42:236-44. In German.
7.   Buhrlen B, Gerdes N, Jackel WH. Development and psychometric testing of a patient questionnaire for medical rehabilitation (IRES-3). Rehabilitation (Stuttg) 2005;44:63-74. In German.
8.   Van Bennekom CAM, Jelles F, Lankhorst GJ. Rehabilitation Activities Profile: the ICIDH as a framework for a problem-oriented assessment method in rehabilitation medicine [review]. Disabil Rehabil 1995;17:169-75.
9.   World Health Organization. ICF: International Classification of Functioning, Disability and Health. Geneva: WHO, 2001.
10. World Health Organization. ICIDH: International Classification of Impairments, Disabilities and Handicap. Geneva: WHO,1980.
11. Stamm TA, Cieza A, Coenen M, Machold KP, Nell VP, Smolen JS, et al. Validating the International Classification of Functioning, Disability and Health Comprehensive Core Set for Rheumatoid Arthritis from the patient perspective: a qualitative study. Arthritis Rheum 2005;53:431-9.
12. Beckerman H, Roelofsen E, Knol D., Lankhorst G. The value of the Rehabilitation Activities Profile (RAP) as a quality sub-system in rehabilitation medicine. Disabil Rehabil 2004;26:387-400.
13. Robson C. Real World Research: a resource for social scientists and practitioners. 2nd ed. Oxford: Blackwell Publishers; 2002.
14. Arnett FC, Edworthy SM, Bloch DA, McShane DJ, Fries JF, Cooper NS, et al. The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. Arthritis Rheum 1988;31:315-24.
15. Tijhuis GJ, Zwinderman AH, Hazes JM, Breedveld FC, Vlieland PM. Two-year follow-up of a randomized controlled trial of a clinical nurse specialist intervention, inpatient, and day patient team care in rheumatoid arthritis. J Adv Nurs 2003;41:34-43.
16. Van den Hout WB, Tijhuis GJ, Hazes JMW, Breedveld FC, Vliet Vlieland TP. Cost effectiveness and cost utility analysis of multidisciplinary care in patients with rheumatoid arthritis: a randomised comparison of clinical nurse specialist care, inpatient team care, and day patient care. Ann Rheum Dis 2003;62:308-15.

17. Tugwell P, Bombardier C, Buchanan WW, Goldsmith CH, Grace E, Hanna B. The MACTAR Patient Preference Disability Questionnaire: an individualized functional priority approach for assessing improvement in physical disability in clinical trials in rheumatoid arthritis. J Rheumatol 1987;14:446-51.

18. Verhoeven AC, Boers M, van der Linden S. Validity of the MACTAR questionnaire as a functional index in a rheumatoid arthritis clinical trial. J Rheumatol 2000;27:2801-9.

19. Siegert CE, Vleming LJ, Vandenbroucke JP, Cats A. Measurement of disability in Dutch rheumatoid arthritis patients. Clin Rheumatol 1984;3:305-9.

20. De Jong Z, van der Heijde DM, McKenna SP, Whalley D. The reliability and construct validity of the RAQoL: a rheumatoid arthritis-specific quality of life instrument. Br J Rheumatol 1997;36:878-83.

21. Riemsma RP, Taal E, Rasker JJ, Houtman PM, Van Paassen HC, Wiegman O. Evaluation of a Dutch version of the AIMS2 for patients with rheumatoid arthritis. Br J Rheumatol 1996;35:755-60.

22. Evers AW, Taal E, Kraaimaat FW, Jacobs JW, Abdel-Nasser A, Rasker JJ, et al. A comparison of two recently developed health status instruments for patients with arthritis: Dutch-AIMS2 and IRGL. Br J Rheumatol 1998;37:157-64.

23. Prevoo ML, van 't Hof MA, Kuper HH, van Leeuwen MA, van de Putte LB, van Riel PL. Modified disease activity scores that include twenty-eight-joint counts: development and validation in a prospective longitudinal study of patients with rheumatoid arthritis. Arthritis Rheum 1995;38:44-8.

24. Van Gestel AM, Anderson JJ, van Riel PL, Boers M, Haagsma CJ, Rich B, et al, and the American College of Rheumatology European League of Associations for Rheumatology. ACR and EULAR improvement criteria have comparable validity in rheumatoid arthritis trials. J Rheumatol 1999;26:705-11.

25. Tijhuis GJ, Kooiman KG, Zwinderman AH, Hazes JM, Breedveld FC, Vliet Vlieland TP. Validation of a novel satisfaction questionnaire for patients with rheumatoid arthritis receiving outpatient clinical nurse specialist care, inpatient care, or day patient team care. Arthritis Rheum 2003;49:193-9.

26. Boers M, Verhoeven AC, Markusse HM, van de Laar MA, Westhovens R, van Denderen JC, et al. Randomised comparison of combined step-down prednisolone, methotrexate and sulphasalazine with sulphasalazine alone in early rheumatoid arthritis [published erratum appears in Lancet 1998;351:220]. Lancet 1997;350:309-18.

27. Lambert CM, Hurst NP, Forbes JF, Lochhead A, Macleod M, Nuki G. Is day care equivalent to inpatient care for active rheumatoid arthritis? Randomised controlled clinical and economic evaluation. BMJ 1998;316:965-9.

Chapter 4

The impact of introducing an ICF-based rehabilitation tool on staff satisfaction with multidisciplinary team care in rheumatology: an exploratory study

J. Verhoef[1, 2], P.J. Toussaint[1], H. Putter[3], J.H.M. Zwetsloot-Schonk[1], T.P.M. Vliet Vlieland[4].

1   Department of Clinical Informatics;
2   Department of Physical Therapy;
3   Medical Statistics;
4   Department of Rheumatology, Leiden University Medical Center (LUMC), The Netherlands.

Abstract

Objective
To investigate the impact of introducing a rehabilitation tool on multidisciplinary team members' satisfaction with team functioning, team conferences and written information exchange.

Design
Pre-test post-test design.

Setting
Day patient and inpatient wards of a rheumatology rehabilitation clinic.

Subjects
Members of two multidisciplinary teams.

Intervention
The introduction of an electronic version of the Rehabilitation Activities Profile (RAP).

Main measures
The Group Environment Scale (GES) and questionnaires on satisfaction with team conferences and administrative procedures administered before (T1) and 12 months after (T2) the introduction of the RAP.

Results
The GES cohesion subscale was significantly higher in T2 than in T1 in the day patient setting (mean difference 1.9; 95% Confidence Interval (CI) 0.3;3.4), whereas in the inpatient setting the GES cohesion and the order and organization subscales were significantly lower (mean differences -3.0; 95%CI -4.7;-1.3 and -2.7; 95%CI -4.3;-1.1, respectively). Satisfaction with team conferences was significantly higher in T2 compared to T1 in the day patient setting (mean difference total score 0.6; 95%CI 0.3;1.0), but not in the inpatient setting (mean difference -0.3; 95% CI -0.7;0.2). In both settings, the proportions of health professionals spending >10 minutes on administrative tasks per patient contact were significantly higher in T2 than in T1.

Conclusions
In the day patient setting, the introduction of a rehabilitation tool had a positive effect on team members' satisfaction with team functioning and team conferences, whereas in the inpatient setting the effect was absent or the opposite. In both settings, the time spent on administrative tasks increased.

Introduction

Many patients with rheumatoid arthritis (RA) find their performance of daily life activities and participation in society considerably impaired (1). To support patients in living with the consequences of the disease, rehabilitative management strategies, including care provided by a team of health professionals from various disciplines, are often required (2).

In the past decades, the added value of a team care approach over regular outpatient care in patients with RA has been demonstrated in a number of studies (3,4). Although these studies have extensively documented the *outcomes* of multidisciplinary team care, the number of studies on the *process* of team care in rheumatology, including team functioning, is limited (5-7). Studies on the process of team care could provide more insight into the active elements of this intervention, which is still considered to be a "black box" (8).

With respect to the process of team care in rheumatology, the importance of a structured approach has in recent years been highlighted (9). A systematic approach implies the definition and evaluation of common treatment goals, including the level of activities and participation (10,11). For that purpose a common language for the various health professionals is a prerequisite (12). Moreover, in this process, an active participation of the patient regarding treatment priorities is required (11). To facilitate the setting and evaluation of patient-oriented treatment goals, a number of rehabilitation tools have been developed (11,13-16). These instruments have in common that they offer health professionals a general framework to assess the patient and safeguard the setting of goals in those areas that are most relevant for individual patients.

Studies evaluating the impact of the implementation of these rehabilitation tools on the process of multidisciplinary team care in rheumatology are scarce. An observational study concerning the usage of the Canadian Occupational Performance Measure (COPM) in RA patients showed that, according to the health professionals involved, the tool improved patient participation and goal setting (13). The one available study on the Rehabilitation Problem-Solving Form (RPS) in rheumatology was confined to a single case study (11).The Indicators of Rehabilitation Status (IRES-3) (14,15) and the Rehabilitation Activities Profile (RAP) (16) have not yet been evaluated in rheumatology. In a general and paediatric rehabilitation setting it was found that the introduction of the Rehabilitation Activities Profile did not improve health professionals' satisfaction with team conferences (17,18). However, health professionals reported benefits such as uniformity of language, getting information about a patient's perceived problems, and the formulation and attunement of rehabilitation goals (17) or insisted on further implementation of the tool (18).

Given the scarcity of data, the aim of the study reported here was to investigate the impact of the implementation of a rehabilitation tool on the process of team care in the rheumatology setting. For the intervention, the Rehabilitation Activities Profile was chosen, because a validated Dutch version was available at the time that the study was designed (16,17). This instrument was already used in another Dutch rheumatology rehabilitation clinic (19).

Subjects and methods

Study design and subjects

The investigation reported here was part of a previous prospective cohort study addressing the impact of introducing the Rehabilitation Activities Profile on clinical effectiveness and patient satisfaction. For that purpose, a pre-test post-test design, comparing the outcomes of multidisciplinary team care in patients with RA in a 12-month period where the rehabilitation tool was not used (January 2001-December 2001; T1) with a 12-month period after the electronic rehabilitation tool had been implemented (January 2003 – December 2003; T2). The study was executed at the day patient and inpatient wards of the department of Rheumatology of the Leiden University Medical Center (LUMC) in Leiden, the Netherlands. The prospective clinical cohort study showed that the introduction of the Rehabilitation Activities Profile had no effect on the improvement of functional ability or quality of life, however, a modest, yet statistically significant improvement of RA patients' satisfaction with care was seen (20).

The study reported in this article involved all members of the two multidisciplinary teams connected with the day patient and inpatient wards in periods T1 and T2. Trainees and nurses from the inpatient ward who only worked in evening and night shifts were excluded. The Medical Ethics Committee of the LUMC approved the study.

Multidisciplinary team care characteristics and team functioning

The rehabilitation clinic is a tertiary referral centre with inpatient and day patient multidisciplinary team care facilities for patients with rheumatic diseases from the district of Leiden and surrounding districts. In both settings, patients admitted for multidisciplinary team care had increasing difficulties in performing daily life activities, despite multidisciplinary treatment in the outpatient clinic. Day patient team care was provided twice a week between 10 a.m. and 4 p.m. for those patients whose health status did not demand hospitalization. Inpatients stayed overnight and during the weekend and were primarily in need of intensive medical and nursing care.

Inpatients and day patients followed prescribed treatment programmes. Individual exercise therapy and group exercise therapy were fixed components of the programme, with individual occupational therapy and interventions by the nurse, social worker, the medical doctor, orthopaedic shoemaker and other medical specialists and health professionals scheduled according to individual needs. Effectiveness and costs of team care provided in this clinic have been described in previous studies (21-23).

In both settings team conferences lasting approximately 2 hours were scheduled weekly, with all patients who were admitted being discussed. Until 2002, before the introduction of the rehabilitation tool, all team members consecutively contributed in a fixed order (rheumatologist, nurse, physical therapist, occupational therapist and social worker). The chairperson of the team conference was the rheumatologist. In both settings the same persons participated in the team conference every week, apart from the nurses in the inpatient team care setting, who rotated according to their working schedules. General treatment goals were set at the end of the patient's initial team conference, but were not systematically evaluated during the follow-up team conferences.

During the patient's initial team conference, team members used their own written records, whereas for the follow-up team conferences additional printed minutes of the previous team conference were also available.

Before the Rehabilitation Activities Profile was introduced, the administrative work load of all health professionals consisted of three different forms: 1. a discipline-specific patient record; 2. a multidisciplinary patient record with separate sheets for every discipline and 3. a discharge form with a summary and description of practical arrangements and appointments to be separately filled in for every discipline.

The Rehabilitation Activities Profile

In January 2002, the Rehabilitation Activities Profile was introduced. The Rehabilitation Activities Profile is a comprehensive checklist of daily life activities and social participation based on the International Classification of Functioning, Disability and Health (ICF) (24), formerly described by the International Classification of Impairments, Disability and Handicap (ICIDH (12). It consists of five domains on the level of activities and participation: communication, mobility, personal care, occupation and relationships (16). The five main Rehabilitation Activities Profile domains are divided into 21 items, which comprise 71 sub-items. With the implementation of the Rehabilitation Activities Profile, every item and its corresponding sub-items were allocated to two health professionals from different disciplines, according to their specific expertise. Other team members were encouraged to make a contribution to any (sub)item if this would provide additional information. With every (sub)item information about limitations as well as patient perceived problems was given (yes/no format with space for explanatory written comment). Every health professional did the scoring during his or her initial regular assessment of the patient (interview and physical examination), which was scheduled on the first or second day of the admission in all cases. The administration of a full Rehabilitation Activities Profile took approximately 15 to 20 minutes. The summary of limitations and perceived problems and ensuing treatment goals were discussed with the patient after the initial team conference by the physician or the nurse and any discrepancies with the patients' priorities were solved.

In January and in May 2002, all team members, including the administrative assistants, were trained (in total 1 ½ days) regarding the background of the Rehabilitation Activities Profile, the formulation of common treatment goals, inventory of the specific patients' medical history and needs and the use of the concomitant electronic Rehabilitation Activities Profile report forms.

After the introduction of the Rehabilitation Activities Profile, the rheumatologist was still the chairperson of the team conference, but the order of the conference was directed by the patient's limitations and problems according to the dimensions of the Rehabilitation Activities Profile and the ensuing treatment goals. In both periods, the planning of the various interventions that were part of the individual patient care treatment programmes was unchanged.

With the introduction of the rehabilitation tool a new multidisciplinary patient record was made available in paper (as a printout) as well as by means of an electronic report form. The electronic version was available for every individual health professional

from any place in the hospital and at any time. On average, about 10 minutes were needed to enter the allocated items in the electronic record form. This latter time could be extended depending on the computer skills of the different team members.

All information about newly admitted patients' health status and ensuing proposals regarding treatment goals was delivered on paper to all team members by an administrative assistant before the patient's initial team conference. In addition, a follow-up Rehabilitation Activities Profile report was used during the follow-up team conferences. The paper forms of these Rehabilitation Activities Profile reports were created by specially developed software and could be printed and stored by all team members for use in their own discipline-specific records.

After the Rehabilitation Activities Profile had been introduced, the same paper patient records were still used along side the electronic Rehabilitation Activities Profile report system. Health professionals decided themselves whether to replace their own discipline-specific paper record by the information in the electronic Rehabilitation Activities Profile report system; the physical therapists deciding to do so in both settings.

The main differences between the multidisciplinary team care process before and after the introduction of the Rehabilitation Activities Profile are summarized in an Appendix.

In both settings, the introduction of the rehabilitation tool was guided by one trained health professional, who was not involved in the treatment process (JV). This implementation co-ordinator was the chair of a steering committee, composed of representatives of every discipline. The steering committee decided on the division of the various items of the rehabilitation tool among the disciplines and developed the contents of the newly developed medical record. In addition, the implementation co-ordinator provided the training course and assisted team members in using the rehabilitation tool in daily practice. For that purpose, he attended all team conferences in both settings during and after the implementation of the Rehabilitation Activities Profile.

After the Rehabilitation Activities Profile and its computer application had been implemented, its usage by all team members was equally intensive in both settings. The only exception was the usage of the Rehabilitation Activities Profile by individual nurses in the inpatient care ward, which varied largely due to the shifts in duties. All printed report forms of the patients involved in the study were found to be all completed with respect to 5 domains of the rehabilitation tool and ensuing goals.

Assessment methods
At the end of both periods questionnaires were administered to all eligible team members.

Sociodemographic characteristics
For each team member, gender, professional training, age, number of years of professional experience and number of years working in the team were recorded. Team stability for both the inpatient and day patient teams was expressed as the proportion of team members connected to the team in both periods T1 and T2.

Team functioning
Team members' perceptions of team functioning (25) were measured with the Group Environment Scale Real Form (GES-Form R). This 90-item questionnaire measures 10 subscales of people's perceptions of actual group settings: cohesion, leader support, expressiveness, independence, task orientation, self-discovery, anger and aggression, order and organization, leader control and innovation. These 10 subscales assess three underlying sets of dimensions, pertaining to: relationships, personal growth, and system maintenance and system change (26). Each of the ten subscales consists of 9 statements. Each statement is scored as right or wrong. For this study, the subscale self-discovery was omitted as this was considered irrelevant for our study. Every GES subscale score ranges from 0 to 9. Regarding the goals and the philosophy of the Rehabilitation Activities Profile, higher GES subscale scores for cohesion, leader support, expressiveness, independence, task orientation and innovation are on the one hand considered as more favourable. On the other hand, no specific changes in subscale scores for leader control, order and organization, and anger and aggression are considered more favourable (25,27). Reference data, reliability analyses, and internal consistency are available on the GES (26).

Satisfaction with team conferences
Team members' satisfaction with various aspects of team conferences was measured by means of the 'Staff satisfaction with team conference'-questionnaire (28). This questionnaire comprises 38 questions regarding 5 dimensions: problem analysis (10 items), planning interventions (8 items), evaluation (11 items), organization (7 items), and common viewpoint (2 items). Answers to all the questions were assessed on a 7-point Likert scale (1="very bad" to 7= excellent"). A total score can be calculated by adding all item scores and divide by 38 which expresses a professional's satisfaction with team conferences (1="very bad" to 7= excellent"). This questionnaire proved to have face and content validity and a high internal consistency (28).

Administrative work load and timing and quality of information
The estimated average time spent on administrative tasks during initial contacts (newly admitted patients) and during follow-up contacts was recorded at the end of both periods T1 and T2 (<5 minutes, 5-10 minutes, >10 minutes).

The team members' appreciation of the timing and quality of written information was measured at the end of T2 by means of 6 transitional questions pertaining to perceived changes in satisfaction with the time spent on administrative tasks (2 questions) and the timing (2 questions) and quality (2 questions) of written information received from other disciplines during the initial and follow-up contacts (more satisfied, unchanged, less satisfied).

All self-developed questions were pilot tested among 3 health professionals who were familiar with rheumatology but were not members of the two teams involved.

Usage of the Rehabilitation Activities Profile

In order to determine whether the Rehabilitation Activities Profile report form had been used for all the patients with RA admitted in T2, all printed Rehabilitation Activities Profile report forms of the patients involved in the study were screened for completeness at the end of the implementation period by the implementation co-ordinator. He also recorded whether contributions were made by all the health professionals involved.

Statistical analysis

All continuous variables were expressed as means and standard deviations, or as medians and ranges, according to their distribution. Categorical data were expressed as numbers and percentages.

Differences between age, number of years in the profession and number of years in the team were analysed in the two settings in T1 and in T2 using the Mann-Whitney U test.

For the comparisons of satisfaction scores between the two periods, it was taken into account that on the one hand a considerable proportion of the same team members was working in both periods so that not all scores on the questionnaires in the two periods could be considered as independent. On the other hand, a number of team members were only working in one of the teams in either T1 or T2, leading to incomplete pairs. In order to account for dependent data and to use all available data from both periods linear mixed effects model (repeated measures linear model) was used with team members as random effect and setting, period, and their interaction as fixed effects. In case of non-normality of the data of the GES or the satisfaction with team conferences questionnaires log transformations were used. To check the assumptions of the linear mixed effects model, it was tested for periods and for both settings whether paired and unpaired data could indeed be combined, by comparing mean observations of those professionals who were part of a pair with those not part of a pair (Mann-Whitney U test or independent sample t-test). In case of a significant effect of setting or for setting and period interaction (setting X period) for two or more subscales of a questionnaire, data were separately presented for the inpatient and day patient care settings. Differences between the two settings regarding the number of team members who were more satisfied with time spent on administrative tasks, the moment of receiving written information and the quality of the written information in T2, were analysed using the Chi-square test or Fisher's exact test where appropriate.

All statistical analyses were performed using SPSS (version 12.0.1) with P values less than or equal to 0.05 considered to be statistically significant.

Results

In T1, 16 health professionals (2 rheumatologists, 7 nurses, 3 physical therapists, 1 occupational therapist, 1 social worker and 2 administrative staff member) were working in the day patient setting and 15 (3 rheumatologists, 7 nurses, 2 physical therapists, 1 occupational therapist, 1 social worker, and 1 administrative staff member) in the inpatient

setting. In T2, in the day patient setting 10 of the original 16 health professionals remained in the team, whereas six health professionals left and six health professionals joined the team (team stability 10/16=63%). For the inpatient setting, 8 of the original 15 health professionals remained in the team, whereas 6 health professionals left and 6 health professionals joined the team (team stability 8/15=53%).

The screening of the electronic report forms showed that a report form was completed for all the patients involved in the study. All the health professionals were found to contribute regularly to the electronic Rehabilitation Activities Profile report form with the only exception of a number of nurses in the inpatient care ward.

In Table 1 the characteristics of the team members in periods T1 and T2 are presented. In T1, there were no significant differences between the day patient team and the inpatient team members concerning age, years in profession and years working within the team. In both settings, the new team members in T2 did not differ significantly from the total group of team members working in T1 (data not shown).

Table 1 **Characteristics of health professionals connected to a day patient and inpatient multidisciplinary team in rheumatology**

	Day patient care		Inpatient care	
Assessment	T1	T2	T1	T2
Number of professionals	16	16	15	13
Female	15	16	13	11
Male	1	-	2	2
Professional training:				
Physician	2	3	3	1
Nurse	7	5	7	6
Physical therapist	3	3	2	2
Occupational therapist	1	2	1	1
Social worker	1	1	1	2
Administrative staff	2	2	1	1
Age (median, range)[1,2]	41.5 (26.0-58.0)	40.5 (26.0-58.0)	38.0 (23.0-59.0)	41.0 (25.0-52.0)
Years in profession [1,2] (median, range)	18.0 (0.2-35.0)	17.0 (2.0-38.0)	11.0 (0.5-25.0)	15.5 (4.0-28.0)
Years in team[1,2] (median, range)	5.0 (0.2-7.0)	7.0 (0.2-8.0)	3.5 (0.2-5)	4.0 (0.2-8.0)

[1] P values of the differences between day patient and inpatient care setting in T1 for age, years in profession and years in team were $P = 0.89$, $P = 0.22$, and $P = 0.49$, respectively.
[2] P values in T2 were $P = 0.77$, $P = 0.90$, and $P = 0.55$, respectively.

Table 2   Health professionals' satisfaction with team functioning according to the Group Environment Scale

Period	Day Patient Care				Inpatient Care			
	T1	T2	Difference between periods		T1	T2	Difference between periods	
Response rate	13/16 (81%)	14/16 (88%)			12/15 (80%)	10/13 (77%)		
	Mean (SD)	Mean (SD)	Mean (95% CI)	P value	Mean (SD)	Mean (SD)	Mean (95% CI)	P value
I. Relationship dimensions								
Cohesion	6.2 (2.6)	8.1 (1.0)	1.9 (0.3;3.4)	0.02	7.8 (1.3)	4.8 (2.7)	-3.0 (-4.7;-1.3)	<0.01
Leader support	6.7 (1.6)	7.0 (1.9)	0.3 (-1.5;2.0)	0.76	6.3 (3.2)	4.9 (1.9)	-1.4 (-3.3; 0.5)	0.15
Expressiveness	4.7 (2.1)	5.1 (1.9)	0.4 (-1.0;1.8)	0.59	5.8 (1.5)	4.9 (1.4)	-0.9 (-2.4;0.6)	0.22
II. Personal Growth dimensions								
Independence	5.2 (1.9)	5.5 (1.2)	0.3 (-0.8;1.5)	0.56	6.2 (1.2)	5.2 (1.6)	-1.0 (-2.3;0.2)	0.11
Task orientation	7.3 (1.7)	7.9 (1.3)	0.6 (-0.5;1.7)	0.28	7.6 (0.9)	6.8 (1.5)	-0.8 (-2.0;0.4)	0.19
Anger and aggression	3.7 (1.4)	3.2 (1.6)	-0.5 (-1.6;0.6)	0.38	2.7 (1.4)	1.8 (1.0)	-0.9 (-2.1;0.3)	0.13
III. System Maintenance and Change dimensions								
Order and organization	7.3 (2.0)	7.5 (1.3)	0.2 (-1.2;1.6)	0.77	7.1 (1.9)	4.4 (1.9)	-2.7 (-4.3;-1.1)	<0.01
Leader control	5.5 (1.2)	4.5 (1.0)	-1.0 (-2.0;0.03)	0.06	3.7 (1.6)	3.5 (1.4)	-0.2 (-1.3;1.0)	0.76
Innovation	2.9 (1.9)	3.7 (2.3)	0.8 (-0.6;2.2)	0.28	2.4 (1.4)	2.2 (1.4)	-0.2 (-1.8;1.3)	0.76

Linear Mixed Effect Model; Statistical significance with a significance level of $P \leq 0.05$.

Table 3   Health professionals' satisfaction with team conferences as measured with the 'Staff satisfaction with team conferences' Questionnaire

Period	Day Patient Care				Inpatient Care			
	T1	T2	Difference between periods	P value	T1	T2	Difference between periods	P value
Response rate	12/16 (75%)	14/16 (88%)			7/15 (47%)	10/13 (77%)		
	Mean (SD)	Mean (SD)	Mean (95% CI)		Mean (SD)	Mean (SD)	Mean (95% CI)	
Problem analysis (10 items)	4.9 (0.3)	5.6 (0.4)	0.6 (0.2;1.0)	<0.01	5.1 (0.4)	4.9 (0.8)	-0.2 (-0.7;0.3)	0.47
Planning intervention (8 items)	4.3 (0.6)	5.2 (0.5)	0.9 (0.5;1.3)	<0.01	4.7 (0.5)	4.7 (0.4)	0.03 (-0.5;0.6)	0.92
Evaluation (11 items)	4.7 (0.6)	5.2 (0.5)	0.5 (0.04;1.0)	0.03	5.1 (0.5)	4.6 (0.7)	-0.5 (-1.0;0.1)	0.12
Organization (7 items)	5.3 (0.5)	5.7 (0.5)	0.4 (0.01;0.9)	0.05	5.4 (0.4)	5.1 (0.7)	-0.3 (-0.8;0.3)	0.31
Common viewpoint (2 items)	5.0 (1.0)	5.4 (0.8)	0.4 (-0.4;1.2)	0.29	4.9 (0.7)	4.5 (1.2)	-0.4 (-1.4;0.5)	0.36
Total score	4.8 (0.4)	5.4 (0.4)	0.6 (0.3;1.0)	<0.01	5.1 (0.4)	4.8 (0.6)	-0.3 (-0.7;0.2)	0.26

Linear Mixed Effect Model; Statistical significance with a significance level of $P \leq 0.05$.

Table 2 shows the results of the GES. All GES scores were normally distributed and there were no significant differences in mean scores between paired and unpaired observations in T1. With respect to the day patient setting, the GES cohesion subscale score was significantly higher in T2 than in T1. For all the other subscales no significant differences between the two periods were seen. For the inpatient setting, the mean subscales cohesion and order and organization were significantly lower in T2 as compared to period T1.

Table 3 shows the results of the 'Staff satisfaction with team conference'-questionnaire. All the staff satisfaction scores were normally distributed and there were no significant differences in mean scores in T1 between paired and unpaired observations. The day patient team showed significantly higher ratings in T2 for the dimensions problem analysis, planning intervention, evaluation, organization and the total score as compared to T1. For the inpatient setting, no significant differences between the two periods for any dimension nor the total score were seen.

The answers regarding the questions on the administrative load are presented in Table 4. At T1, the response rates were 88% (14/16) and 73% (11/15) and at T2 94% (15/16) and 85% (11/13) for the day patient and the inpatient teams, respectively. In both settings, the proportion of health professionals spending >10 minutes on administrative tasks per initial or follow-up patient contact was significantly higher in T2 than in T1. The differences for the follow-up team conferences in the day patient care setting and the initial team conferences in the inpatient setting reached statistical significance.

Table 4   **Distribution of the number of health professionals (%) over the various categories of their estimated average time spent on administrative tasks per patient**

Period	Day Patient Care			Inpatient Care		
	T1	T2	P value	T1	T2	P value
Response rate	14/16 (88%)	15/16 (94%)		11/15 (73%)	11/13 (85%)	
Initial contacts						
< 5 minutes	1 (8%)	2 (15%)	0.28	1 (13%)	-	0.002
5-10 minutes	3 (25%)	-		5 (62%)	-	
> 10 minutes	8 (67%)	11 (85%)		2 (25%)	10 (100%)	
missing/n.a.	2	2		3	1	
Follow-up contacts						
< 5 minutes	-	3 (21%)	0.01	3 (33%)	2 (24%)	1.0
5-10 minutes	8 (100%)	5 (36%)		4 (45%)	3 (38%)	
> 10 minutes	-	6 (43%)		2 (22%)	3 (38%)	
missing/n.a.	6			2	3	

Chi-square test or Fisher's exact test, where appropriate, significance level: $P \leq 0.05$.

With respect to satisfaction with time spent on administrative tasks, 10/12 day patient team members (83%) and 3/9 inpatient team members (33%) reported to be more satisfied with time spent on administrative tasks (p=0.03).

In the day patient setting, 10/12 health professionals (83%) were more satisfied with the moment they received written information from other team members, whereas there were no inpatient team members who were more satisfied (n=0; 0%) (p<0.01).

Furthermore, 12/12 day patient team members (100%) and 2/9 inpatient team members (22%) were more satisfied with the quality of the written information exchange (p<0.01).

Discussion

This study showed that with respect to team functioning in a rheumatology setting, the implementation of an ICF based rehabilitation tool improved the perception of cohesion in the day patient setting whereas in the inpatient setting, the perceptions of cohesion and of order and organization decreased. Health professionals' satisfaction with team conference increased in a day patient setting, whereas in the inpatient setting the effect was absent. Overall, the time spent on administrative tasks increased in both settings. More team members reported an increase in satisfaction with the timing and quality of written information in the day patient than in the inpatient setting.

Team functioning and team conferences
It still remains unclear how the difference of the impact of the introduction of the Rehabilitation Activities Profile on team satisfaction with regards to team functioning and team conferences between the two settings can be explained. Overall, the team composition and working methods were similar in the day patient and inpatient settings during both periods. Moreover, the teams were trained simultaneously with regards to the use of the Rehabilitation Activities Profile and the computer application, and review of the medical records of RA patients admitted after the introduction of the Rehabilitation Activities Profile revealed that all the records were complete, pointing at a sustained level of implementation in both wards.

However, it remains to be established whether factors such as potential differences in the focus of admission, a more medical approach in the inpatient setting and a more rehabilitative approach in the day patient setting, changes in staff within the relatively small teams, subtle differences over time regarding the contribution of individual health professionals to the shared medical record, or any other unknown difference between the two setting could have played a role. Nevertheless, the discordant results indicate the necessity to analyse the impact of the introduction of rehabilitation tools at the level of individual teams rather than at an aggregated level. In two previous studies related to the impact of introducing rehabilitation tools on satisfaction with team conferences (17,18), the results were not described for every team separately. By the combination of data from various teams, beneficial or adverse effects on specific teams may have been overlooked.

In these studies, the absence of effect was attributed to incomplete implementation of the Rehabilitation Activities Profile (17,18) or the lack of a computer application (17).

In this study, we found that for the day patient setting the cohesiveness subscore significantly increased, whereas in the inpatient setting the cohesiveness as well as the order and organization subscores significantly decreased. A possible explanation for this discrepancy could be that in the day patient setting the focus is more on rehabilitation than in the inpatient ward, where patients are primarily in need of intensive medical and nursing care. Given the strong focus on rehabilitation, it is conceivable that in the day patient team the introduction of the Rehabilitation Activities Profile increased the health professionals' feeling of being part of a group of people working on joint rehabilitation goals. In contrast, in the inpatient setting the use of the rehabilitation tool caused confusion, probably because in that ward discipline-specific goals could not so easily be turned into joint goals on the level of activities and participation. The difficulty could lay in disconcordance between the contents of the Rehabilitation Activities Profile and the inpatients' characteristics. The Rehabilitation Activities Profile is largely focused on the ICF level of Activities and Participation (29). The spectrum of problems encountered by patients with RA is, however, broad and includes also aspects on the level of Body Functions, Body Structures, Environmental and Personal Factors (30-32). For example, pain and fatigue are common problems in RA patients who are admitted for multidisciplinary team care. In particular with inpatients that are in need of medical care, there is likely to be a strong focus on Body functions and Body structures. In contrast, goals on the level of participation can usually only be attained on the longer term and in the patient's own environment. This would imply that the focus of the Rehabilitation Activities Profile may be too narrow to meet all RA patients' rehabilitation needs, especially of those patients admitted for medical problems. In fact, the Rehabilitation Activities Profile may be less suitable for the monitoring of progress and the evaluation at discharge in more medical-oriented, inpatient settings where admissions are usually brief. To serve the rehabilitation needs of these specific patient groups, the addition of relevant items on the level of Body functions and Body structures could be considered.

Administrative workload

The results of the present study indicate that in both settings the administrative workload increased after the introduction of the Rehabilitation Activities Profile. It should be noted, however, that in our study, satisfaction with regards to the timing and the quality of information exchange was measured using a limited number of transitional questions, which were not extensively validated. This implies that the data should be interpreted with care.

Moreover, since at T1 a considerable number of health professionals in the day patient setting were already spending >10 minutes on administration per contact, the actual increase in administrative workload may even be underestimated.

Despite these limitations, the finding that the usage of rehabilitation tools increases the administrative workload is in concordance with the observation by Jelles et al. (17). In that study it was reported, based on open-ended questions among 34 members of three

teams, that the application of the Rehabilitation Activities Profile was found to be time-consuming and resulting in a lots of paperwork. However, in that study, no computer application was available, so that a relatively large quantity of forms and papers had to be processed by hand. In our study, all health professionals, except for the physical therapists, kept using their individual written patient records. In case of full replacement of the individual health professional's patient record by the information entered in connection with the new multidisciplinary record, time spent on administrative tasks will be equal or less compared to the situation before the introduction of the rehabilitation tool.

In this study the Rehabilitation Activities Profile was administered by different health professionals by allocating the items and sub-items according to their expertise. The Rehabilitation Activities Profile can, however, also be administered by smaller teams or by one health professional. Originally, the Rehabilitation Activities Profile was developed as a comprehensive assessment method with a two-level structure. The 21 items serve as a screening device and could be used by one health professional. The second level sub-items will be used only if limitations are identified on the first level. Other available disciplines could supply the in-depth assessment of selected items (16). It remains to be established to what extent the administration of the Rehabilitation Activities Profile by one health professional could reduce the administrative workload of other disciplines.

Satisfaction with administrative workload, timing and quality of information
In the day patient setting significantly more team members had an increased satisfaction with regards to administrative load, timing, and quality of information compared to the inpatient setting. It still remains unclear how the differences in satisfaction between the two settings can be explained. It is conceivable that factors such as the general workload, the suitability given the patient characteristics and the level of acceptance of the Rehabilitation Activities Profile could have played a role.

Limitations
In this study, the GES was used as a measure of the health professionals' satisfaction with regards to team functioning. Up to now experience with the GES has been limited. It has been used in two studies concerning patients with various conditions including stroke, spinal cord injury, orthopaedic conditions, and Parkinsonism (25, 27). Moreover, Smits et al. (33) used a modified GES to explore the influence of hospital culture, leadership, and physician involvement on team functioning in 50 inpatient rehabilitation units of Veterans Administration Hospitals. The GES scores obtained in the present study were comparable with those of Halstead et al. (25) and Strasser et al. (27). The study of Halstead et al. (25) was the only intervention study in which the change scores of the GES were comparable to our study. Although it was reported that the GES was also used in a controlled observational study of Beckerman et al. (6), the GES scores were in that study used as model coefficients and were not suitable for further comparison with our results. More study of team functioning before and after interventions aimed at the successful implementation of a rehabilitation tool in multidisciplinary team care is needed.

In this study, the Rehabilitation Activities Profile was introduced together with its electronic application, so it is not possible to make a judgment on the extent to which the changes in team functioning were caused by either the changes regarding the general treatment approach or by the use of the medical record.

Another limitation of this study was, that it was executed in one hospital and concerns one specific setting (rheumatology). Thus, it remains unclear whether in other situations where multidisciplinary team conferences are involved, similar results would have been obtained. Moreover, the numbers of health professionals involved in this study were small, and a number of subjects changed jobs between the two study periods. Therefore, it cannot be totally ruled out that observed differences were in part due to interpersonal variation. Concerning the small sample size, it should also be noted that response rates were overall relatively low. We have no clear explanation for this specific low response rate of the team conference satisfaction questionnaire at T1 in the inpatient setting (47%), since all the questionnaires were administered at the same time.

In addition, no experimental design with controls was used. However, no rheumatology clinic with similar multidisciplinary team care facilities and similar patient populations and not using the Rehabilitation Activities Profile was available at the time the study was designed.

Due to the small numbers of participants in this study it was not possible to undertake subgroup analysis in order to find factors that could explain the opposite findings in the team members' experiences in using the rehabilitation tool between the day patient and the inpatient setting.

Further research

Based on the findings in this study, it is difficult to judge whether the benefits of the usage of the Rehabilitation Activities Profile outweigh the extra time needed for administrative tasks. Given the fact that the finding vary among settings, this trade-off can only be made by the health professionals involved in a specific setting. For future research, it is suggested that the effects of the implementation of a rehabilitation tool on the team members' satisfaction with team functioning and team conferences can be best described for different settings and/or teams separately. In order to be able to perform sub analyses on the level of different subgroups such as specific disciplines within the teams, the inclusion of sufficient numbers of study subjects is advocated.

Clinical messages

– The impact of introducing a rehabilitation tool on health professionals' satisfaction with the multidisciplinary team care process varies largely according to the setting.
– Since the usage of a rehabilitation tool increases health professionals' administrative workload, its full integration with current patient records and forms is desirable.
– The impact of introducing rehabilitation tools should be studied at the level of individual teams rather than considering teams as homogenous.

Appendix   Main differences between the team care process before and after the introduction of
the Rehabilitation Activities Profile

	Before the introduction of the Rehabilitation Activities Profile	After the introduction of the Rehabilitation Activities Profile
Availability of information before initial team conference	No information available.	Information recorded in the initial electronic Rehabilitation Activities Profile report form is available (electronic and printed form).
Availability of information at follow-up team conferences	Minutes of the previous team conference, discipline-specific and multidisciplinary patient record.	Printed initial Rehabilitation Activities Profile report form and the follow-up Rehabilitation Activities Profile report forms distributed to all team members before the follow-up team conference
Course of multidisciplinary team conference	Health professionals contribute in a fixed order (physician, nurse, physical therapist, occupational therapist, social worker)	The order of the team conference is directed by the patients' activity and participation limitations and problems and ensuing treatment goals according the Rehabilitation Activities Profile report form.
Common treatment goals	Treatment goals are unsystematically formulated and not allocated to specific disciplines	Common treatment goals are determined according to the patients' activity and participation limitations and allocated to specific disciplines
Participation of the patient	After the initial team conference the patient is informed by the rheumatologist or nurse about general treatment goals and treatment plan.	The rheumatologist or nurse discuss the treatment goals and treatment plans with the patient according to the Rehabilitation Activities Profile report forms weekly
Administrative workload initial and follow-up contacts	A discipline-specific patient record, a multidisciplinary patient record and a multidisciplinary discharge form	In addition to a discipline-specific patient record, a multidisciplinary patient record and a multidisciplinary discharge form, specific allocated Rehabilitation Activities Profile items and sub-items are entered into an electronic Rehabilitation Activities Profile report form.

References

1. Scott DL, Smith C, Kingsley G. What are the consequences of early rheumatoid arthritis for the individual? Best Pract Res Clin Rheumatol 2005;19:117-36.

2. Davis RM, Wagner EG, Groves T. Advances in managing chronic disease. Research, performance measurement, and quality improvement are key. BMJ 2000;320:525-6.

3. Spiegel JS, Spiegel TM, Ward NB. Are rehabilitation programs for rheumatoid arthritis patients effective? Semin Arthritis Rheum 1987;16:260-70.

4. Vliet Vlieland TPM, Hazes JMW. Efficacy of multidisciplinary team care programs in rheumatoid arthritis. Semin Arthritis Rheum 1997;27:110-22.

5. Petersson IF. Evolution of team care and evaluation of effectiveness. Curr Opin Rheumatol 2005;17:160-3.

6. Beckerman H, Roelofsen E, Knol D, Lankhorst G. The value of the Rehabilitation Activities Profile (RAP) as a quality sub-system in rehabilitation medicine. Disabil Rehabil 2004;26:387-400.

7. Monaghan J, Channell K, McDowell D, Sharma AK. Improving patient and carer communication, multidisciplinary team working and goal-setting in stroke rehabilitation. Clin Rehabil 2005;19:194-9.

8. Yelin EH. What's inside the team care box? Is it the parts, the connections, the attention, or the Gestalt? J Rheumatol 1991;18:1647-8.

9. Stucki G. Understanding disability. Ann Rheum Dis 2003;62:289-90.

10. Stucki G, Ewert T. How to assess the impact of arthritis on the individual patient: the WHO ICF. Ann Rheum Dis 2005;64:664-8.

11. Steiner WA, Ryser L, Huber E, Uebelhart D, Aeschlimann A, Stucki G. Use of the ICF model as a clinical problem-solving tool in physical therapy and rehabilitation medicine. Phys Ther 2002;82:1098-107.

12. Jelles F, van Bennekom CAM, Lankhorst GJ. Instruments to structure interdisciplinary team conferences in rehabilitation medicine: the added value of the Rehabilitation Activities Profile. J Rehabil Sciences 1995;8:51-7.

13. Wressle E, Lindstrand J, Neher M, Marcusson J, Henriksson C. The Canadian Occupational Performance Measure as an outcome measure and team tool in a day treatment programme. Disabil Rehabil 2003;25:497-506.

14. Schochat T, Pilz C, Neuner R. The Indicators of Rehab Status questionnaire version 3 (IRES-3) in 1818 rehabilitees with musculoskeletal Diseases. Rehabilitation (Stuttg) 2003;42:236-44. In German.

15. Buhrlen B, Gerdes N, Jackel WH. Development and psychometric testing of a patient questionnaire for medical rehabilitation (IRES-3). Rehabilitation (Stuttg) 2005;44:63-74. In German.

16. Van Bennekom CAM, Jelles F, Lankhorst GJ. Rehabilitation Activities Profile: the ICIDH as a framework for a problem-oriented assessment method in rehabilitation medicine. Disabil Rehabil 1995;17:169-75.

17. Jelles F, van Bennekom CAM, Lankhorst GJ, Bouter LM, Kuik DJ. Introducing an innovative method in team conferences. Disabil Rehabil 1996;18:374-9.

18. Roelofsen EE, Beckerman H, Lankhorst GJ, Bouter LM. The effects of the Rehabilitation Activities Profile for children on the quality of team conferences. In: Roelofsen EE. The Rehabilitation Activities Profile for children. Development, implementation and evaluation. Thesis, Free University Amsterdam, 2001.

19. Schuringa A. Behandeling van een patiënt met SLE volgens het Revalidatie Activiteiten Profiel. Ned T Reum 2001;2:40-5. In Dutch.

20. Verhoef J, Toussaint PJ, Zwetsloot-Schonk JHM, Breedveld FC, Putter H, Vliet Vlieland TPM. Effectiveness of the introduction of an International Classification of Functioning, Disability and Health-based rehabilitation tool in multidisciplinary team care in patients with rheumatoid arthritis. Arthritis Rheum 2007;57:240-8.

21. Tijhuis GJ, Zwinderman AH, Hazes JMW, van den Hout WB, Breedveld FC, Vliet Vlieland TPM. A randomized comparison of care provided by a clinical nurse specialist, inpatient team care and day patient team care in rheumatoid arthritis. Arthritis Rheum 2002;47: 525-31.

22. Tijhuis GJ, Zwinderman AH, Hazes JMW, Breedveld FC, Vliet Vlieland TPM. The two-year follow-up of a randomised controlled trial of a clinical nurse specialist intervention, inpatient, and day patient team care in rheumatoid arthritis. J Adv Nurs 2003;41:34-43.

23. Van den Hout WB, Tijhuis GJ, Zwinderman AH, Hazes JMW, Breedveld FC, Vliet Vlieland TPM. Cost-effectiveness and cost-utility analysis of multidisciplinary care in patients with rheumatoid arthritis: a randomised comparison of clinical nurse specialist care, inpatient team care, and day patient care. Ann Rheum Dis 2003; 62:308-15.

24. World Health Organization. ICF: International Classification of Functioning, Disability and Health. Geneva: WHO, 2001.

25. Halstead LS, Rintala DH, Kanellos M, Griffin B, Higgins L, Rheinecker S, et al. The innovative rehabilitation team: an experiment in team building. Arch Phys Med Rehabil 1986;67:357-61.

26. Moos RH, Humphrey B. Group environment scale. Palo Alto (CA): Consulting Psychologists Press, Inc.; 1981.

27. Strasser DC, Falconer JA, Martino-Saltzmann D. The rehabilitation team: staff perceptions of the hospital environment, the interdisciplinary team environment, and interprofessional relations. Arch Phys Med Rehabil 1994;75:177-82.

28. Jelles F, van Bennekom CAM, Lankhorst GJ, Bouter LM. Staff satisfaction with team conferences: development of a questionnaire. Clin Rehabil 1996;10:49-57.

29. Jelles F, van Bennekom CA, Lankhorst GJ. The interdisciplinary team conference in rehabilitation medicine. Am J Phys Med Rehabil 1995;74:464-5.

30. Stucki G, Cieza A, Geyh S, Battistella L, Lloyd J, Symmons D, et al. ICF Core Sets for rheumatoid arthritis. J Rehabil Med 2004;44(Suppl):87-93.

31. Coenen M, Cieza A, Stamm TA, Amann E, Kollerits B, Stucki G. Validation of the International Classification of Functioning, Disability and Health (ICF) Core Set for rheumatoid arthritis from the patient perspective using focus groups. Arthritis Res Ther 2006;8:R84.

32. Stamm TA, Cieza A, Coenen M, Machold KP, Nell VP, Smolen JS, et al. Validating the International Classification of Functioning, Disability and Health Comprehensive Core Set for Rheumatoid Arthritis from the patient perspective: a qualitative study. Arthritis Rheum 2005;53:431-9.

33. Smits SJ, Falconer JA, Herrin J, Bowen SE, Strasser DC. Patient-focused rehabilitation team cohesiveness in veterans administration hospitals. Arch Phys Med Rehabil 2003;84:1332-8.

Chapter 5

Validity and responsiveness of the Rehabilitation Activities Profile (RAP) in patients with rheumatoid arthritis

J. Verhoef[1, 2], P.J. Toussaint[1], H. Putter[3], J.H.M. Zwetsloot-Schonk[1], T.P.M. Vliet Vlieland[4].

1   Department of Clinical Informatics;
2   Department of Physical Therapy;
3   Medical Statistics;
4   Department of Rheumatology, Leiden University Medical Center (LUMC), The Netherlands.

Abstract

Objective
To investigate the validity and responsiveness of the Rehabilitation Activities Profile (RAP; a rehabilitation tool structuring the multidisciplinary team care process) in patients with rheumatoid arthritis (RA).

Methods
In 85 RA patients admitted to a rheumatology clinic the RAP was applied at admission, at discharge, and six weeks thereafter. Additional assessments included measures of physical and psychological functioning, disease activity and quality of life. Associations between the RAP and other outcome measures were determined by Spearman rank correlation coefficients. Responsiveness measures included the standardized response mean (SRM), effect size (ES) and responsiveness ratio (RR).

Results
The RAP score correlated significantly with all other outcome measures. The mean RAP score improved from 15.2 to 13.2 at discharge (change -2.0; 95%CI -3.4 – -0.7) and to 11.5 (change -3.7; 95%CI -3.9 – -1.5) 6 weeks thereafter. The responsiveness of the RAP score was low (SRM –0.34, ES –0.30) to high (RR –0.87) at discharge and moderate (SRM -0.54, ES -0.55) to high (RR -1.56) 6 weeks thereafter.

Conclusions
Apart from its qualities as a tool to structure the team care process, the measurement properties of the RAP indicate that its application as an outcome measure in daily practice in multidisciplinary team care in RA patients is feasible.

Introduction

Despite important advances in medical treatment, rheumatoid arthritis (RA) is a disease which has in many patients a major impact on multiple areas of their lives (1). To support patients in living with the consequences of the disease, care provided by a team of health professionals from various disciplines is often required (2).

Previous research has demonstrated that in patients with RA, activity limitations improve significantly as a result of multidisciplinary rehabilitation (3-5). In all of these studies, the Health Assessment Questionnaire (HAQ) (6) was used as a measure of limitations in daily activities. Rehabilitation in patients with RA has, however, a broader scope, and is aimed at the reduction of participation restrictions as well. Currently available measures to evaluate rehabilitation in rheumatology are in general not specifically designed to include the information most pertinent to the rehabilitation process and lack a direct link to a theoretical framework to classify the consequences of disease such as the World Health Organization (WHO) International Classification of Functioning, Disability and Health (ICF) (7).

In recent years, a number of rehabilitation tools have become available that were, apart from structuring the rehabilitation process, designed to measure rehabilitation outcomes, and meet the abovementioned specifications. Examples of such tools are the Rehabilitation Activities Profile (RAP) (8), the Canadian Occupational Performance Measure (COPM) (9) and the Indicators of Rehabilitation Status (IRES-3) patient questionnaire (10,11). With respect to their measurement properties in arthritis care, only the value of the COPM has been established so far (12).

Although the RAP proved to be a reliable, valid and responsive measurement instrument to measure functional recovery in patients with stroke (13-15), hip fractures (16), traumatic brain injury (17) and amyotrophic lateral sclerosis (18), its usefulness to measure outcomes in rheumatology rehabilitation remains unclear. We hypothesized that a measure specifically designed to evaluate activity limitations and participation restrictions, such as the RAP, would have the potential to reflect those limitations as well as their improvement following rehabilitation. The aim of this study was to therefore investigate the internal consistency, validity and responsiveness of the RAP as a measurement instrument in multidisciplinary team care in patients with RA.

Subjects and methods

Subjects

Data were gathered as part of a prospective pre-test post-test study comparing the outcomes of multidisciplinary team care and patient satisfaction with care in a 12-month period where the RAP was not used (January 2001-december 2001) with a 12-month period after the RAP had been implemented (January 2003-December 2003). Patients were consecutively recruited at the inpatient and day patient multidisciplinary team care wards of the Rheumatology Rehabilitation Clinic of the Leiden University Medical

Center. Inclusion criteria were: RA as defined by the 1987 American Rheumatism Association criteria (19), being older than 18 years, sufficient physical and emotional status to take part in assessments and to complete questionnaires, the latter to be judged by the physician. In brief, the evaluation of the impact of the introduction of the RAP showed that it did not have an effect on clinical outcomes but did to a limited extent improve patient satisfaction with care (20). The medical ethics committee of the Leiden University Medical Center approved the study protocol and all patients gave written informed consent. For the present study on the value of the RAP as a measurement instrument, only the data from the post-test period were used, where the RAP was fully implemented in the multidisciplinary team care process.

Multidisciplinary team care
All patients in both the inpatient and day patient care wards were treated by a multidisciplinary team comprising a rheumatologist, an occupational therapist, a physical therapist, a social worker and nurses. Day patient team care was provided twice a week between 10 a.m. and 4 p.m. with a fixed period of one and a half hour's rest for those patients whose health status did not demand hospitalization. Inpatients stayed overnight and during the weekend and were primarily in need of intensive medical and nursing care. Day patients and inpatients followed prescribed treatment programmes. Individual exercise therapy and group exercise therapy were fixed components of the programme, with individual occupational therapy and interventions by the nurse, social worker, the medical doctor, orthopaedic shoemaker and other medical specialists and health professionals scheduled according to individual needs. Effectiveness and costs of team care provided in this clinic have been described in previous studies (4,21,22). The duration of the treatment depended on the achieved health gains of the patient.

Assessment methods
Clinical assessments were performed by one trained health professional (JV), who was not involved in the treatment. Assessments were done at admission, discharge and six weeks thereafter.

Sociodemographic and disease characteristics
Sociodemographic and disease characteristics recorded at admission were age, sex, status of living, educational level (low: up to and including lower technical and vocational training; medium: up to and including secondary technical and vocational training; and high: up to and including higher technical and vocational training and university), employment status, disease duration, the presence of rheumatoid factor and erosions, current medication, and previous admissions to the rehabilitation clinic.

Medical treatment
Data on the number of treatment days during admission and the use of non-steroidal anti-inflammatory drugs (NSAIDs), disease modifying antirheumatic drugs (DMARDs),

oral corticosteroids (prednisone), and intra-articular or intra-muscular injections with corticosteroids (yes/no) were gathered from the medical records.

RAP

The RAP is a rehabilitation tool which was originally developed for screening, goal setting, monitoring of progress, and the expression of a functional prognosis in rehabilitation (13-15). It was designed to cover the WHO International Classification of Impairments, Disabilities and Handicaps (ICIDH) (23) levels Disabilities and Handicaps (matching the ICF components "Activities and Participation" and "Environmental Factors") (7). It covers the following domains: *communication* (matching ICF Activities and Participation, Chapter 3: Communication), *mobility* (matching ICF Activities and Participation, Chapter 4: Mobility), *self-care* (matching ICF Activities and Participation, Chapter 5: Self-care), *daily activities* (matching ICF Activities and Participation, Chapters 6, 8, and 9: Domestic life, Major life areas, and Community, social, and civic life, respectively) and *social relationships* (matching ICF Activities and Participation, Chapter 7: Interpersonal interactions and relationships and matching ICF Environmental factors, Chapter 3: Support and relationships, respectively) (7,18,20).

These 5 domains are divided into 21 items, which comprise 71 sub-items. For every item or sub-item two aspects are determined: the health professional's judgment regarding the extent of disability and the self-reported patient's perceived problem with that disability (8,16). The health professional's judgment regarding the RAP domains communication, mobility, self-care and daily activities is expressed in a severity grading ranged from 0 (performs activity without difficulty) to 3 (does not perform activity). For the RAP domain relationships the amount of change is determined on a scale ranging from 0 (no change) to 3 (very large change). If a RAP item was not applicable (e.g. because an activity was not performed by a patient at all) a zero score was given. For the RAP scoring system, only the health professional's severity grading of the disabilities is used (14,15,18). The RAP total score includes all 21 items and ranges from 0 (no disability) to 63 (severe disability) (13,18). The number of items and score ranges within the five domains are as follows: communication (2 items; range 0 to 6), mobility (6 items; rage from 0 to 18), self-care (6 items; ranges from 0 to 18), daily activities (4 items; rang from 0 to 12), and social relationships (3 items; ranges from 0 to 9).

Physical functioning

Physical functioning was measured according to the following instruments:
– The McMaster Toronto Arthritis (MACTAR) Patient Preference Disability Questionnaire, a semi-structured interview, aimed to record and evaluate activity limitations relevant to the individual patient (24). Activities were obtained from and ranked by the patient at each assessment. The baseline weighted MACTAR score ranges between 39 to 59 and the weighted follow-up scores ranges between 21 to 77, whereas changes from baseline of the weighted score could range from -28 (maximal deterioration) to 38 (maximal improvement).

- The HAQ, comprising 20 questions regarding 8 domains of activities of daily living, with the total score ranging from 0 (no functional limitations) to 3 (serious functional limitations) (6).
- The 50 feet walk test, pertaining to he time needed to walk 50 feet (15.25 meters) on a flat surface (seconds) (4,25-27).
- The Timed-stands test, where patients were asked to stand up and down from a sitting position 10 times as quickly as possible, without using their hands and keeping both feet on the floor (seconds) (26).
- The Stair test, pertaining to the time needed to go up and down a flight of 10 steps (seconds) (27).
- Grip strength, measured using the Martin Vigorimeter (kPa). Each hand was measured three times with the highest of three scores being used. The mean grip strength of the right and the left hands was calculated (28).
- The Escola Paulista de Medicina (EPM)-Range Of Motion scale (EPM-ROM), which measures the range of motion of 10 active assisted movements of selected joints with goniometry. The scale ranges from 0 (full joint flexibility) to 30 (severe limited joint flexibility) (29).

Psychological functioning

Psychological functioning was measured with the psychological interaction scale (mood; 5 items and level of tension; 5 items) of the Dutch Arthritis Impact Measurement Scales-2 (Dutch AIMS-2), with the scale score ranging from 0 to 10, and a higher score indicating a poorer psychological health status (30).

Disease activity

Disease activity was measured with the Disease Activity Score-28 (DAS-28), a composite index including the number of swollen and tender joints, a visual analogue scale for patients' global assessment of disease activity (VAS disease activity), and the erythrocyte sedimentation rate (ESR).

The DAS28 was calculated according to the formula: $0.56 \sqrt{}$ (number of tender joints) $+ 0.28 \sqrt{}$ (number of swollen joints) $+ 0.70 \ln$ (ESR) $+ 0.014$ (VAS patients' global assessment of disease activity) (31). DAS28 end-point scores lower than 3.2 are considered to represent low disease activity, between 3.2 and 5.1 moderate disease activity and higher than 5.1 high disease activity (32).

Pain was measured with a visual analogue scale (VAS), consisting of a 100 mm horizontal line, ranging from 0 on the left anchor (no pain at all) to 100 on the right anchor (unbearable pain).

Quality of life

Quality of life (QoL) was measured with the Rheumatoid Arthritis Quality of life (RAQoL) questionnaire, comprising 30 yes/no questions. The total score ranges from 0 to 30, with a lower score indicating higher quality of life (33).

Statistical analysis

In case of non-normality, the data were log-transformed.

The internal consistency of the RAP total score and the five RAP domain scores was determined by calculating Cronbach's alpha. The internal consistency is considered to be good when Cronbach's alpha is between 0.70 and 0.95 (34).

Possible floor or ceiling effects of the RAP were determined by using the frequency distributions of the RAP total and domain scores at admission. Floor or ceiling effects are considered to be present if more than 15% of the respondents achieved the lowest or highest possible score, respectively (34).

To investigate the relationship between the RAP total score and sociodemographic and disease characteristics, RAP scores were compared among categories of patients. For that purpose, continuous data were dichotomized according to the median and the unpaired t-test or analysis of variance (ANOVA) was used, dependent on the number of categories.

In this study two aspects of construct validity were used: convergent validity (how strongly a measures correlates with other related measures) and discriminative validity (the ability to distinguish between 'known groups' with expected differences in scores) (34,35).

To test the convergent validity, correlations between the RAP total score and its domain scores on the one side and measures of physical and psychological functioning, disease activity, and overall quality of life on the other side were determined. We hypothesized that higher RAP total scores would be associated with worse physical and psychological functioning, higher levels of disease activity and a lower quality of life. Furthermore, as the RAP total score is a measure of activities and participation, we hypothesized that correlations with general measures of physical functioning (MACTAR and HAQ) and overall quality of life (RAQoL) would be the strongest, whereas correlations with measures addressing one aspect of physical functioning (50 feet walk test, timed-stands test, stair test, grip strength and EPM-ROM scale), psychological functioning and disease activity would be weaker.

We hypothesized that correlations between the RAP domain scores and other measures would vary according to the activities reflected in the RAP domains and the nature of the other outcome measures. Overall, we expected that the associations between the RAP domain social relationships and all other outcome measures would be the weakest.

To test the discriminative validity of the RAP total score we calculated the RAP total scores within four different categories (quartiles) of the HAQ scores at admission, and compared them amongst each other with One-Way ANOVA, with Post Hoc Multiple Comparisons using Bonferroni correction. We expected the differences of the HAQ score between the quartiles of the HAQ to exceed 0.19, which is considered to be a clinically significant difference (36). We hypothesized that the baseline RAP total score would increase significantly with every quartile of the baseline HAQ score.

For all outcome measures mean differences (and standard deviations) between admission and discharge, between admission and 6 weeks after discharge, and between

discharge and 6 weeks after discharge were calculated with the 95% confidence intervals, with their *P* values derived from the paired sample t-test.

The magnitude of change of all measures was described by the standardized response mean (SRM; mean score at admission minus the mean score at discharge or 6 weeks after discharge divided by the standard deviation of the change score) (37), the effect size (ES; mean score at admission minus the mean score at discharge or 6 weeks after discharge divided by the standard deviation of the mean score at admission), and the responsiveness ratio (RR; the mean change score of 'improved' patients divided by the standard deviation of the change score in 'stable' patients) (38). The distinction between improved and stable patients was made on the basis of the HAQ score, where a difference of 0.19 or more is considered to be a clinically significant change (36). Patients with an improvement of the HAQ score ≥ 0.19 were classified as improved, HAQ change score between -0.19 and 0.19 as stable and a HAQ change score ≤ -0.19 as deteriorated. The interpretation of the magnitude of the ES can also be applied to the SRM and the RR, with 0.2 being considered as low, 0.5 as moderate and 0.8 as high, independent of the sign (39,40).

All statistical analyses were performed using SPSS (version 12.0.1), with *P* values less than or equal to 0.05 considered to be statistically significant. All testing was two-sided.

Results

The sociodemographic and clinical characteristics of the 85 patients included in the study are shown in Table 1. Sixteen patients did not use DMARDs at admission, and 11 patients who had previously used DMARDs stopped recently because of ineffectiveness and/or side effects. There were 5 newly diagnosed RA patients.

The medical treatment during admission is shown in Table 2. Of the 16 patients who did not use a DMARD at admission, 11 patients started with one or more DMARDs during admission. In the 5 patients who did not use a DMARD at admission and did not start during admission, treatment with DMARDs was planned but postponed due to medical reasons. In 3 of these patients, oral prednisone was started during admission.

At admission, the RAP total score was 15.2 (SD 6.7), whereas the scores within the domains were 6.4 (SD 2.7) for mobility, 4.2 (3.3) for self-care, 4.0 (2.4) for daily activities and 0.6 (SD 1.3) for social relationships, respectively. For the domain communication, all patients had score 0 at all three time points. This domain was therefore not taken into account in the analyses. At baseline, the minimum score (=0) of the RAP total score was found in 0% of the patients. These numbers (proportions) were 82 (97%) for the domain communication, 0 (0%) for the domain mobility, 10 (12%) for the domain self-care, 5 (6%) for the domain daily activities and 62 (73%) for the domain social relationships, respectively. In none of the patients, the maximum score was reached, for either the RAP total score or the domain scores.

Cronbach's alpha was 0.78 for the RAP total score, 0.63 for the domain 'mobility', 0.79 for the domain 'self-care', 0.40 for the domain 'daily activities' and 0.67 for the domain 'social relationships'.

Table 1   **Baseline clinical and sociodemographic characteristics of 85 patients with rheumatoid arthritis admitted for multidisciplinary team care**

Median (min-max)	
Age, years	61 (22-83)
Duration of RA, years	6 (0.1-43)
Number of patients (%)	
Female	65 (77)
Positive rheumatoid factor	58 (73)
With erosions	49 (61)
Current use of medication:	
NSAID[1]	55 (66)
DMARD[2]	69 (81)
Prednisone[3]	15 (18)
Living alone	21 (25)
Education level[4]:	
Low	62 (73)
Medium	11 (13)
High	12 (14)
With paid employment	17 (20)
With previous admission to rehabilitation clinic	38 (45)

[1] Non-steroidal anti-inflammatory drugs.
[2] Disease modifying antirheumatic drugs.
[3] Oral corticosteroids.
[4] Low: up to and including lower technical and vocational training; Medium: up to and including secondary technical and vocational training; and High: up to and including higher technical and vocational training and university.

Overall, there were no associations between the RAP total score and sociodemographic or disease characteristics (results not shown), apart from a significantly higher RAP score in patients who had previously been admitted to the rehabilitation clinic (16.8, SD 7.3) as compared to patients who had not been admitted before (13.8, SD 5.8) (p=0.05, unpaired t-test).

The associations between the RAP total score and measures of functional status, psychological functioning, disease activity and quality of life are presented in Table 3. In general, significant and moderate to high associations were found between the RAP total score and all other measures. The correlations indicated that in all cases higher RAP scores were associated with worse physical and psychological functioning and higher levels of disease activity and lower quality of life. Similar results were obtained for the RAP domains mobility and self-care (except for the association between the RAP mobility domain and psychological function and between the RAP self-care domain and the timed-stands test). In general, the associations between the RAP domains daily activities and social relationships on the one side and measures of functional status on the other side were weak and not statistically significant.

Table 2   Number of treatment days, unit of admission and use of medication in 85 patients with rheumatoid arthritis admitted for multidisciplinary team care

Number of treatment days; median (min-max)	10 (1-31)
Number of patients (%)	
Unit of admission	
Day patient care	56 (66)
Inpatient care	29 (34)
Medical treatment	
NSAIDs[1]	
Stable	40 (75)
Dose or application change	2 (4)
Start new NSAIDs	11 (21)
DMARDs[2]	
Stable	28 (36)
Dose or application change	28 (36)
Start new DMARDs	22 (28)
Prednisone[3]	
Stable	10 (45)
Dose or application change	5 (23)
Start Prednisone	7 (32)
Intramuscular or intraarticular corticosteroid injections	21 (25)

[1] Non-steroidal anti-inflammatory drugs.
[2] Disease modifying antirheumatic drugs.
[3] Oral corticosteroids.

The discriminating properties of the RAP, reflected by the RAP total score within four different categories of the HAQ showed that the RAP total score increased with higher HAQ scores. Statistically significant differences were seen for the comparisons of the RAP total score between the first and the fourth HAQ quartile (10.8 SD 4.3 and 22.0 SD 6.6, respectively; p<0.001), the second and the fourth quartile (13.0 SD 3.7 and 22.0 SD 6.6, respectively, p<0.001) and the third and the fourth quartile (15.5 SD 6.6 and 22.0 SD 6.6, respectively; p<0.002; all *P* values Bonferroni corrected). For the RAP mobility and self-care domains, a similar result was obtained, with the difference between the first and the third quartile also reaching statistical significance (results not shown). For the RAP domain scores daily activities and social relationships, none of the differences between the domain scores in the various HAQ quartiles were seen (results not shown).

Table 3   Spearman rank correlation coefficients between the Rehabilitation Activities Profile
(RAP) total score and four RAP domain scores and other outcome measures in
85 patients with rheumatoid arthritis admitted for multidisciplinary team care

	RAP mobility	RAP self-care	RAP daily activities	RAP social relationships	RAP-Total
Functional status					
MACTAR	-0.35	-0.47	-0.39	-0.24	-0.61
HAQ (0-3)	0.62	0.63	0.13 ^{ns}	-0.03 ^{ns}	0.59
Walktest	0.61	0.32	-0.02 ^{ns}	-0.12 ^{ns}	0.39
Timed-Stands Test	0.50	0.23 ^{ns}	-0.04 ^{ns}	0.09 ^{ns}	0.31
Stair Test	0.53	0.31	0.22 ^{ns}	0.10 ^{ns}	0.50
Grip Strength	-0.24	-0.50	-0.21 ^{ns}	0.12 ^{ns}	-0.41
EPM-ROM (0-30)	0.39	0.39	-0.02 ^{ns}	-0.26	0.30
Psychological functioning					
D-AIMS2, psychological interaction scale (0-10)	0.14 ^{ns}	0.41	0.30	0.28	0.39
Disease activity					
DAS28	0.31	0.49	0.22 ^{ns}	-0.03 ^{ns}	0.44
VAS-pain	0.32	0.26	0.06 ^{ns}	0.03 ^{ns}	0.31
Quality of Life					
RAQoL (0-30)	0.48	0.51	0.30	0.15 ^{ns}	0.62

The associations between the RAP total sum score and the outcome measures were all statistically significant
with $P < 0.05$.
MACTAR, McMaster Toronto Arthritis Patient preference Disability Questionnaire; HAQ, Health Assessment
Questionnaire; EPM-ROM, Escola Paulista de Medicina (EPM)-range of motion scale; D-AIMS2, Dutch-Ar-
thritis Impact Measurement Scale2; DAS28, Disease Activity Score-28; VAS, Visual Analogue Scale; RAQoL,
Rheumatoid Arthritis Quality of Life-questionnaire.

Table 4 shows the baseline and change scores of the various outcome measures. All data
appeared normally distributed, except for the results of the walk test, timed-stands test,
stair test, and grip strength at admission, so these data were log-transformed. Overall, a
significant improvement between admission and discharge as well as between admis-
sion and six weeks after discharge was seen according to all outcome measures (except
for the RAP domains 'daily activities' and 'social relationships' at discharge, and RAP
domain 'social relationships', the EPM-ROM and VAS-pain 6 weeks after discharge).
The mean RAP total sum score improved from 15.2 to 13.2 (change -2.0; 95%CI (Confi-
dence Interval) -3.4 – -0.7) at discharge and from 15.2 to 11.5 (change -3.7; 95%CI -3.9 – -
1.5) six weeks thereafter. Between discharge and 6 weeks after discharge no significant
differences were seen, except for RAP total score (change -1.8; 95%CI-3.3- -0.2), RAP
mobility (change -0.5; 95%CI -0.9- -0.1), RAP daily activities (change -1.0; 95%CI -1.7- -
0.4), and VAS pain (change 6.6; 95%CI 0.5-12.6) (all p<0.05).

Table 4 Baseline scores (mean (SD)) and change from baseline at discharge (mean (95% CI)) and 6 weeks after discharge (mean (95% CI)) of 85 patients with RA admitted for multidisciplinary team care

	Baseline	Discharge	6 weeks after discharge	Discharge			6 weeks after discharge		
	Mean (SD)	Change (95% CI)	Change (95% CI)	SRM	ES	RR	SRM	ES	RR
Functional status									
RAP-total sum score (0-63)	15.2 (6.7)	-2.0 (-3.4;-0.7)*	-3.7 (-3.9;-1.5)*	-0.34	-0.30	-0.87	-0.54	-0.55	-1.56
RAP-mobility	6.4 (2.7)	-0.7 (-1.0;-0.4)*	-1.2 (-1.9;-0.5)*	-0.48	-0.26	-1.05	-0.42	-0.46	-0.93
RAP-self-care	4.2 (3.3)	-1.3 (-1.7;-0.8)*	-1.5 (-2.3;-0.7)*	-0.61	-0.39	-1.69	-0.45	-0.44	-1.56
RAP-daily activities	4.0 (2.4)	0.1 (-0.5;0.7)	-0.8 (-1.4;-0.2)*	0.04	0.04	-0.10	-0.33	-0.33	-0.73
RAP-social relationships	0.6 (1.3)	-0.2 (-0.5;0.2)	-0.2 (-0.5;0.2)	-0.12	-0.13	-0.26	-0.12	-0.13	-0.73
MACTAR	47.3 (3.6)	13.2 (11.6;14.9)*	12.1 (9.6;14.6)*	2.06	3.57	2.76	1.31	3.31	1.96
HAQ (0-3)	1.39 (0.66)	-0.15 (-0.24;-0.07)*	-0.18 (-0.28;-0.07)*	-0.41	-0.23	n.a.	-0.40	-0.26	n.a.
Walktest (sec)[1]	2.8 (0.4)	-0.1 (-0.1;-0.0)*	-0.1 (-0.1;-0.0)*	-0.64	-0.31	-1.54	-0.33	-0.23	-0.94
Timed-Stands Test (sec)[1]	3.7 (0.4)	-0.2 (-0.2;-0.1)*	-0.2 (-0.2;-0.1)*	-0.60	-0.40	-1.61	-0.65	-0.44	-0.94
Stair Test (sec)[1]	2.9 (0.4)	-0.2 (-0.2;-0.1)*	-0.1 (-0.2;-0.1)*	-0.76	-0.41	-0.98	-0.51	-0.31	-0.95
Grip Strength (kPa)[1]	2.7 (1.0)	0.3 (0.2;0.4)*	0.3 (0.2;0.4)*	0.57	0.31	0.85	0.55	0.31	1.11
EPM-ROM (0-30)	8.2 (3.4)	-0.5 (-0.9;-0.1)*	-0.4 (-0.9;0.0)	-0.28	-0.13	-0.22	-0.22	-0.12	-0.39
Psychological functioning									
D-AIMS2, psychological interaction scale (0-10)	4.5 (1.7)	-0.6 (-0.9;-0.3)*	-0.6 (-0.9;-0.3)*	-0.43	-0.34	-0.54	-0.44	-0.37	-0.72
Disease activity									
DAS28	5.46 (1.43)	-0.58 (-0.80;-0.35)*	-0.73 (-1.03;-0.44)*	-0.59	-0.43	-0.99	-0.60	-0.56	-0.82
VAS-Pain (mm)	44.5 (23.3)	-11.9 (-17.4;-6.5)*	-4.2 (-11.1;2.7)	-0.49	-0.53	-0.77	-0.14	-0.19	-0.49
Quality of life									
RAQoL (0-30)	17.4 (5.9)	-1.4 (-2.1;-0.6)*	-1.8 (-3.1;-0.5)*	-0.44	-0.23	-0.63	-0.33	-0.30	-0.84

* The level of significance was set at P < 0.05. SRM, ES and RR: 0.2 small effect, 0.5 moderate effect, 0.8 large effect. CI, Confidence Interval; SRM, Standardised Response Mean; ES, Effect Size; RR, Responsiveness Ratio based on improvement /stable HAQ score; MACTAR, McMaster Toronto Arthritis Patient preference Disability Questionnaire; HAQ, Health Assessment Questionnaire; EPM-ROM, Escola Paulista de Medicina (EPM)-range of motion scale; D-AIMS2, Dutch-Arthritis Impact Measurement Scale2; DAS28, Disease Activity Score-28; VAS, Visual Analogue Scale; RAQoL, Rheumatoid Arthritis Quality of Life-questionnaire; n.a.=not applicable.

[1] Scores were log-transformed due to non-normality.

At discharge, the numbers (%) of patients that were improved, stable or deteriorated according to the HAQ score were 32 (45%), 29 (40%) and 11 (15%), respectively). The change scores of the RAP total score in these three categories were 5.1 (SD 4.7), -0.8 (SD 6.0) and 1.1 (SD 5.9), respectively (p <0.001, one-way ANOVA, improved versus stable). Six weeks after discharge, the numbers of patients classified as improved, stable or deteriorated according to the HAQ were 28 (43%), 27 (42%) and 10 (15%), respectively. The change scores of the RAP total score in these three categories were 8.3 (SD 5.3), 1.0 (SD 5.3) and -2.6 (SD 6.6), respectively (p <0.001, one-way ANOVA, improved versus stable and improved versus deteriorated).

The responsiveness of the RAP total sum score was low (SRM –0.34 and ES –0.30) to moderate (RR –0.87) at discharge, and moderate (SRM -0.54 and ES -0.55) to high (RR -1.56) at 6 weeks after discharge.

The responsiveness of the four RAP domains was in general smaller than that of the RAP total score, both at discharge and 6 weeks thereafter. The responsiveness of the RAP domains mobility and self-care was larger than that of the domains daily activities and social relationships.

Discussion

The Rehabilitation Activities Profile (RAP) is a rehabilitation tool, providing a structured, patient-oriented approach to assessment, goal setting and treatment planning on the level of activities and participation. Moreover, it was designed to be used as an outcome measure to evaluate the result of the rehabilitation process in individual patients (8). This study was designed to extend the validation and the responsiveness of the RAP in the evaluation of the outcomes of multidisciplinary team care in a rheumatology setting. It was found that the RAP is an internally consistent, valid and responsive tool to measure clinical changes in patients with RA admitted for multidisciplinary team care.

In our study, the internal consistency of the RAP total score and its domain scores appeared to be sufficient, apart from the domain daily activities. The lack of correlation between the items of the daily activities domain could indicate that summarizing the items in this domain is not justified (34). In general, our results regarding the internal consistency appear to be in the same range as those obtained in previous studies with other patient groups (14-16). Comparisons must be done with some caution, however, as the scoring methods vary among studies, with different combinations of domains.

For the RAP domains communication and social relationships a clear floor effect was seen, which could have a negative impact on the content validity, reliability and responsiveness of these domains (34). Previous studies have not reported on potential floor or ceiling effects of the RAP. Therefore, it remains unclear whether this floor effect is specific for RA patients. The scoring system of the RAP (41) is unclear with respect to items that are not applicable: a score of zero could mean that the patient does not perform a certain activity at all or that a patient has no limitation regarding that activity. It

remains unclear to what extent the frequency of items that were scored as zero because of inapplicability contributed to the floor effect of some of the domains of the RAP.

The moderate, yet significant associations of the RAP total score with measures of functional ability, psychological functioning, disease activity and quality of life substantiate its validity in patients with RA. The RAP total score was found to discriminate between four categories (quartiles) of the HAQ score. The differences between the four quartiles of the HAQ score as observed in the present study were in line with the clinical relevant difference of 0.19 as described by Redelmeier and Lorig (36).

If separate domain scores are considered, only the RAP domains mobility and self-care appear to be related to other measures. In previous studies in other patient groups, the associations between the RAP domain scores and disease specific measures of functional ability were in the same range or somewhat higher than those found in the present study (14,16,18). In our study, the correlations between the RAP domains daily activities and relationships and all other aspects of health status were in general very weak. In one previous study in which associations between individual RAP domains and other health status measures were examined, a similar weak association for the domain relationship was observed (16). In that study, in patients with hip fractures, correlations between the RAP domain relationships and domains of the Nottingham Health Profile varied between 0.01 and 0.27. In none of the other studies addressing the validity of the RAP the association between the RAP domain daily activities and other measurements of health status was presented. As the RAP reflects, apart from limitations in activities, restrictions in participation as well, moderate associations with measures of physical functioning were to be expected. The same is true for associations with quality of life, which concept comprises far more aspects than physical functioning and societal participation alone. The incomplete associations between individual RAP domains and measures of physical functioning as observed in the present study could indicate that the RAP is indeed likely to reflect additional components of health status, such as participation. However, as Cronbach's alpha of some of the RAP domains was relatively low, it could also mean that some RAP domains do not adequately reflect the concept they stand for.

In general, all patients improved between admission and discharge and 6 weeks thereafter. The observed change scores of the HAQ were in line with those found in previous clinical trials on multidisciplinary team care in RA patients (3-5). With respect to responsiveness, the various measures of responsiveness consistently demonstrate sufficient performance of the RAP total score. Concerning the RAP domain scores, the responsiveness of the RAP mobility and self-care scores was moderate, whereas the responsiveness of the RAP daily activities and social relationships scores was poor. In addition, in our patient group the RAP communication domain score could not be used, due to an extreme floor-effect (all patients having score 0 at all time points).

In the present study, the results of the measures of responsiveness for mobility and personal care were in the same range as those obtained in four other studies, including patients with hip fractures (16), stroke (15,42) or amyotrophic lateral sclerosis (ALS) (18). In general, a larger responsiveness of the personal care domain than of the mobility

domain was found. De Groot et al. (18) reported measures of responsiveness for the RAP total score, with in general somewhat higher values than those seen in the present study. In that study, it was found that in a cohort of patients with ALS in whom changes in activity limitations over time were evaluated, showing a decline of functional ability, the ES of the RAP was 0.44 and 0.85 and the SRM 0.71 and 1.2, after 6 and 12 months from the start of the evaluation, respectively. Direct comparisons of responsiveness are, however, difficult to make as the potential improvement may depend strongly on the nature and extent of the activity limitations and participation restrictions of the various patient populations involved and the setting and duration of their rehabilitation process.

Moreover, variations regarding the domains included in the calculation of the RAP total score exist with different combinations of domains (14-18,42). The study by De Groot et al. (18) was the only study also using the RAP total score based on all 21-items and scores ranges from 0 (no disability) to 63 (severe disability).

Based on the validity and responsiveness of the RAP in a group of RA patients admitted for multidisciplinary team care, the use of the RAP total scores, as well as the mobility and self-care domain scores is warranted. Given the extreme floor effect of the domains communication and social relationships, the low correlation between the domain social relationships and all other outcome measures, the low internal consistency of the domain daily activities and the unfavourable responsiveness of the domains daily activities and social relationships, the relevance of some domains of the RAP in this specific patient population could be questioned. The findings suggest that a further exploration of the relevance of the items included in these domains for this specific patient group is warranted. For that purpose, the recently developed preliminary ICF core set for rheumatoid arthritis could be used (43-45). By means of a formal consensus process, 96 and 39 categories from the ICF components Body functions, Body structures, Activities and Participation, and Environmental factors were identified for a comprehensive and brief RA core set, respectively (43). The contents of the core sets were validated by means of interviews (45) and focus groups (44). The fact that, in contrast with the RAP, the core sets for RA include elements from the ICF components Body functions and Body structures could imply that the scope of the RAP, mainly focusing on the component Activities and Participation, may be too narrow. Within the process of rehabilitation of patients with RA, goal setting and treatment on the level of Body structures (e.g. qualitative changes in structure, including accumulation of fluid, of the joints of hand and fingers) and Body functions (e.g. pain, fatigue) is an essential element (46). It is conceivable that to optimize its usage, the RAP has to be extended with domains or items for specific patient groups, whereas other domains could be omitted. A far going adaptation of the original RAP does, however, have major implications for its content validity as was defined by Bennekom et al. (14), and which was mainly focused on the ICF component 'Activities and Participation'. In fact, such an adaptation of the RAP will lead to the development of a new measurement instrument which will require new reliability, validity, and responsiveness studies.

Another issue is the measurement of the patient's perception regarding the impact of activity and participation limitations. Although this feature of the RAP is advocated as

one of its strengths (8), the patient's perception is not explicitly taken into account in the scoring system (41). Therefore, it remains unclear to what extent the RAP could serve as a proxy for the assessment of the patient perceived rehabilitation needs. Given the evolving acknowledgment of the importance of the patient's role in arthritis management (47), the use of a scoring method where the patient's perception is taken into account should be considered.

The incomplete associations between the RAP and other, well-known measures of physical functioning, such as the HAQ, substantiate its potential suitability for the process of rehabilitation of patients with RA. However, the responsiveness of the RAP is in the same range as that of HAQ, whereas the responsiveness of a patient-oriented outcome measure, the MACTAR, was even greater. This finding indicates that, in a situation where maximal responsiveness of a measurement instrument is required, the performance of the HAQ and the RAP would probably be similar, but a patient-oriented tool would be superior (37). In daily practice, however, the usage of measurements instruments such as the HAQ and MACTAR is in general time-consuming and less attractive because of cost constraints and limited human resources. The results of the present study show that in daily practice the RAP could, if it is already used as a rehabilitation tool, also be employed as a measurement instrument. In this particular situation, where the RAP is already used and an evaluation of outcomes is required, the employment of additional outcome measures such as the HAQ or the MACTAR might not be necessary any more.

A limitation of the study is the fact that neither the patients nor the assessor were blinded. This could have introduced bias towards improvement. In that respect, the inclusion of a control group without treatment could have enhanced the contrast between stable versus improved patients. Moreover, the study was executed in one rheumatology clinic, so that the results may not be generalisable to all patients with RA admitted for multidisciplinary team care.

In conclusion, the RAP appeared to be internally consistent, valid and responsive to clinical changes in RA patients admitted for multidisciplinary team care. Its added value as a measurement instrument in daily practice depends on whether the RAP is already used as a clinical tool to structure the team care process, whether other outcome measures such as the HAQ are already routinely employed, and whether the setting and duration of the rehabilitation process is suitable to achieve improvements on the level of societal participation. The latter is usually not the case in a hospital inpatient setting, where the focus is on medical care and admissions are usually brief. Future research should be directed at a further optimization of its contents specifically for RA patients and at standardization of the scoring system. Moreover, including the patient's view in the scoring system should be considered.

Acknowledgements

References

1.   Scott DL, Smith C, Kingsley G. What are the consequences of early rheumatoid arthritis for the individual? Best Pract Res Clin Rheumatol 2005;19:117-36.

2.   Davis RM, Wagner EG, Groves T. Advances in managing chronic disease. Research, performance measurement, and quality improvement are the key. BMJ 2000;320:525-6.

3.   Lambert CM, Hurst NP, Forbes JF, Lochhead A, Macleod M, Nuki G. Is day care equivalent to inpatient care for active rheumatoid arthritis? Randomised controlled clinical and economic evaluation. BMJ 1998;316:965-9.

4.   Tijhuis GJ, Zwinderman AH, Hazes JM, Breedveld FC, Vlieland PM. Two-year follow-up of a randomized controlled trial of a clinical nurse specialist intervention, inpatient, and day patient team care in rheumatoid arthritis. J Adv Nurs 2003;41:34-43.

5.   Vliet Vlieland, TPM. Multidisciplinary team care and outcomes in rheumatoid arthritis. Curr Opin Rheumatol 2004;16:153-6.

6.   Siegert CE, Vleming LJ, Vandenbroucke JP, Cats A. Measurement of disability in Dutch rheumatoid arthritis patients. Clin Rheumatol 1984;3:305-9.

7.   World Health Organization. ICF: International Classification of Functioning, Disability and Health. Geneva: WHO; 2001.

8.   Van Bennekom CAM, Jelles F, Lankhorst GJ. Rehabilitation Activities Profile: the ICIDH as a framework for a problem-oriented assessment method in rehabilitation medicine. Disabil Rehabil 1995;17:169-75.

9.   Wressle E, Lindstrand J, Neher M, Marcusson J, Henriksson C. The Canadian Occupational Performance Measure as an outcome measure and team tool in a day treatment programme. Disabil Rehabil 2003;25:497-506.

10. Schochat T, Pilz C, Neuner R. The Indicators of Rehab Status questionnaire version 3 (IRES-3) in 1818 rehabilitees with musculoskeletal Diseases. Rehabilitation (Stuttg) 2003;42:236-44. In German.

11. Buhrlen B, Gerdes N, Jackel WH. Development and psychometric testing of a patient questionnaire for medical rehabilitation (IRES-3). Rehabilitation (Stuttg) 2005;44:63-74. In German.

12. Kjeken I, Slatkowsky-Christensen B, Kvien TK, Uhlig T. Norwegian version of the Canadian Occupational Performance Measure in patients with hand osteoarthritis: validity, responsiveness, and feasibility. Arthritis Rheum 2004;51:709-15.

13. Jelles F, van Bennekom CA, Lankhorst GJ, Sibbel CJ, Bouter LM. Inter- and intra-rater agreement of the Rehabilitation Activities Profile. J Clin Epidemiol 1995;48:407-16.

14. Van Bennekom CA, Jelles F, Lankhorst GJ, Bouter LM. The Rehabilitation Activities Profile: a validation study of its use as a disability index with stroke patients. Arch Phys Med Rehabil 1995;76:501-7.

15. Van Bennekom CA, Jelles F, Lankhorst GJ, Bouter LM. Responsiveness of the rehabilitation activities profile and the Barthel index. J Clin Epidemiol 1996;49:39-44.

16. Van Balen R, Essink-Bot ML, Steyerberg E, Cools H, Habbema DF. Quality of life after hip fracture: a comparison of four health status measures in 208 patients. Disabil Rehabil 2003;25:507-19.

17. Van Baalen B, Odding E, van Woensel MPC, van Kessel MA, Roebroeck ME, Stam HJ. Reliability and sensitivity to change of measurement instruments used in a traumatic brain injury population. Clin Rehabil 2006;20:686-700.

18. De Groot IJ, Post MW, Van Heuveln T, Van Den Berg LH, Lindeman E. Measurement of decline of functioning in persons with amyotrophic lateral sclerosis: responsiveness and possible applications of the Functional Independence Measure, Barthel Index, Rehabilitation Activities Profile and Frenchay Activities Index. Amyotroph Lateral Scler 2006;7:167-72.

19. Arnett FC, Edworthy SM, Bloch DA, McShane DJ, Fries JF, Cooper NS, et al. The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. Arthritis Rheum 1988;31:315-24.

20. Verhoef J, Toussaint PJ, Zwetsloot-Schonk JHM, Breedveld FC, Putter H, Vliet Vlieland TPM. Effectiveness of the introduction of an International Classification of Functioning, Disability and Health-based rehabilitation tool in multidisciplinary team care in patients with rheumatoid arthritis. Arthritis Rheum 2007;57:240-8.

21. Tijhuis GJ, Zwinderman AH, Hazes JMW, van den Hout WB, Breedveld FC, Vliet Vlieland TPM. A randomized comparison of care provided by a clinical nurse specialist, inpatient team care, and day patient team care in rheumatoid arthritis. Arthritis Rheum 2002;47:525-31.

22. Van den Hout WB, Tijhuis GJ, Zwinderman AH, Hazes JMW, Breedveld FC, Vliet Vlieland TPM. Cost-effectiveness and cost-utility analysis of multidisciplinary care in patients with rheumatoid arthritis: a randomised comparison of clinical nurse specialist care, inpatient team care, and day patient care. Ann Rheum Dis 2003; 62:308-15.

23. World Health Organization. ICIDH: International Classification of Impairments, Disabilities and Handicap. Geneva: WHO;1980.

24. Tugwell P, Bombardier C, Buchanan WW, Goldsmith CH, Grace E, Hanna B. The MACTAR Patient Preference Disability Questionnaire-an individualized functional priority approach for assessing improvement in physical disability in clinical trials in rheumatoid arthritis. J Rheumatol 1987;14:446-51.

25. Grace EM, Gerecz EM, Kassam YB, Buchanan HM, Buchanan WW, Tugwell PS. 50-foot walking time: a critical assessment of an outcome measure in clinical therapeutic trials of antirheumatic drugs. Br J Rheumatol 1988;27:372-4.

26. Newcomer KL, Krug HE, Mahowald ML. Validity and reliability of the timed-stands test for patients with rheumatoid arthritis and other chronic diseases. J Rheumatol 1993;20:21-7.

27. Van den Ende CH, Hazes JM, le Cessie S, Mulder WJ, Belfor DG, Breedveld FC, et al. Comparison of high and low intensity training in well controlled rheumatoid arthritis. Results of a randomised clinical trial. Ann Rheum Dis 1996;55:798-805.

28. Jones E, Hanly JG, Mooney R, Rand LL, Spurway PM, Eastwood BJ, et al. Strength and function in the normal and rheumatoid hand. J Rheumatol 1991;18:1313-8.

29. Vlieland TP, van den Ende CH, Breedveld FC, Hazes JM. Evaluation of joint mobility in rheumatoid arthritis trials: the value of the EPM-range of motion scale. J Rheumatol 1993;20:2010-4.

30. Evers AW, Taal E, Kraaimaat FW, Jacobs JW, Abdel-Nasser A, Rasker JJ, et al. A comparison of two recently developed health status instruments for patients with arthritis: Dutch-AIMS2 and IRGL. Br J Rheumatol 1998;37:157-64.

31. Prevoo ML, van 't Hof MA, Kuper HH, van Leeuwen MA, van de Putte LB, van Riel PL. Modified disease activity scores that include twenty-eight-joint counts. Development and validation in a prospective longitudinal study of patients with rheumatoid arthritis. Arthritis Rheum 1995;38:44-8.

32. Van Gestel AM, Anderson JJ, van Riel PL, Boers M, Haagsma CJ, Rich B, et al, and the American College of Rheumatology European League of Associations for Rheumatology. ACR and EULAR improvement criteria have comparable validity in rheumatoid arthritis trials. J Rheumatol 1999;26:705-11.

33. De Jong Z, van der Heijde DM, McKenna SP, Whalley D. The reliability and construct validity of the RAQoL: a rheumatoid arthritis-specific quality of life instrument. Br J Rheumatol 1997;36:878-83.

34. Terwee CB, Bot SD, de Boer MR, van der Windt DA, Knol DL, Dekker J, et al. Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol 2007;60:34-42.

35. Harrison MJ, Hassell A, Dawes PT, Scott DL, Knight SM, Davis MJ, et al. The overall status in rheumatoid arthritis (OSRA) measure-further evidence to support its use in clinical practice. Rheumatology 2007;46:849-55.

36. Redelmeier DA, Lorig K. Assessing the clinical importance of symptomatic improvements. An illustration in rheumatology. Arch Intern Med 1993;153:1337-42.

37. Liang MH, Lew RA, Stucki G, Fortin PR, Daltroy L. Measuring clinically important changes with patient-oriented questionnaires. Med Care 2002;40(4Suppl):II45-51.

38. Guyatt G, Walter S, Norman G. Measuring change over time: assessing the usefulness of evaluative instruments. J Chronic Dis 1987;40:171-8.

39. Liang MH, Fossel AH, Larson MG. Comparisons of five health status instruments for orthopedic evaluation. Med Care 1990;28:632-42.

40. Wanders AJ, Gorman JD, Davis JC, Landewe RB, van der Heijde DM. Responsiveness and discriminative capacity of the assessments in ankylosing spondylitis disease-controlling antirheumatic therapy core set and other outcome measures in a trial of etanercept in ankylosing spondylitis. Arthritis Rheum 2004;51:1-8.

41. Van Bennekom CAM, Jelles F, Lankhorst GJ. Revalidatie Activiteiten Profiel, handleiding en beschrijving. Amsterdam: VU Uitgeverij; 1994:p.15-21. In Dutch.

42. Van de Weg FB, Kuik DJ, Lankhorst GJ. Post-stroke depression and functional outcome: a cohort study investigating the influence of depression on functional recovery from stroke. Clin Rehabil 1999;13:268-72.

43. Stucki G, Cieza A, Geyh S, Battistella L, Lloyd J, Symmons D, et al. ICF Core Sets for rheumatoid arthritis. J Rehabil Med 2004;44(Suppl):87-93.

44. Coenen M, Cieza A, Stamm TA, Amann E, Kollerits B, Stucki G. Validation of the International Classification of Functioning, Disability and Health (ICF) Core Set for rheumatoid arthritis from the patient perspective using focus groups. Arthritis Res Ther 2006;8:R84.

45. Stamm TA, Cieza A, Coenen M, Machold KP, Nell VP, Smolen JS, et al. Validating the International Classification of Functioning, Disability and Health Comprehensive Core Set for Rheumatoid Arthritis from the patient perspective: a qualitative study. Arthritis Rheum 2005;53:431-9.

46. Stucki G, Ewert T. How to assess the impact of arthritis on the individual patient: the WHO ICF. Ann Rheum Dis 2005;64:664-8.

47. Petersson IF. Evolution of team care and evaluation of effectiveness. Curr Opin Rheumatol 2005;17:160-3.

Chapter 6

Pilot study of the development of a theory-based instrument to evaluate the communication process during multidisciplinary team conferences in rheumatology

J. Verhoef[1, 2], P.J. Toussaint[1], H. Putter[3], J.H.M. Zwetsloot-Schonk[1],
T.P.M. Vliet Vlieland[4].

1   Department of Clinical Informatics;
2   Department of Physical Therapy;
3   Medical Statistics;
4   Department of Rheumatology, Leiden University Medical Center (LUMC), The Netherlands.

Abstract

Background
Co-ordinated teams with multidisciplinary team conferences are generally seen as a solution to the management of complex health conditions. However, problems regarding the process of communication during team conferences are reported, such as the absence of a common language or viewpoint and the exchange of irrelevant or repeated information. To determine the outcome of interventions aimed at improving communication during team conferences, a reliable and valid assessment method is needed.

Aim
To investigate the feasibility of a theory-based measurement instrument for assessing the process of the communication during multidisciplinary team conferences in rheumatology.

Method
An observation instrument was developed based on communication theory. The instrument distinguishes three types of communication: (I) grounding activities, (II) co-ordinaton of non-team activities, and (III) co-ordinaton of team activities. To assess the process of communication during team conferences in a rheumatology clinic with inpatient and day patient facilities, team conferences were videotaped. To determine the inter-rater reliability, in 20 conferences concerning 10 patients with rheumatoid arthritis admitted to the inpatient unit, the instrument was applied by two investigators independently. Content validity was determined by analysing and comparing the results of initial and follow-up team conferences of 25 consecutive patients with rheumatoid arthritis admitted to the day patient unit (Wilcoxon signed rank test).

Results
The inter-rater reliability was excellent with the intra-class correlation coefficients being >0.98 for both type I and III communications in 10 initial and 10 follow-up conferences (type II was not observed). An analysis of an additional 25 initial and 86 follow-up team conferences showed that time spent on grounding (type I) made up the greater part of the contents of communication (87% S.D. 14 and 60% S.D. 29 in initial and follow-up conferences, respectively), which is significantly more compared to time spent on co-ordinaton (p<0.001 and 0.02 for categories II and III, respectively). Moreover, significantly less time was spent on grounding in follow-up as compared to initial team conferences, whereas the time spent on co-ordinaton (type III) increased (both *P* values <0.001).

Conclusion
This theory-based measurement instrument for describing and evaluating the communication process during team conferences proved to be reliable and valid in this pilot study. Its usefulness to detect changes in the communication process, e.g. after implementing systems for re-structuring team conferences mediated by ICT applications, should be further examined.

Introduction

Chronic disease represents a huge burden on health services worldwide. To meet the complex needs of patients with chronic diseases, health professionals from various disciplines are often involved in the treatment process. Successful chronic disease interventions usually involve a multidisciplinary care team (1). Team care is defined as co-ordinated, comprehensive care provided by persons who integrate their observations, expertise and decisions (2). The setting and attainment of treatment goals and the evaluation of the treatment plan is a collective team responsibility (3,4).

Team conferences play a crucial role in setting and adapting rehabilitation goals and planning and evaluating interventions. During team conferences, various tasks have to be performed, such as the exchange of information about the patient's health status, as determined by different health professionals and finding agreement about and evaluate team goals to be set and resulting interventions to be executed. During this process, disciplinary information (i.e. information that is gathered and will be used by one discipline only) has to be translated into team information (i.e. information that is of use for all disciplines involved)(5).

From the literature (4,6-8) and daily practice, it appears that staff satisfaction with team conferences where no overt structuring of the communication tasks is used, is generally low. One of the often-cited problems with team conferences is that there is too much focus on the exchange of information, which is often discipline-specific and therefore in part irrelevant for other team members (4,9-11). Moreover, there is often a lack of common goals to be set and evaluated. Treatment goals are often discipline-specific, because of a lack of a common viewpoint as a team. This problem may be related to the absence of a common language (4,12-15).

Some studies (6-8) show evidence that structuring the team conference by using a rehabilitation tool (12) has positive effects on staff satisfaction. In order to evaluate the effect of structuring team conferences on the level of process of communication, a reliable and valid measurement instrument is needed. So far, the literature concerning evaluations of team conferences in health care is scarce. In some studies, indirect measures associated with communication during team conferences are employed, such as measures of health professionals' satisfaction with team conferences (7) or the analysis of treatment plans resulting from team conferences (8,16). Two studies analysed the process of communication during team conferences in a direct way, by means of audio-tape recordings (17,18), using a theoretical framework. In the study by Hopkins Rintala et al. (17), the categories for the analysis comprised speaker, form (authorative versus non-authorative) and content (physical function, psychosocial function, environment). Engström et al. (18) analysed the parameters speaker, form (gives/asks for opinion, gives/asks for suggestion, gives/asks for orientation, sums up and prescribes) and content (investigation, treatment, prognosis, social, cultural, psychological and physical aspects). Although these analyses are thorough and detailed, for the evaluation of the effects of ICT-mediated interventions, additional information regarding the process of communication is needed. The unit of analysis in the aforementioned studies was the

verbal act or the message. If we want to reorganize communication processes, this level of analysis is too fine grained, and an additional analysis pertaining to *sets* of messages is needed. The literature on communication and language (19,20) proposes three important features that apply to sets of messages instead of individual messages: joint activity (i.e. the treatment of a patient), time/place context (where and when the communication sessions take place) and intention (goal of communication process).

In this article, we present a theory-based observation instrument for assessing the process of communication during team conferences, with the focus on the intentions of sets of messages. The inter-rater reliability and the content validity (21) of the instrument will be described.

## Methods

Patients and setting

This study is a cross-sectional pilot study focusing on the process of communication during team conferences held in the rehabilitation day patient and inpatient clinic of the Department of Rheumatology of the Leiden University Medical Center in the Netherlands. Effectiveness and costs of team care provided in this clinic have been described in previous studies (22-24). At the time, this pilot study was conducted, the team conferences, that lasted about 1.5 h, were scheduled weekly, with a maximum of eight patients (inpatient clinic) to 15-20 patients (day patient clinic) being discussed. The chair of the conferences was the rheumatologist. First, the newly admitted patients were discussed (initial team conferences), followed by patients who had been admitted for a longer period (follow-up team conferences). For every admitted patient, contributions to the team conference were made in a fixed order by all attendees: the rheumatologist, nurse, physical therapist, occupational therapist and social worker.

For the present case study, 20 team conferences (10 initial and 10 first follow-up) concerning 10 patients with rheumatoid arthritis admitted to the inpatient unit and all 25 initial and 86 follow-up team conferences concerning 25 consecutive patients with rheumatoid arthritis admitted to the day patient unit were video-recorded and stored on CD-ROM.

Development of the instrument

The instrument is based on recent communication theories, as developed by Te'eni (19) and Clark (20).

First, we have developed a model for describing communication processes (25,26). In this model, a communication process is decomposed into its constituting activities (Fig. 1).

Figure 1   Decomposition of a communication process
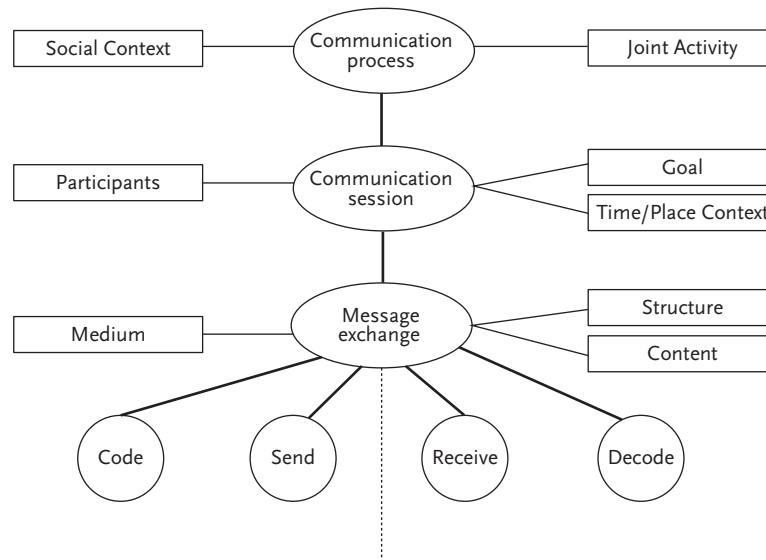
The *participants* are involved in a *joint activity* (treatment of a patient with rheumatoid arthritis), and they intend to co-ordinate their actions by means of participating in a *communication process* (20)(the team conference). Such a process can be decomposed into one or more *communication sessions* in which *messages* (with structure and content) are exchanged. Communication sessions can be characterized by their *goal* and by the *time/ place context* in which they take place. In the setting of a multidisciplinary team conference, all messages are exchanged instantaneously and at the same location. So, the time/ place context of a session is: same time/ same place.

Regarding the goals, based on the analysis of Clark (20), two goals for sessions can be distinguished: *to ground* and *to co-ordinate*, and this leads to three session types:
– Type I: Grounding sessions. Messages are exchanged with the goal of grounding. Participants either provide input for the shared basis by relating their findings or actions regarding the patient, or they negotiate the content of the shared basis by questioning or adapting information contained in the shared basis. The outcome of type I sessions is a shared view of the current health status of the patient.
– Type II: Non-team co-ordinaton sessions. Non-team activities are co-ordinated. An example is when the physician asks the nurse to schedule a patient's appointment.
– Type III: Team co-ordinaton sessions. Activities of team members are co-ordinated. An example is when a team discusses the activities that must be performed before a patient can be discharged.

Based on these session types, a scoring form was designed, with which each session type occurring in a discussion of a patient during a team conference could be classified and

its duration recorded (see Fig. 2). A set of messages was classified as a type I session in the following cases: If someone read aloud from the medical file, if a question was asked about the information given on the patient's health status, if information about the health status was added or if a discussion took place on the correct interpretation of the patient's health status. A set of messages was judged to be a type II session if an action was ordered from one team member to the other, where this action was not related to a team goal. Finally, a set of messages was classified to be a type III session if an action was proposed, discussed and/or allocated, that was directly related to a team goal.

Application of the instrument

From every part of the team conference concerning a specific patient, the following characteristics were assessed: the status of the team conference (initial or follow-up), the total duration of the team conference, time spent on grounding (type I), time spent on practical arrangements (type II) and time spent on co-ordinaton regarding treatment goals and interventions among team members (type III) (all in seconds). The total duration of the team conference per patient minus the summation of time spent on the three types of communication was designated as noise. Percentages of time spent on session types I, II, or III were calculated by dividing the time spent on that type of session by the summation of time spent on the three types of communication to eliminate the effects of noise.

To determine the reliability of the instrument, the instrument was used independently by two persons (JV en PT) in 10 initial and 10 follow-up team conferences concerning 10 patients admitted to the inpatient clinic.

To determine the content validity, the 25 initial team conferences of 25 patients admitted to the day patient clinic were compared with the 86 matching follow-up conferences. For this purpose, the scoring was done by the two assessors jointly. With respect to the content validity, the assumption was that the proportion of time spent on grounding (type I) would be larger than the time spent on co-ordinaton (type II and III) in both the initial and follow-up sessions. Moreover, it was to be expected that the proportion of time spent on team co-ordinaton (type III) would be smaller during initial team conferences than during follow-up team conferences.

Figure 2   An example of a scoring form on which time spent (in real time from videotape) on the three types of communication sessions were recorded per team member in case of type I. The other types were recorded as a separate score, not differentiated by team member. After this scoring was done by both investigators independently, these scores were compared and in case of discrepancy it was discussed until consensus was reached. The final scores were converted into the duration of the specific type of communication session in seconds (showed between brackets). These data were used for analysis.

Name: Mrs. A
Location: day patient clinic
Type team conference: follow-up, number 2
Date team conference: 10-12-2003
Investigator: JV
Total duration team conference: 8.32 – 18. 08 [596]

Team member	Type I	Type III (team)	Type II (non-team)
MD	8.34 – 9.10 [36]		
Nurse	9.10 –10.20 [70]		
			10.20 –10.55 [35]
PT	10.55 – 13.00 [125]		
OT	13.00 – 14.50 [110]		
		14.50 –15.50 [60]	
SW	15.50 – 16.40 [50]		
		16.40 – 18.05 [85]	

The profile of this team conference showed:

Type I: 36 + 70 + 125 + 110 + 50 = 391 seconds
Type II: 35 seconds
Type III: 60 + 85 = 145 seconds
Sum of types: 571 seconds
Total duration
Team conference: 576 seconds
Noise: 5 seconds

Statistical analysis

The inter-rater reliability of the instrument was calculated by comparing the results (proportions of time spent on session types I-III) of 20 videotaped team conferences concerning 10 consecutive patients admitted to the inpatient unit by means of the intra-class correlation coefficients (ICC). The Wilcoxon signed ranks test was applied to detect possible systematic differences between the two investigators.

To assess the content validity, the proportions of time spent on each of the three types of communication sessions *within* both the initial and follow-up sessions was compared by means of the Wilcoxon signed ranks test. Moreover, the proportions of time spent on each of the three types of communication sessions during 25 initial team conferences were compared with those of the 86 follow-up team conferences. For that purpose, the 86 follow-up conferences were aggregated to 25 summarized cases. Initial and follow-up conferences were compared by means of the Wilcoxon signed ranks test.

All data were analysed with the SPSS Software package version 11.

Results

For the reliability study, 20 team conferences (10 initial and 10 follow-up) of 10 consecutive patients with rheumatoid arthritis admitted to the inpatient unit were analysed. The mean duration of these conferences was 404s (S.D. 198) according to assessor I and 401s (S.D. 198) according to assessor II (p=0.31).

The results of the reliability-analysis of the scores of the 20 videotaped team conferences are shown in Table 1. The intra-class correlation coefficients of regarding types I and III communication sessions were both >0.98 for the initial team conferences and >0.99 for the follow-up team conferences. There were no significant differences between the results of the two investigators regarding the proportion of time spent on type I or type III communication sessions with either the initial or the follow-up team conferences. Both the results of assessors I and II showed that the time spent on type I was significantly longer than the time spent on type III (p=0.005 for assessor I and p=0.005 for assessor II). There was no difference between initial and follow-up conferences in this respect.

Table 1   **Means (S.D.) of the proportions of time spent on the three types of communication sessions during 10 initial team conferences and 10 follow-up team conferences concerning 10 patients with rheumatoid arthritis admitted to a rheumatology inpatient care unit**

	Assessor I	Assessor II	*P* value[a]	ICC[b] (95% CI)[c]
Initial team conferences				
Proportion of communication (%)				
Type I	98.5 (3.4)[d]	98.6 (3.3)[e]	0.72	>0.98 (0.95-0.99)
Type II	-	-	-	-
Type III	1.5 (3.4)	1.4 (3.3)	0.72	>0.98 (0.95-0.99)
Follow-up team conferences				
Proportion of communication (%)				
Type I	80.5 (11.8)[d]	80.0 (12.5)[e]	0.18	>0.99 (0.99-1)
Type II	-	-	-	-
Type III	19.5 (11.8)	20.0 (12.5)	0.18	>0.99 (0.99-1)

[a] Wilcoxon signed ranks test between scores of assessors I and II.
[b] ICC = intra-class correlation coefficient.
[c] CI = confidence interval.
[d] *P* = 0.005, Wilcoxon signed ranks test, type I compared with III within assessor I.
[e] *P* = 0.005, Wilcoxon signed ranks test, type I compared with III within assessor II.

The characteristics of the videotaped team conferences concerning 25 patients admitted to the day patient unit and the results of the content validity analysis are presented in Table 2. In total, there were 25 initial and 86 follow-up team conferences to be analysed. The mean duration of the follow-up team conferences was significantly lower than that of the initial team conferences (271 and 428s, respectively; p<0.001), with the percentage of noise slightly but not significantly increasing (41s (9%) and 36s (12%) in the initial and follow-up team conferences, respectively (p=0.39)).

Table 2   Characteristics of team conferences concerning 25 patients with rheumatoid arthritis admitted to a rheumatology day patient care unit

	Initial team conferences (n=25)	Follow-up team conferences (n=25)	P value[a] between initial and follow-up team conferences
Total duration (s)	469 (111)	307 (89)	< 0.001
Duration three types of communication (s)	428 (121)	271 (73)	< 0.001
Noise duration (s)	41 (33)	36 (26)	0.39
Proportion of communication (%)			
Type I grounding	87 (14)[b]	60 (29)[c]	< 0.001
Type II non-team co-ordinaton	6 (9)	6 (13)	1
Type III team co-ordinaton	7 (9)	34 (31)	< 0.001

All values are presented as means (S.D.), means and S.D. from follow-up team conferences are presented as means of the total number of follow-up team conferences per patient.
[a] Wilcoxon signed ranks test, initial compared with follow-up conferences.
[b] $P < 0.001$, Wilcoxon signed ranks test, type I compared with III within initial team conferences.
[c] $P < 0.02$, Wilcoxon signed ranks test, type I compared with III within follow-up team conferences.

Time spent on grounding (type I) made up the greater part of the contents of communication (87% S.D. 14 and 60% S.D. 29 in initial and follow-up conferences, respectively), which is significantly more compared to time spent on co-ordinaton ($p < 0.001$ and $p < 0.02$ for the comparisons of the time spent on type I with types II and III, respectively). Moreover, significantly less time was spent on grounding in follow-up conferences as compared to initial team conferences, whereas the time spent on co-ordinaton (type III) increased (both P values < 0.001).

Conclusions and further research

In this pilot study, an observation instrument to describe the communication process during multidisciplinary team conferences was developed. The instrument classifies communication session according to their goal (grounding, non-team co-ordinaton or team co-ordinaton). It showed excellent inter-observer reliability and its content validity appears to be sufficient, with a significantly larger proportion of time spent on grounding than on co-ordinaton in both initial and follow-up team conferences, with the proportions of time spent on grounding being larger and on co-ordinaton being smaller in initial as compared to follow-up conferences.

In general, time spent on grounding sessions made up the largest part of both the initial and the follow-up team conferences, in contrast with time spent on team co-ordinaton sessions. This is in line with expectations from literature (4,12,13) on problems with team conferences and the described theory of communication, thereby, confirming the content validity of the instrument. Moreover, the proportion of time spent on co-ordinaton was larger in follow-up conferences as compared to initial conferences. This finding suggests that the team members used the follow-up team conferences for team co-ordinaton activities, although it was only a relatively small proportion of time of the total duration of the follow-up team conference. This is also in line with the major problems of communication during multidisciplinary team conferences reported in literature: exchange of disciplinary information which is irrelevant or only partially relevant for other team members, the lack of a common viewpoint which is essential for goal setting, and the absence of a common language (4,12-15). The over-representation of type I communication sessions in both the initial and follow-up team conference could be an indication of the occurrence of these problems in the rheumatology setting that was studied.

In the studies of Rintala and Engström (17,18), describing verbal activities during team conferences, no data were presented on inter-rater reliability and content validity on the level of sessions types. These studies focused on verbal activities as a characteristic of individual messages instead of the characteristics of sets of messages. The instrument developed in this pilot study is capable in grouping messages into three different types of communication sessions, with which we are able to characterize a team conference as a communication process directed to grounding, team co-ordinaton or to non-team co-ordinaton. The instruments used by Rintala (17) and Engström (18) do not provide information on this aggregated level of communication.

Co-ordinating interdependent actions is the major objective in multidisciplinary team care, and the communication process during team conferences must reflect this goal. However, if we look at the measurement results given in this pilot study, we can conclude that most time is spent on grounding (type I) instead of co-ordinating interdependent actions (type III). This raises the question of how to reorganize the team conferences in order to enhance team co-ordinaton sessions and reduce the grounding sessions. An obvious possibility is to enable grounding before the team conference (change of time/place context), such that more time is left for co-ordinating. This can be accomplished if agreement is reached about the information that has to be included in the shared basis, and this information is made available to all team members before the team conference takes place.

In an intervention that was designed at the Rheumatology Department of the Leiden University Medical Center, the first prerequisite was achieved by introducing the Rehabilitation Activities Profile, a rehabilitation tool, (12,13,27,28) as a structured way of reporting patient data. The second condition was achieved by implementing an electronic information system in which patient data were registered by the individual team members according to the structure of the Rehabilitation Activities Profile, and made accessible to the others prior to the team conference.

Using the observation instrument will probably give insight into the changes of the occurrence of the three types of communication sessions during team conferences by comparing the scores before and after introducing the intervention. The results of this evaluation will be available by 2005.

References

1.   Davis RM, Wagner EG, Groves T. Advances in managing chronic disease. Research, performance measurement, and quality improvement are key. BMJ 2000;320:525-6.

2.   Halstead LS. Team care in chronic illness: a critical review of the literature of the past 25 years. Arch Phys Med Rehabil 1976;57:507-11.

3.   DeLisa JA, Martin GM, Currie DM. Rehabilitation medicine: past, present and future. In: DeLisa JA, Gans BM (Eds.) Rehabilitation medicine: principles and practice. 3rd ed. Lippincott-Raven, Philadelphia, 1998:p.3-32.

4.   Jelles F, van Bennekom CAM, Lankhorst GJ. The interdisciplinary team conference in rehabilitation medicine. Am J Phys Med Rehabil 1995;74:464-5.

5.   Toussaint PJ, Verhoef J, Vliet Vlieland TPM, Zwetsloot-Schonk JHM. The impact of ICT on communication in health care. Medinfo 2004;11(Pt2):988-91.

6.   Jelles F, van Bennekom CAM, Lankhorst GJ, Bouter LM, Kuik DJ. Introducing an innovative method in team conferences. Disabil Rehabil 1996;18:374-9.

7.   Roelofsen EE, Lankhorst GJ, Bouter LM. Translation and adaptation of a questionnaire to assess the group processes of rehabilitation team conferences. Clin Rehabil 2001;15:148-55.

8.   Roelofsen EE, Beckerman H, Lankhorst GJ, Bouter LM. The effects of the Rehabilitation Activities Profile for children on the quality of team conferences. In: Roelofsen EE. The Rehabilitation Activities Profile for children. Development, implementation and evaluation. Thesis, Free University Amsterdam, 2001.

9.   Fordyce WE. On disciplinary peers. Arch Phys Med Rehabil 1981;62:51-3.

10. Davis A, Davis S, Moss N, Marks J, McGrath J, Hovard L, et al. First steps towards an interdisciplinary approach to rehabilitation. Clin Rehabil 1992;6:237-44.

11. Bakheit AMO. Effective teamwork in rehabilitation. Int J Rehabil Res 1996;14:301-6.

12. Jelles F, van Bennekom CAM, Lankhorst GJ. Instruments to structure interdisciplinary team conferences in rehabilitation medicine: the added value of the Rehabilitation Activities Profile. J Rehabil Sciences 1995;8:51-7.

13. Beckerman H, Roelofsen EE, Knol DL, Lankhorst GJ. The value of the Rehabilitation Activities Profile (RAP) as a quality sub-system in rehabilitation medicine. Disabil Rehabil 2004;26:387-400.

14. Anderson TP. An alternative frame of reference for rehabilitation: the helping process versus the medical model. Arch Phys Med Rehabil 1975;56:101-4.

15. Rothberg JS. The rehabilitation team: future direction. Arch Phys Med Rehabil 1981;62;407.

16. Spiegel JS, Spiegel TM. An objective examination of multidisciplinary patient conferences. J Med Educ 1984;59:436-8.

17. Hopkins Rintala D, Hanover D, Alexander JL, Sanson-Fisher RW, Willems EP, Halstead LS. Team care: an analysis of verbal behavior during patient rounds in a rehabilitation hospital. Arch Phys Med Rehabil 1986;67:118-22.

18. Engström B. Communication and decision-making in a study of a multidisciplinary team conference with the registered nurse as conference chairman. Int J Nurs Stud 1986;23:299-314.

19. Te'eni D, Review: A cognitive-affective model of organisational communication for designing IT, in: MIS Quarterly 2001;25(2):p.251-312.

20. Clark HH, Using Language, Cambridge University Press, 1996.

21. Cork RD, Detmer WM, Friedman CP. Development and initial validation of an instrument to measure physicians' use of, knowledge about, and attitudes towards computers. JAMIA 1998;5:164-76.

22. Tijhuis GJ, Zwinderman AH, Hazes JMW, van den Hout WB, Breedveld FC, Vliet Vlieland TPM. A randomized comparison of care provided by a clinical nurse specialist, inpatient team care, and day patient team care in rheumatoid arthritis. Arthritis Rheum 2002;47:525-31.

23. Tijhuis GJ, Zwinderman AH, Hazes JMW, Breedveld FC, Vliet Vlieland TPM. The two-year follow-up of a randomised controlled trial of a clinical nurse specialist intervention, inpatient, and day patient team care in rheumatoid arthritis. J Adv Nurs 2003;41:34-43.

24. Van den Hout WB, Tijhuis GJ, Zwinderman AH, Hazes JMW, Breedveld FC, Vliet Vlieland TPM. Cost-effectiveness and cost-utility analysis of multidisciplinary care in patients with rheumatoid arthritis: a randomised comparison of clinical nurse specialist care, inpatient team care, and day patient care. Ann Rheum Dis 2003;62:308-15.

25. Toussaint PJ, Verhoef J, Vliet Vlieland TPM, Zwetsloot-Schonk JHM. Improving the quality of communication in health care. Stud Health Technol Inform 2003;95:857-62.

26. Verhoef J, Toussaint PJ, Vliet Vlieland TPM, Zwetsloot-Schonk JHM. The impact of structuring multidisciplinary team conferences mediated by ICT in the treatment of patients with rheumatic diseases. In: Bos L et al. (eds.) Medical and Care Compunetics, Vol. 103, IOS Press, Amsterdam, 2004:p.183-90.

27. Steiner WA, Ryser L, Huber E, Uebelhart D, Aeschlimann A, Stucki G. Use of the ICF model as a clinical problem-solving tool in physical therapy and rehabilitation medicine. Phys Ther 2002;82:1098-107.

28. Wressle E, Lindstrand J, Neher M, Marcusson J, Henriksson C. The Canadian Occupational Performance Measure as an outcome measure and team tool in a day treatment programme. Disabil Rehabil 2003;25:497-506.

Chapter 7

The impact of the implementation of a rehabilitation tool on the contents of the communication during multidisciplinary team conferences in rheumatology

J. Verhoef[1, 2], P.J. Toussaint[1], H. Putter[3], J.H.M. Zwetsloot-Schonk[1], T.P.M. Vliet Vlieland[4].

1   Department of Clinical Informatics;
2   Department of Physical Therapy;
3   Medical Statistics;
4   Department of Rheumatology, Leiden University Medical Center (LUMC), The Netherlands.

Abstract

Objective
Problems with multidisciplinary team conferences in health care include the exchange of too much (discipline-specific) information. The aim of this study was to investigate the effect of the implementation of a rehabilitation tool on the contents of communication during multidisciplinary team conferences in a rheumatology setting.

Methods
All initial and follow-up team conferences of 25 consecutive patients with rheumatoid arthritis admitted to a day patient care ward were videotaped during a period before (period I) and after (period II) the introduction of a rehabilitation tool. The aims of the rehabilitation tool were to enhance discussions on the co-ordination of care rather than merely exchange of information. This was achieved by providing a framework for the setting and evaluation of common treatment goals and management strategies as well as accompanying electronic and printed records. For every team conference, the duration of time spent on three types of communication was recorded: (1) grounding regarding the patient's health status, (2) the making of practical arrangements by no more than two health professionals, and (3) the co-ordination of common treatment goals or management strategies. Comparisons of the proportions of time spent on the different types of communication between the two periods were done by means of the Mann-Whitney U-test.

Results
Apart from the 25 initial team conferences in both periods, 86 and 71 follow-up team conferences were available in periods I and II, respectively. Regarding the initial team conferences, the proportion of time spent on grounding and practical arrangements was significantly smaller in period II than in period I. In addition, the proportion of time spent on common goals or management strategies was significantly greater in period II than in period I. For the follow-up team conferences, the proportion of time spent on practical arrangements was significantly smaller in period II, than in period I. Moreover, the proportions of time spent on the other types of communication did not differ significantly between the two periods.

Conclusion
The implementation of a rehabilitation tool including a computer application increased the proportion of time spent on the discussion of common treatment goals or management strategies during initial but not during follow-up team conferences in a day patient rheumatology clinic.

Introduction

Despite important improvements in the medical treatment, many patients with rheumatoid arthritis (RA) find their performance of activities of daily living and participation in society considerably hampered. Apart from the medical care, including medication and surgery, additional forms of care such as exercise and occupational therapy, are often required in patients with RA (1,2). In case of multiple or complex problems, where health professionals from various disciplines are involved, the provision of care by a multidisciplinary team is generally considered to be the optimal management strategy (3,4). With the multidisciplinary team care model, team conferences are held in many situations, with the aim of exchanging information, setting or adapting treatment goals and plans and evaluating interventions derived from the treatment goals (3,4).

It was shown that multidisciplinary team conferences pay a positive contribution to the management of rheumatic diseases including RA (5) or other complex health conditions (5,6). However, the literature and daily practice indicate that the communication during multidisciplinary team conferences is often characterized by the exchange of information rather than discussions on common goals or the co-ordination of the management plans of the various team members (7-9). Apart from the relatively large contribution of information exchange, it has also been noted that its contents is often too discipline-specific and partly irrelevant for the other health professionals involved (7-9).

Regarding the extent of the information exchange, it should, however, be noted that information can be exchanged in a different manner than only orally during the multidisciplinary team conference. An alternative is to provide information prior to the meeting in the form of electronic and printed reports. Concerning the content of the information, there are nowadays tools available to facilitate health professionals to focus on common treatment goals and the co-ordination of management plans rather than discipline-specific information (10-12).

The Rehabilitation Activities Profile (RAP) is an example of such a tool, specifically designed for the multidisciplinary rehabilitation setting. First, the RAP facilitates health professionals in the setting and evaluation of common goals, by providing a comprehensive framework to describe the patient's current limitations and problems. Second, the accompanying electronic and printed report forms make the information on the patient's health status, treatment goals and treatment plans accessible for all health professionals at any time (9,13). In two previous studies (13,14), the impact of the introduction of the RAP on team conferences was examined. In a setting concerning inpatients with various diagnoses, it was found that the introduction of the RAP did not influence the team members' satisfaction with the team conferences (13). In a paediatric rehabilitation setting, a positive effect on the quality of the team conferences with respect to result-orientation was seen (14). In both studies the assessment of the team conferences was done in an indirect way, namely by a questionnaire (13) and by an examination of the patient's medical records (14).

These two studies were not specifically focused on the extent of the exchange of information versus discussions on common treatment goals and management strate-

gies. Therefore, it remains unclear to what extent the introduction of the RAP has an impact on the contents of multidisciplinary team conferences.

We hypothesized that the implementation of the RAP would change the contents of the multidisciplinary team conference. More specifically, we expected a shift from the exchange of information in favour of discussions about the co-ordination of common treatment goals and management strategies. The present study, executed in a rheumatology setting, was designed to investigate whether this was indeed the case.

Methods

Patients and setting

This study was part of a larger, prospective cohort study addressing two research questions:

The impact of the introduction of the RAP on: (1) clinical effectiveness and patient satisfaction; (2) the contents of the communication during multidisciplinary team conferences.

For that purpose, a two group before-after design was used with the introduction of the rehabilitation tool (RAP) as the intervention. The clinical outcomes of multidisciplinary team care and the contents of multidisciplinary team conferences of all patients with rheumatoid arthritis (RA) admitted in a 12-month period where the rehabilitation tool was not used (January 2001-December 2001; period I) were compared with those in a 12-month period after the rehabilitation tool had been implemented (January 2003 – December 2003; period II).

The study was executed at the rehabilitation day patient clinic of the Department of Rheumatology of the Leiden University Medical Center (LUMC) in the Netherlands. The rheumatology clinic offers multidisciplinary team care, consisting of care provided by a rheumatologist, nurse, physical therapist, occupational therapist and social worker. The Medical Ethics Committee of the LUMC approved the study.

The clinical study showed that the introduction of the RAP had no effect on the improvement of functional ability or quality of life, however, a modest, but statistically significant improvement of RA patients' satisfaction with care was seen (15).

For the current study on the contents of multidisciplinary team conferences, only the data of the first 25 consecutive patients with RA who participated in the clinical study and of whom videotapes of all team conferences were available, were used in both periods.

The rehabilitation tool and team conferences

Until 2002, before the introduction of the rehabilitation tool, all team members contributed to the initial as well as the follow-up team conferences of every patient in a fixed order (rheumatologist, nurse, physical therapist, occupational therapist and social worker). For the initial team conferences team members used their own records, whereas for the follow-up team conferences minutes of the previous team conference were also available.

In January 2002, the rehabilitation tool was introduced and was fully implemented in January 2003. The rehabilitation tool was the Rehabilitation Activities Profile (RAP), a comprehensive checklist of activities of daily living and societal participation based on the International Classification of Functioning, Disability and Health (ICF) (16), formerly described by the International Classification of Impairments, Disability and Handicap (ICIDH) (7). The RAP consists of five domains on the level of activities and participation: communication, mobility, personal care, occupation and relationships (12). The five main RAP domains are divided into 21 items, which comprise 71 sub-items. For example the item 'walking' in the domain mobility has two sub-items (indoors and walking outdoors), and the item 'dressing' in the domain personal care has five sub-items (upper part of the body, lower part of the body, fastenings, body-worn aids and ornaments/adornments) (12).

With the implementation of the RAP, every item and its corresponding sub-items were allocated to two health professionals from different disciplines, according to their specific expertise. With every (sub)item a score for limitation as well as patient perceived problem was given (yes/no format), and there was space for a written comment. Other team members were encouraged to make a contribution to any (sub)item if this would provide additional information. Every health professional did the scoring during his or her initial regular assessment of the patient (interview and physical examination), which was scheduled on the first or second day of the admission in all cases.

For the purpose of this study, an electronic version of the RAP was created by using a form generator (Vragenbank®). Based on a pre-defined template, an initial and a follow-up RAP report form could be generated. Both the initial and follow-up report forms were also made available in paper form by means of a specially developed printing function of the form generator. An empty version of the paper form of the initial RAP report form was used by every team member for the initial assessment of the patient. The data were entered into the electronic version of the RAP afterwards. The electronic RAP report forms were embedded in a particular part of the hospital's information system (HIS). This part presented information on a specific patient in a coherent way, such as: laboratory results, radiology results, medication and discharge letters. The patient's identifying data were inserted into the RAP report forms automatically from the HIS. The electronic version could be accessed by individual health professionals from any place in hospital and was available any time.

The initial RAP report form comprised the filled-in RAP (limitations, problems) regarding common treatment goals. For that purpose, all team members should have filled in the assigned (sub)items and possibly also some other items that were deemed relevant by the team member. The proposed treatment goals were discussed during the initial team conference and afterwards with the patient. The agreed common treatment goals were, after manual selection by the administrative assistant, automatically transferred from the initial RAP report form to the follow-up RAP report form. The follow-up RAP report form has the possibility to describe the progress of achievement of those goals (achieved, partially achieved, and not achieved). The electronic follow-up forms were filled in during the follow-up team conferences by the administrative assistant.

Both the filled-in initial and follow-up report forms were delivered on paper to all team members by the administrative assistant before every team conference.

Similar to the situation before the introduction of the RAP, the rheumatologist started every team conference about a particular patient by giving information about the current health status and the medical treatment. The order of the initial and follow-up team conferences was directed by the proposed and the agreed common treatment goals, respectively. So, in contrast with the situation before the introduction of the RAP, the order and course of the team conferences were directed by the treatment goals rather than by the fixed contribution of the five disciplines involved.

In both periods, the planning of the various interventions that were part of the individual day patient care treatment programmes was unchanged. Initial assessments were performed by all disciplines within two treatment days, followed by individual treatment programmes, tailored to personal needs. Every treatment day comprised interventions by at least three different disciplines, with exercise therapy being a fixed part of every day care programme. In both periods the duration of treatment was determined by the multidisciplinary team, and depended on the achieved health gains of the patient.

Measurements

Sociodemographic, disease and treatment characteristics
Sociodemographic and disease characteristics of the patients recorded at baseline were age, disease duration (years), sex, rheumatoid factor (positive; yes/no), erosions (yes/no), current use of medication, status of living (living alone; yes/no), education level (low: up to and including lower professional training; medium: up to and including secondary professional training; high: up to and including higher professional training and university), employment status and previous admission to a rehabilitation clinic. Furthermore, the number of treatment days at the rehabilitation day patient clinic was recorded in both periods. A treatment day was defined as an individual day patient care programme, provided between 10a.m. and 4p.m.

Contents of communication during team conferences
All team conferences of 25 patients in both periods were videotaped from the same position in the same meeting room (17). The camera was running before the start of the meeting in order to prevent different behaviour by the team members (18). After videotaping, the data were stored on CD-ROM.

The team conferences were analysed by using a self-developed measurement instrument to evaluate the contents of the communication during multidisciplinary team conferences. The reliability and face validity of this instrument have been previously established in a rheumatology setting (19). The instrument concerned a structured scoring form, by which the time spent on three types of communication (19) was recorded:

Type I. Oral communication concerning information on the patient's health status with the goal of grounding, i.e. achieving a shared view of the current health status of the patient.

Type II. Oral communication regarding practical arrangements among no more than two team members. An example is when the physician asks the nurse to schedule a patient's appointment.

Type III. Oral communication on the setting or adaptation of common treatment goals or the attunement of interventions related to the common treatment goals. An example is when a team discusses the activities that must be performed before a patient can be discharged.

We hypothesized that the introduction of the RAP would accomplish a shift from information exchange (type I) towards discussions about the common treatment goals and plans (type III).

Video scoring was executed by two trained investigators (JV and PJT) who were not involved in the treatment. From every part of the team conference that was devoted to a specific patient, the following characteristics were assessed: the status (initial or follow-up), the total duration (the time from the mentioning of the name of the patient to the mentioning of the name of the next patient by the chairperson; in seconds), and the summation of time spent on the three types of communication (in seconds). The total duration of the team conference per patient minus the summation of time spent on the three types of communication (all in seconds) was defined as noise.

Both investigators scored the videos separately on a scoring form. The results were compared and discrepancies were discussed by means of a second scoring of the particular part of the video by both investigators simultaneously. This procedure was repeated until consensus was reached.

Proportions of time spent on types I, II, or III were calculated by dividing the time spent on that type of communication by the summation of time spent on any of the three types of communication to eliminate the effects of noise. Due to the fact that part of the analysis was done on the level of the contents of discussions rather than single verbal actions, the duration of the contributions of the individual team members could not be compared between the two periods. An exception was a part of the contribution of the rheumatologist, as in both periods, the team conferences started with a summary of the medical aspects of the patient's health status.

Statistical analysis

The study was designed considering the change in percentages of time spent on type III during the initial team conferences as the primary outcome measure. Therefore, the number of patients needed to enrol in this study (N) was based on a two-sample t-test power analysis with a difference to detect in mean percentage of time spent on type III communication during initial team conferences between the two periods of 15 %. In another intervention study aimed to investigate whether a training programme for the chairperson of the multidisciplinary team conference changed the verbal activity of the different team members, changes in verbal activity per discipline ranged from 0% to 28% (no standard deviations provided) (20). Based on these findings, we estimated a mean change of 15 % (halfway between 0% and 28%). In addition, we assumed the standard deviation to be equal to the estimated difference, i.e. 15%. Then, with a power

of 0.90 and p<0.05 (two-tailed test), 22 initial team conferences per period would be required.

All measures were expressed as medians and ranges. In case of median values of zero, the means (S.D.) were presented. Differences between the patients' characteristics between the two periods were analysed using the Chi-square test, Fisher's exact test or the Mann-Whitney U-test, where appropriate. In order to be able to compare the variable number of follow-up conferences per patient, the follow-up conferences were aggregated (by calculating the means per patient) to 25 summarized cases per period.

Differences regarding the proportions of time spent on each of the three types of communication between initial and follow-up conferences within a period were compared by means of the Wilcoxon signed ranks test. Differences with respect to the proportions of time spent on each of the three types of communication between the two periods for the initial and the follow-up team conferences were compared by means of the Mann-Whitney U-test. All data were analysed with the SPSS Software package version 11.

Results

The baseline sociodemographic and clinical characteristics of the patients in periods I and II as well as the median number of treatment days are shown in Table 1. No statistically significant differences in baseline characteristics between the periods were found, except for the median number of treatment days (10 days in period I and 8 days in period II; p=0.046). In period I the number of treatment days ranged from 6 to 25 days, with outliers being two patients with 23 and 25 treatment days, respectively, due to medical complications.

In total, there were 25 initial and 86 follow-up team conferences (median 3, range 1-6) in period I and 25 initial and 71 follow-up team conferences (median 3, range 1-4) in period II to be analysed. The characteristics of the videotaped initial and follow-up team conferences are shown in Table 2.

The median total *absolute* duration of the initial team conferences per patient was significantly longer in period II (666s) as compared to period I (448s) (p<0.001). Although the total absolute duration of the follow-up team conferences was also longer in period II than in period I (284 and 315s in periods I and II, respectively), this difference did not reach statistical significance (p=0.43).

With respect to the absolute duration of time spent on noise and the three types of communication, overall the absolute duration of time spent on noise and type II communication was shorter and the absolute time spent on type I and type III communication was longer in period II than in period I. Concerning the decrease in time spent on type II communication, the difference between the two periods reached statistical significance for both the initial and the follow-up team conferences. Regarding the differences in the absolute duration of time spent on noise and types I and III communication, the differences reached statistical significance for either the initial or the follow-up team conferences.

Table 1 Comparison of clinical and sociodemographic baseline characteristics and number of treatment days of patients with RA admitted for multidisciplinary day team care in a period before (I; N=25) and a period after (II; N=25) the introduction of the Rehabilitation Activities Profile

	Period I N=25	Period II N=25	P Value[#]
Median (range)			
Age (year)	59 (25-75)	59 (29-79)	0.73
Duration of RA (year)	4 (0.8-23)	5 (0.5-33)	0.90
Number of treatment days	10 (6-25)	8 (4-11)	0.046[*]
Number of patients (%)			
Female	18 (72)	17 (68)	1.0
With positive rheumatoid factor	17 (68)	17 (68)	1.0
With erosions	20 (80)	14 (56)	0.13
Current use of medication:			
NSAID[a]	18 (72)	18 (72)	1.0
DMARD[b]	18 (72)	23 (92)	0.14
Oral corticosteroids	7 (28)	3 (12)	0.29
Living alone	6 (24)	7 (28)	1.0
Education level			
Low	17 (68)	18 (72)	1.0
Medium	5 (20)	4 (16)	1.0
High	3 (12)	3 (12)	1.0
With paid employment	7 (28)	6 (24)	1.0
With previous admission to rehabilitation clinic	9 (36)	10 (40)	1.0

[#] Chi-square test, Fisher's exact test or Mann-Whitney U-test, where appropriate, significance level of $P \le 0.05$.
[*] $P < 0.05$, Mann-Whitney U-test.
[a] Non-steroidal anti-inflammatory drugs.
[b] Disease modifying anti-rheumatic drugs.

The significantly longer absolute duration of the initial team conferences in period II as compared to period I appeared to be mainly the result of the significantly longer duration of type III communication in period II as compared to period I (243 (65-442)s and 0 (0-108)s, respectively). This increase in absolute time spent on type III communication was not counterbalanced by the decrease in time spent on type I and type II communication.

Table 2   Characteristics of initial and follow-up team conferences concerning 25 consecutive patients with RA treated by a multidisciplinary day patient care team in period I and II

	Period I		Period II		P Value[a]	
	Initial team conferences	Follow-up team conferences	Initial team conferences	Follow-up team conferences	Initial team conferences period I/II	Follow-up team conferences period I/II
Total number of team conferences (initial and follow-up) video-recorded	25	86	25	71	1.0	0.58
Total number of team conferences missed	0	3	0	0		
Absolute total duration team conference (s)[b]	448 (301-710)	284 (148-564)*	666 (259-1249)	315 (158-467)*	<0.001	0.43
Absolute duration three types of communication (s)[b]	409 (270-694)	255 (132-547)*	617 (243-1221)	293 (148-429)*	<0.001	0.25
Absolute noise duration (s)	36 (1-152)	25 (5-71)*	20 (4-128)	20 (7-50)	0.02	0.12
Absolute time (s) spent on communication type:						
Grounding duration (type I)	368 (214-694)	155 (29-266)*	340 (114-986)	190 (51-335)*	0.61	0.05
Non-team co-ordination (type II)	0 (0-110)[c]	7 (0-85)	0 (0-30)[d]	0 (0-0)	<0.005	<0.001
Team co-ordination (type III)	0 (0-108)[e]	79 (17-342)*	243 (65-442)	86 (52-268)*	<0.001	0.79
Proportion of noise (%) from total duration team conference	9 (0.2-36)	9 (2-25)	3 (0.6-18)	6 (3-13)*	<0.005	0.06
Proportion of time (%) spent on communication type:						
Grounding (type I)	89 (72-100)	62 (7-84)*	62 (20-84)	68 (15-86)	<0.001	0.05
Non-team co-ordination (type II)	0 (0-23)	5 (0-24)	0 (0-5)	0 (0-0)	<0.001	<0.001
Team co-ordination (type III)	0 (0-25)	33 (13-85)*	38 (16-74)	32 (14-85)	<0.001	0.81
Proportion of time (%) spent by medical doctor	31 (15-60)	20 (6-39)*	20 (8-47)	17 (4-61)	<0.001	0.16

All values are presented as median (range). All values from follow-up team conferences are presented as median (range) of the total number of follow-up team conferences per patient.

a Mann-Whitney U-test or Chi-square test where appropriate.

b The absolute total duration may not add up to the same value as the sum of the separate communication types and noise due to the use of the median.

c Mean value (S.D.): 21 (31).

d Mean value (S.D.): 1 (6).

e Mean value (S.D.): 26 (37).

* $P < 0.05$, Wilcoxon signed ranks test, initial compared with follow-up team conferences.

Regarding the *proportions* of time spent on noise and the various types of communication, the median proportion of noise of the initial team conferences was significantly greater in period I (9%) than in period II (3%) (p=0.003), whereas for the follow-up conferences there were no differences in duration of noise (9% and 6% in periods I and II, respectively; p=0.06). The proportion of time spent on grounding (type I) was significantly greater in period I (89%) as compared to period II (62%) (p<0.001) for the initial team conferences, whereas for the follow-up team conferences the proportion of time spent on grounding was greater in period II (68%) than in period I (62%) (p=0.05).

The proportion of time spent on the making of practical arrangements among no more than two team members (type II) decreased in period II as compared to period I for both the initial as well as follow-up team conferences.

The proportion of time spent on team co-ordination during initial team conferences was significantly smaller in period I (0%) than in period II (38%), whereas for the follow-up team conferences there were no significant differences between the two periods (33% and 32% in periods I and II, respectively; p=0.81).

The proportion of time spent on the rheumatologist's presentation of medical information was significantly greater in period I (31%) than in period II (20%) (p<0.001) for the initial team conferences. However, with respect to the follow-up team conferences there were no significant differences between the two periods (20% and 17% in periods I and II, respectively; p=0.16).

Within both periods I and II, time spent on grounding made up the larger part of the team conferences, regardless of whether an initial or a follow-up conference was concerned (period I: 89% and 62% in the initial and the follow-up conferences, respectively; period II: 62% and 68% in the initial and the follow-up conferences, respectively).

Discussion and suggestions for further research

In a multidisciplinary team care setting in rheumatology, the implementation of a rehabilitation tool to structure the team conferences had a significant impact on the contents of the communication. For the initial team conferences, the proportion of time spent on the evaluation of common treatment goals and management strategies increased and the proportions of time spent on noise, grounding and non-team co-ordination decreased significantly. For the follow-up team conferences the same trends were seen, with only the decrease in proportions of time spent on grounding and non-team co-ordination activities reaching statistical significance. Overall, the absolute duration of the initial team conferences increased.

The literature concerning the evaluation of the effect of interventions aimed to improve the quality of multidisciplinary team conferences is scarce (19).

In two studies the effect of the implementation of the same rehabilitation tool as employed in the present study, the RAP, on multidisciplinary team conferences was examined (13,14). Although the results of these studies are difficult to compare with

those of the present study, the conclusion of the study by Roelofsen et al. (14), that treatment plans are becoming more result-oriented, points in the same direction as the outcomes of the present study. In addition, two studies concerning interventions aimed to improve the communication during team conferences are of special interest (20,21). Although other interventions than the introduction of a rehabilitation tool were involved, these studies comprised an analysis of the communication during multidisciplinary team conferences in a direct way, similar to the present study. One study (21) evaluated the effects of the introduction of a structured team conference format and the appointment of a co-ordinator and another study (20) evaluated the effects of a team conference chairperson training programme. On the basis of an analysis of tape recordings, a decrease in the participation rate of the medical doctor (20,21) as well as a shift towards more attention for the patient's need for information (20) was demonstrated. In these two studies, the level of analysis did not pertain to the interaction among team members but rather the detached verbal actions of single participants (20,21). Moreover, these studies did not discriminate between the impact of interventions on the type of team conferences (initial or follow-up).

In our study, the impact of the intervention appeared to be greater for initial than for follow-up team conferences. Therefore, we hypothesized that for the follow-up team conferences, the ratio between the three types of communication (with, on average 2/3 of the time being spent on grounding and 1/3 on the evaluation of the common treatment goals and management strategies) was already optimal, leaving little room for further improvement. Our study demonstrated that, apart from a *relative* increase of the time spent on team co-ordination, the *absolute* duration of time spent on this type of communication of the initial team conferences did also increase significantly. This increase was not counterbalanced by absolute decreases in time spent on the other types of communication, so that the total absolute duration of the initial team conferences increased significantly. It should be noted that overall the absolute and relative decrease in time spent on noise or type I or type II communication were relatively small, despite statistical significance. This was especially the case for type II communication. All of these findings implicate that for every clinical setting, it remains to be established whether a longer duration of patient conferences is feasible and is justified by improvement of its quality. Whether the increase of the time spent on discussions on common treatment goals and common management strategies during the initial team conferences has resulted in more appropriate goal setting and resulting better clinical outcomes or increased patient satisfaction, remains to be established. An interesting observation in this respect was that the *average* duration of admission was significantly shorter in period II than in period I. With the patient characteristics and medical treatment showing no differences between the two periods, it remains unclear to what extent the decrease in average length of stay could be ascribed to chance, unknown factors with an impact on length of stay or the more goal-oriented approach employed in the second period.

After implementation of the RAP the proportion of time spent on the provision of medical information (grounding) by the physician during initial team conferences was significantly lower than before its introduction. A decrease of participation of the medi-

cal doctor was also seen in the two previously mentioned studies (20,21). This finding indicates that the communication process has become more democratic and less physician-dominated (21), however, in the present study this was only found during the initial team conferences.

The reliability and validity of the scoring methods employed in the abovementioned studies concerning a direct analysis of team conferences (20,21) have not been reported. In contrast with the methods employed in these studies, which focused on frequencies and contents of transcripted detached verbal activities of individual team members, the instrument used in the present study was concerned with connected verbal activities from different persons. Our instrument may therefore provide a useful addition to the currently available instruments for the analysis of group communication processes. It remains to be established whether the performance of our measurement instrument is similar when audiotapes instead of videotapes are used.

A limitation of the present study was that we used the time spent on various types of communication as a proxy for the quality of communication during multidisciplinary team conferences, whereas until now there is no gold standard for this concept. However, it is conceivable that the time spent on specific types of communication could serve as a proxy for quality, as the exchange of too much information is generally seen as a negative attribute for team conferences (7-9,13,22). Apart from indirect methods, such as questionnaires among health professionals, direct evaluations of team conferences have been employed. These include audiotaped and videotaped team conferences, usually analysed by means of measurement of the duration of speaking time of the various participants (20,21) rather than by the duration of specific types of communication. In future research, the methods for the analysis of audiotaped or videotaped team conferences should be further refined and standardized. Moreover, as the study was executed in one hospital and concerns one specific setting (rheumatology), it is not clear whether in other situations where multidisciplinary team conferences are involved, similar results would have been obtained.

In conclusion, a significant impact of the introduction of a rehabilitation tool and an accompanying computer application on the contents of the communication during multidisciplinary team conferences was found. More research is needed to find out how the effects on the communication compare to other aspects of team care such as cohesiveness and team members' assessments of administrative load and costs, clinical outcomes and patient satisfaction.

Summary points

What is already known:
–   Team conferences pay a positive contribution to the multidisciplinary management of complex health conditions.
–   Problems with the communication during team conferences pertain to the exchange of too much information which is (partially) irrelevant for other team members.
–   So far, studies on the impact of interventions aimed at improvement of the communication during team conferences, such as rehabilitation tools, have not focused on the contents of communication.

What this study adds:
–   With the implementation of an information and communication technology (ICT)-mediated rehabilitation tool the proportion of time spent on the discussion of common treatment goals and management strategies during initial team conferences in a multidisciplinary day patient care setting in rheumatology increased, whereas this effect was absent in follow-up team conferences.
–   Studies pertaining to the communication during multidisciplinary team conferences need to differentiate between initial and follow-up team conferences.
–   For the description of changes in the communication during multidisciplinary team conferences, an analysis on the level of the contents of the communication in addition to an analysis on the level of individual messages is a feasible and useful approach.

References

1.   Jacobi CE, Triemstra M, Rupp I, Dinant HJ, van den Bos GAM. Health care utilization among rheuma-
     toid arthritis patients referred to a rheumatology center: unequal needs, unequal care? Arthritis Care
     Res 2001;45:324-30.
2.   Li LC, Maetzel A, Pencharz JN, Maguire L, Bombardier C, and the community hypertension and arthri-
     tis project (CHAP) team. Use of mainstream nonpharmacologic treatment by patients with arthritis.
     Arthritis Care Res 2004;51:203-9.
3.   Petersson IF. Evolution of team care and evaluation of effectiveness. Curr Opin Rheumatol 2005;17:160-
     3.
4.   Vliet Vlieland TPM. Multidisciplinary team care and outcomes in rheumatoid arthritis. Curr Opin
     Rheumatol 2004;16:153-6.
5.   Spiegel JS, Spiegel TM. An objective examination of multidisciplinary patient conferences. J Med
     Educ1984;59:436-8.
6.   King MA, Roberts MS. Multidisciplinary case conference reviews: improving outcomes for nursing
     home residents, carers and health professionals. Pharm World Sci 2001;23:41-5.
7.   Jelles F, van Bennekom CAM, Lankhorst GJ. Instruments to structure interdisciplinary team confer-
     ences in rehabilitation medicine: the added value of the Rehabilitation Activities Profile. J Rehabil Sci-
     ences 1995;8:51-7.
8.   Jelles F, van Bennekom CAM, Lankhorst GJ. The interdisciplinary team conference in rehabilitation
     medicine. Am J Phys Med Rehabil 1995;74:464-5.
9.   Jelles F, van Bennekom CAM, Lankhorst GJ, Bouter LM, Kuik DJ. Structuring multidisciplinary team
     conferences with the Rehabilitation Activities Profile report system: RAP-TEAM. In: Van Bennekom
     CAM and Jelles F. Rehabilitation Activities Profile: the ICIDH as a framework for a problem-oriented
     assessment method in rehabilitation medicine. Thesis, ISBN: 90-9008070-8, Free University Amster-
     dam, 1995.
10. Wressle E, Lindstrand J, Neher M, Marcusson J, Henriksson C. The Canadian Occupational Perform-
     ance Measure as an outcome measure and team tool in a day treatment programme. Disabil Rehabil
     2003;25:497-506.
11. Steiner WA, Ryser L, Huber E, Uebelhart D, Aeschlimann A, Stucki G. Use of the ICF model as a clini-
     cal problem-solving tool in physical therapy and rehabilitation medicine. Phys Ther 2002;82:1098-107.
12. Van Bennekom CAM, Jelles F, Lankhorst GJ. Rehabilitation Activities Profile: the ICIDH as a frame-
     work for a problem-oriented assessment method in rehabilitation medicine. Disabil Rehabil 1995;17:169-
     75.
13. Jelles F, van Bennekom CAM, Lankhorst GJ, Bouter LM, Kuik DJ. Introducing an innovative method in
     team conferences. Disabil Rehabil 1996;18:374-9.
14. Roelofsen EE, Beckerman H, Lankhorst GJ, Bouter LM. The effects of the Rehabilitation Activities Pro-
     file for children on the quality of team conferences. In: Roelofsen EE. The Rehabilitation Activities
     Profile for children. Development, implementation and evaluation. Thesis, ISBN: 90-5669-055-8, Free
     University Amsterdam, 2001.
15. Verhoef J, Toussaint PJ, Zwetsloot-Schonk JHM, Breedveld FC, Putter H, Vliet Vlieland TPM. Effective-
     ness of the introduction of an International Classification of Functioning, Disability and Health-based

rehabilitation tool in multidisciplinary team care in patients with rheumatoid arthritis. Arthritis Rheum 2007;57:240-8.

16. World Health Organization. ICF: International Classification of Functioning, Disability and Health. Geneva: WHO, 2001.

17. Pringle M, Stewart-Evans C. Does awareness of being video recorded affect doctors' consultation behaviour? Br J Gen Pract 1990;40:455-8.

18. Ram P, Grol R, Rethans JJ, Schouten B, van der Vleuten C, Kester A. Assessment of general practitioners by video observation of communicative and medical performance in daily practice: issues of validity, reliability and feasibility. Med Educ 1999;33:447-54.

19. Verhoef J, Toussaint PJ, Putter H, Zwetsloot-Schonk JHM, Vliet Vlieland TPM. Pilot study of the development of a theory-based instrument to evaluate the communication process during multidisciplinary team conferences in rheumatology. Int J Med Inform 2005;74:783-90.

20. Engström B. Communication and decision-making in a study of a multidisciplinary team conference with the registered nurse as conference chairman. Int J Nurs Stud 1986;23:299-314.

21. Halstead LS, Rintala DH, Kanellos M, Griffin B, Higgins L, Rheinecker S, et al. The innovative rehabilitation team: an experiment in team building. Arch Phys Med Rehabil 1986;67:357-61.

22. Haig AJ, LeBreck DB. Measurement of change in rehabilitation team dynamics with the Team Assessment Profile (TAP). Int J Rehabil Health 2000;5:71-83.

Chapter 8

Summary and discussion

Summary

Despite the increasing usage of new and effective drugs, a substantial proportion of patients with RA will have a relatively low, but persistent level of disease activity. Therefore, many patients with RA are in need of long-term comprehensive care delivered by rheumatologists and health professionals from various disciplines. It is known that the access to and the co-ordination of services within comprehensive arthritis care are often insufficient.

This thesis describes the development and evaluation of an arthritis care delivery model in which allied health professionals in primary and institutional care and rheumatologists are involved. Furthermore, the optimization of a traditional multidisciplinary team care model in arthritis management by means of a rehabilitation tool with accompanying computer application is presented.

Chapter 1 gives a short introduction on the treatment of RA, including the usage of non-pharmacologic modalities. The traditional multidisciplinary team care model has long been considered to be the optimal management strategy for RA, however, its availability is limited, underscoring the need for the development and evaluation of alternative arthritis care models. Moreover, it has been questioned whether the delivery of multidisciplinary team care can be optimized with respect to enhancement of the patient's role and communication among team members. For that purpose, the introduction of rehabilitation tools in multidisciplinary team care has been advocated, however, the evidence for their effectiveness in arthritis management is scarce and does not take into account their support by information technology. The research methodology for an appropriate evaluation of the impact of the introduction of rehabilitation tools with accompanying computer applications in multidisciplinary team care, as well as non-pharmacological care in general, is still an underdeveloped area. In this chapter, theoretical frameworks to form the basis for process evaluations for complex care processes are presented.

Chapter 2 describes the feasibility of setting up a system of regional physical therapy networks regarding the treatment of patients with rheumatic diseases. The networks were aimed to enhance care provided by primary care physical therapists by improving their knowledge, technical and communicative skills and the collaboration with rheumatologists. Sixty-three physical therapists from two regions in the Netherlands followed a 5-day postgraduate training course followed by bimonthly workshops and teaching practices in both networks during the evaluation period of 18 months. During this period their knowledge increased significantly and the self-reported communication with other physical therapists and rheumatologists improved. The number of patients treated by physical therapists in the network increased significantly compared to a control group of physical therapists not participating in the network. Eighteen months after the start of the networks, patients' satisfaction scores within the networks were significantly higher than those from outside the networks. It was concluded that setting up physical therapy net-

works for continuing education with the aim to enhance care of patients with rheumatic diseases is feasible and could improve arthritis care management.

Chapter 3 describes a study comparing the impact of the use of an International Classification of Functioning, Disability and Health (ICF)-based rehabilitation tool (Rehabilitation Activities Profile; RAP) on clinical effectiveness and patient satisfaction in a rheumatology multidisciplinary team care setting. This study included all consecutive patients with RA admitted in two 12 month periods, before and after the introduction of the RAP. Primary outcome measure was a patient-oriented measure of functional ability (MACTAR; McMaster Toronto Arthritis Patient Preference Disability Questionnaire), whereas secondary outcome measures included measures of physical and mental functioning, quality of life, disease activity and patient satisfaction. Overall, patients improved significantly between admission and discharge and between admission and six weeks after discharge, however, there was no significant difference between the improvements in the two periods. Patient satisfaction was significantly higher in the period after the introduction of the RAP, however, the absolute difference was small. It was concluded that in RA patients admitted for multidisciplinary team care, the introduction of the RAP did not change clinical effectiveness, but had a modest beneficial impact on patients' satisfaction.

Alongside the study of the clinical effectiveness of the introduction of the RAP in multidisciplinary team care, the impact of this rehabilitation tool and its accompanying computer application on the team members' satisfaction with team functioning, team conferences and administrative load was investigated. *Chapter 4* describes the results of this study, showing that in the day patient setting the introduction of a rehabilitation tool had a positive effect on team members' satisfaction with team functioning, team conferences and the quality of written information exchange. However, in the inpatient setting the effect was absent or the opposite. Due to the small sample size of this study, it is difficult to draw general conclusions on the impact of the introduction of the rehabilitation tool and its accompanying computer application in rheumatology. The findings clearly indicate that in this research area, evaluations on an aggregated level (taking together various teams and settings) can not be recommended.

In the previous chapters, the qualities of the RAP as a tool to structure and facilitate the team care process were studied. *Chapter 5* reports the psychometric properties of the RAP used as an instrument to evaluate the outcomes of multidisciplinary team care. For that purpose, clinical data from the study described in Chapter 3 were used, in particular the data from the 12 month period after the RAP had been introduced.

It appeared that the RAP score at admission was significantly associated with all other outcome measures. The mean RAP score improved significantly in the period between admission and discharge and in the period between admission and six weeks after discharge. According to three measures of responsiveness (effect size, standardized response mean, and responsiveness ratio), the responsiveness of the RAP appeared to be

moderate to high. In conclusion, the RAP proved to have a sufficient validity and responsiveness and in case could, apart from its value regarding the structure of the team care process, be employed as an instrument to evaluate outcomes of multidisciplinary team care in patients with RA.

As already mentioned in Chapter 1, the methodology to evaluate innovations including communication technology in health care is an area of research needing further development. In *Chapter 6*, the development and evaluation of an instrument to analyse the communication during multidisciplinary team conferences, based on the theory of communication, is described. With this instrument, two investigators independently analysed 20 videotaped multidisciplinary team conferences concerning 10 patients with RA admitted to a rheumatology clinic. The inter-rater-reliability was found to be excellent. Face validity was studied by comparing the pattern of communication of 25 initial with 86 follow-up team conferences concerning 25 patients with RA. The instrument proved to be able to discriminate communication patterns between initial and follow-up conferences. Given the reliability and face validity of the instrument, a further evaluation of its usefulness in the analysis of complex communication processes in health care appeared warranted.

The instrument described in Chapter 6 was used to investigate the impact of the introduction of a rehabilitation tool including a computer application on the communication patterns during multidisciplinary team conferences in a rheumatology setting. Connected with the clinical study described in Chapter 3, *Chapter 7* describes a study comparing the communication during multidisciplinary team conferences in a period where the RAP was not used and a period where the RAP was applied.

In both periods, the initial and follow-up videotaped team conferences of 25 patients with RA were analysed with the instrument described in Chapter 6. It was found that the introduction of the RAP had a significant impact on the communication pattern during initial team conferences but to a lesser extent on follow-up team conferences with a shift towards more time being spent on mutual attunement of treatment goals and treatment plans.

Discussion

Rheumatoid arthritis is a chronic disease, which, despite advances in medical treatment, requires the services of various health professionals (e.g. rheumatologists, nurses, physical therapists, occupational therapists and social workers) in many patients. A shortage of specialized health care practitioners and facilities and increasing cost-constraints in health care are creating challenges for arthritis care. This is all the more important as demand for services is expected to increase in the next 20 years (1). To approach these challenges, many countries are beginning to develop new models for arthritis care, that may involve information technology, educational interventions, patient-initiated care and extended roles for health professionals (1).

In this thesis, an arthritis care model concerning a system of networks and continuing education for physical therapists in primary care is described. Moreover, this thesis focuses on the evaluation of the introduction of a rehabilitation tool including a computer application in multidisciplinary team care. Its results can be used to improve specific components of the arthritis care process, such as the education of health professionals and the delivery of multidisciplinary team care.

Networks of health professionals in primary care

The regional physical therapy networks described in the present thesis had two main goals: to extend knowledge and skills and to improve communication among physical therapists and rheumatologists. With admissions for multidisciplinary care becoming more and more rare, the delivery of appropriate care by health professionals in primary care becomes all the more important. Important prerequisites for a transition of care from specialized centres to primary care are sufficient levels of knowledge and clear and direct communication structures.

The evaluation of the system of regional networks and continuing education for physical therapists substantiated the feasibility of this arthritis care model. The favourable results are in line with the positive outcomes of a Canadian project where on the local level physical therapists, general practitioners and other health professionals were educated regarding the diagnosis and treatment of inflammatory arthritis (2). Differences between the two projects pertain, among other things, to the professional backgrounds of the health professionals involved and the extent of the educational programme. These differences underscore the recognition that arthritis care models should always be tailored to local needs. As apart from the networks in the two regions as described in this thesis a substantial number of similar networks in other regions in the Netherlands have evolved, the system of regional networks and continuing education for physical therapist appears to be suitable for a broader implementation in our country. For that purpose, a number of prerequisites need to be met, such as:

- The development of standards for advanced curricula in arthritis care as well as standards for the processes assuring continuing these competencies for physical therapists
- The development of a process for monitoring and ensuring the quality of service delivery
- Recognition of the acquired competencies by relevant stakeholders such as the professional organization of physical therapists, patient organizations, rheumatologists, and health insurance companies
- Visibility

The abovementioned demands indicate that implementation on a larger scale with sufficient quality assurance is only feasible by means of a joint effort of all relevant stakeholders. In the implementation process, the engagement of health professionals other than rheumatologists and physical therapists needs to be taken into account. Examples in other countries have taught us that *joint* advanced education of health professionals

from various disciplines is feasible (2-5). Apart from a gain in efficiency in the provision of education, beneficial side effects may pertain to enhancement of communication and co-operation among health professionals and of the co-ordination of service delivery. Moreover, joint education models may contribute to the levelling of interdisciplinary boundaries. The favourable outcomes of the primary therapist model, where physical therapists and occupational therapist are trained to provide arthritis care related to either profession (4,5), indicate that a far going integration of health professionals' advanced education in arthritis care is attainable.

Optimization of multidisciplinary team care by rehabilitation tools: the value of the RAP
Apart from innovative arthritis care models, this thesis focused on the optimization of a traditional form of care, i.e. multidisciplinary team care. This aim is closely related to the knowledge gap concerning the active elements of multidisciplinary arthritis care. For that purpose, studies employing methodologies other than the randomized controlled trial (6,7), which focus on the *process* of care have been advocated (8,9). Our results indicate that the introduction of a rehabilitation tool, the Rehabilitation Activities Profile (RAP), with accompanying computer application in multidisciplinary team care did not have an effect on clinical outcomes, but had a slight, yet statistically significant effect on patient satisfaction. With respect to the impact on the health professionals involved, the process of communication, team functioning in general and the administrative workload appeared to be influenced, with conflicting results for the two multidisciplinary teams involved in the study.

The mixture of results pertaining to different outcome measures and two different settings (day patient and inpatient) make it difficult to draw a firm conclusion whether the usage of the rehabilitation tool should be recommended or not in the clinic involved in the studies presented in this thesis, as well as in other rheumatology rehabilitation settings. The analysis with respect to patients' clinical outcomes and satisfaction as employed in the present study does not allow for a definite conclusion with respect to a more favourable effect in one of the two settings. The patient numbers were, however, too small for a subgroup analysis. It could be hypothesized, however, that patients admitted on the inpatient ward had different expectations of the goals and outcomes of care than patients in the day patient ward. In general, inpatients were primarily in need of intensive medical and nursing care with in addition a demand for interventions such as physical therapy, occupational therapy or care provided by a social worker. With respect to its impact on staff satisfaction, the clear distinction between its impact on team functioning and team satisfaction with conferences in the inpatient and day patient setting indicate that a rehabilitation tool such as the RAP is more suitable for a "true" rehabilitation setting than for an inpatient nursing ward.

In that respect, it needs to be considered that economic considerations are also important to outweigh the advantages and disadvantages of interventions in health care. Our studies did, however, not include an economic analysis, comprising aspects such as the costs of the development of the computer application, the training, the conferences and contacts needed to guide the implementation process, the duration of the team con-

ferences and the administrative procedures and the average length of stay. Considerations on whether or not to proceed or extend the usage of the rehabilitation tool should also include an analysis of factors that may have played a role in the lack of clinical effectiveness among patients and conflicting experiences among health professionals. With respect to the lack of clinical effectiveness, it could be questioned whether the contents of the RAP in its present form are optimal for arthritis care. The RAP is predominantly focused on the ICF level of Activities and Participation, however, the spectrum of problems encountered by patients with RA is broad, and includes a number of aspects on the level of Body Functions, Body Structures, Environmental and Personal Factors as well (10). Limitations and problems on the level of Activities and Participation must always be seen in connection with the other levels of disease consequences, so that the focus of the RAP may be too narrow. On the other hand, our investigations also indicated that some areas included in the RAP, such as the domain Communication, might not be very relevant for patients with RA. Moreover, the setting and duration of follow-up of rehabilitation must be taken into account. Goals on the level of participation can usually only be attained in patients who are at home, and not during or directly following admission, especially not during inpatient treatment. The RAP in its present form may therefore be less suitable for the monitoring of progress and evaluation at discharge in settings where admissions are brief. All of these reflections point into the direction of consideration of adjustment of the contents of the RAP according those areas that have been previously identified to be relevant by patients with RA and expert health professionals (10) and to the rehabilitation setting where it is to be used. In this respect, it could be worthwhile to study the qualities of other rehabilitation tools. The IRES-3 (Indicators of Rehabilitation Status) (11,12) for example, is also an ICF-based rehabilitation tool, which covers the ICF Components Body Functions, Body Structures, Activities and Participation and Personal and Environmental Factors. This instrument proved to be reliable, valid and sensitive to clinical changes in various rehabilitation settings with many different patient groups (11-13). An advantage of the IRES-3 is that it is self-administered, whereas with the RAP one or more health professionals are involved. In our studies, the RAP was predominantly used by various health professionals at the same time, with all of them applying a specific part. For that purpose, the scoring system was in part omitted and items and sub-items were only judged in a yes/no format. In our study on the responsiveness of the RAP, however, the RAP including the scoring system was done by one health professional, which method was also employed in previous studies where the RAP was applied (14-20). Further studies on the optimization of the usage of the RAP should include an evaluation of differences between its application by one health professional, by a division of items among health professionals or by means of a self-administered version.

In contrast with the RAP, with the IRES-3 (11-13) as well as other rehabilitation tools (21,22), no distinction is made between perceived impairments or limitations and perceived problems. Although this distinction is advocated as an advantage of the RAP, it is not accounted for in its scoring system, and future research should explore its added value.

Assessing the impact of Information Technology in health care

In this thesis we assessed the impact of information technology (IT), by focusing on the way it changed communicative behaviour in a well-defined setting. In general we can say that changing communicative behaviour is one of the major effects of the usage of IT in an organizational setting (23,24). The impact on communication can be assessed by taking into account both its efficacy as well as its efficiency.

Concerning Te'eni's observation that the main goal of communication is to achieve mutual understanding (25), it could be hypothesized that the level by which this is achieved determines the efficacy of the communication. This leaves us with the problem of defining and measuring mutual understanding. In the literature, a number of methods are suggested (25,26). In this thesis we have based our judgement on the efficacy of the team conference communication on the preposition that mutual understanding is achieved when team members are able to agree on common treatment goals. The analysis of the communication during multidisciplinary team conferences demonstrated that in the rheumatology setting, the introduction of a rehabilitation tool with accompanying IT application facilitated the process of mutual agreement on treatment goals.

Efficiency of communication boils down to the effort and time it takes to reach mutual understanding. In this thesis we have assumed that a team conference (a face-to-face meeting, that consumes considerable time from the health professionals) should be used primarily for discussing and negotiating common team goals. All other communication activities, such as informing each other about the patient's health status, should be as limited as possible. This implies that other means must be sought for exchanging information on the patient. In our case we made this exchange asynchronous, by mediating it by means of an IT-application. This enabled health professionals to assess and register the information at a time and place that would suit them best. Indeed, for the initial team conferences, the proportion of time spent on grounding decreased significantly. Grounding can be defined as achieving a shared view of the current health status of the patient, such as a description of the severity and extent of disease activity and the presence of comorbidities. This thesis demonstrated that especially for the initial team conferences, which, before the introduction of the RAP and accompanying IT application consisted for a considerable part of information exchange, a transference of the process of information exchange was indeed accomplished.

In our view, outcome measures, such as patient satisfaction or improvement of health status or health professionals' judgments of team functioning and team conferences, are indirect measures for the impact of IT. This impact must also be assessed in terms of both the efficacy and efficiency of the communication processes it affects. Further research is required into the definition and measurement of mutual understanding in different situations, as well as the relation between the communication measures (process assessments) and the outcome measures. However, this thesis has presented an elaborated case study, offering a clear example of such an approach.

References

1. Li LC, Bombardier C. Setting priorities in arthritis care: Care III Conference. J Rheumatol 2006;33:1891-4.

2. Glazier RH, Badley EM, Lineker SC, Wilkins AL, Bell MJ. Getting a Grip on Arthritis: an educational intervention for the diagnosis and treatment of arthritis in primary care. J Rheumatol 2005;32:137-42.

3. CARE IV Conference [homepage on the internet]. Leeds: University of Leeds. Available from: http://www.leeds.ac.uk/CAREIV/.

4. Li LC, Maetzel A, Davis AM, Lineker SC, Bombardier C, Coyte PC. Primary therapist model for patients referred for rheumatoid arthritis rehabilitation: a cost-effectiveness analysis. Arthritis Rheum 2006;55:402-10.

5. Li LC, Davis AM, Lineker S, Coyte PC, Bombardier C. Effectiveness of the primary therapist model for rheumatoid arthritis rehabilitation: a randomized controlled trial. Arthritis Rheum 2006;55:42-52.

6. Vliet Vlieland TP. CARE: international conference on multidisciplinary care in rheumatoid arthritis. Int J Adv Rheumatol 2003;1:34-6.

7. Petersson IF, Bremander AB, Klareskog L, Stenstrom C. Who cares about team care? Ann Rheum Dis 2005;64(suppl):644.

8. Petersson IF. Evolution of team care and evaluation of effectiveness. Curr Opin Rheumatol 2005;17:160-3.

9. Petersson IF. Team care. Traditions and new trends. J Rheumatol 2006;33:1895-6.

10. Stucki G, Cieza A, Geyh S, Battistella L, Lloyd J, Symmons D, et al. ICF Core Sets for rheumatoid arthritis. J Rehabil Med 2004;44(Suppl):87-93.

11. Schochat T, Pilz C, Neuner R. The Indicators of Rehab Status questionnaire version 3 (IRES-3) in 1818 rehabilitees with musculoskeletal Diseases. Rehabilitation (Stuttg) 2003;42:236-44. In German.

12. Buhrlen B, Gerdes N, Jackel WH. Development and psychometric testing of a patient questionnaire for medical rehabilitation (IRES-3). Rehabilitation (Stuttg) 2005;44:63-74. In German.

13. Igl W, Zwingmann C, Faller H. Sensitivity to change of questionnaires measuring subjective health--results of a prospective comparative study. Rehabilitation (Stuttg). 2006;45:232-42. In German.

14. Jelles F, van Bennekom CA, Lankhorst GJ, Sibbel CJ, Bouter LM. Inter- and intra-rater agreement of the Rehabilitation Activities Profile. J Clin Epidemiol 1995;48:407-16.

15. Van Bennekom CA, Jelles F, Lankhorst GJ, Bouter LM. The Rehabilitation Activities Profile: a validation study of its use as a disability index with stroke patients. Arch Phys Med Rehabil 1995;76:501-7.

16. Van Bennekom CA, Jelles F, Lankhorst GJ, Bouter LM. Responsiveness of the rehabilitation activities profile and the Barthel index. J Clin Epidemiol 1996;49:39-44.

17. Van Balen R, Essink-Bot ML, Steyerberg E, Cools H, Habbema DF. Quality of life after hip fracture: a comparison of four health status measures in 208 patients. Disabil Rehabil 2003;25:507-19.

18. Van Baalen B, Odding E, van Woensel MP, Roebroeck ME. Cognitive functioning of adolescents and young adults with meningomyelocele and level of everyday physical activity. Disabil Rehabil 2006;28:1237-42.

19. De Groot IJ, Post MW, van Heuveln T, van den Berg LH, Lindeman E. Measurement of decline of functioning in persons with amyotrophic lateral sclerosis: responsiveness and possible applications of the Functional Independence Measure, Barthel Index, Rehabilitation Activities Profile and Frenchay Activities Index. Amyotroph Lateral Scler 2006;7:167-72.

20. Van de Weg FB, Kuik DJ, Lankhorst GJ. Post-stroke depression and functional outcome: a cohort study investigating the influence of depression on functional recovery from stroke. Clin Rehabil 1999;13:268-72.

21. Wressle E, Lindstrand J, Neher M, Marcusson J, Henriksson C. The Canadian Occupational Performance Measure as an outcome measure and team tool in a day treatment programme. Disabil Rehabil 2003;25:497-506.

22. Steiner WA, Ryser L, Huber E, Uebelhart D, Aeschlimann A, Stucki G. Use of the ICF model as a clinical problem-solving tool in physical therapy and rehabilitation medicine. Phys Ther 2002;82:1098-107.

23. Winograd T and Flores F, Understanding computers and cognition, Boston: Addison-Wesley, 1986.

24. Cronholm S, Goldkuhl G. Communication analysis as perspective and method for requirements engineering. In: Maté JL, Silva A, editors. Requirements engineering for sociotechnical systems. London: Information Science Publishing; 2005:p.340-58.

25. Te'eni D. Review: A cognitive-affective model of organisational communication for designing IT. MIS Quarterly 2001;25(2):p.251-312.

26. Alpay L, Verhoef J, Toussaint P, Zwetsloot-Schonk B. What makes an "informed patient"? The impact of contextualization on the search for health information on the internet. Stud Health Technol Inform 2006;124:913-9.

Hoofdstuk 9

Samenvatting en discussie

Samenvatting

Een aanzienlijk deel van de patiënten met reumatoïde artritis (RA) heeft, ondanks het gebruik van steeds effectievere medicijnen, een relatief lage, maar persisterende ziekteactiviteit. Om desondanks zo optimaal mogelijk te kunnen blijven functioneren hebben veel patiënten met RA voor kortere of langere termijn behandeling of begeleiding nodig van zorgverleners vanuit verschillende disciplines, zoals bijvoorbeeld reumatologen, fysiotherapeuten, ergotherapeuten, maatschappelijke werkers en verpleegkundigen.

Het is bekend dat de specifieke deskundigheid van zorgverleners, de onderlinge communicatie en afstemming, en de aansluiting van het zorgaanbod op de zorgbehoefte van de patiënt in sommige gevallen te wensen over laat.

Dit proefschrift beschrijft de ontwikkeling en evaluatie van twee zorgmodellen voor patiënten met reumatische aandoeningen: een regionaal artritis zorgmodel waarin health professionals vanuit de eerste- en tweedelijns gezondheidszorg en de reumatologen zijn betrokken en de optimalisatie van een traditioneel multidisciplinair teamzorgmodel voor patiënten met RA door middel van een revalidatie-instrument met de bijbehorende computertoepassing.

Hoofdstuk 1 geeft een korte introductie van de behandeling van patiënten met RA, inclusief de niet-medicamenteuze behandelmogelijkheden.

Het traditionele multidisciplinaire teamzorgmodel is lang beschouwd als de optimale behandelstrategie voor de behandeling van mensen met RA. In Nederland wordt hieronder verstaan een omschreven behandelprogramma, uitgevoerd in reumaklinieken, revalidatiecentra en ziekenhuizen en verzorgd door een vast team van zorgverleners vanuit verschillende disciplines, die hun zorg veelal onderling afstemmen in een multidisciplinair overleg.

De beschikbaarheid van deze vorm van zorg is in Nederland en daarbuiten echter beperkt. Er is dan ook behoefte aan ontwikkeling en evaluatie van alternatieve multidisciplinaire zorgmodellen in de behandeling van patiënten met RA.

Daarnaast is het van belang om mogelijkheden tot het optimaliseren van de kwaliteit van traditionele multidisciplinaire teamzorg te verkennen, bijvoorbeeld door het vergroten van de rol van de patiënt in de behandeling en door het verbeteren van de onderlinge communicatie tussen de leden van een multidisciplinair team. Een manier om dit doel te bereiken is de introductie van een revalidatie-instrument en bijbehorende computerapplicatie. Hoewel methoden om klinische effectiviteit en patiënttevredenheid te meten ruimschoots voorhanden zijn, is de onderzoeksmethodologie die nodig is voor een complete evaluatie van de effecten van het introduceren van een revalidatie-instrument met zijn bijbehorende computertoepassing nog steeds een onderontwikkeld gebied. In dit hoofdstuk worden theoretische raamwerken besproken die de basis vormen van de procesevaluaties binnen complexe zorgprocessen.

Hoofdstuk 2 beschrijft de praktische toepasbaarheid van het opzetten van een systeem van regionale netwerken van fysiotherapeuten gericht op de behandeling van patiënten

met een reumatische aandoening. De netwerken zijn bedoeld om de zorg, geboden door eerstelijns fysiotherapeuten aan mensen met reumatische aandoeningen, te optimaliseren door middel van het verbeteren van kennis en praktische vaardigheden en het verbeteren van de samenwerking met de reumatologen. In 2000 hebben 63 fysiotherapeuten in twee regio's in Nederland - Leiden en Enschede - de 5-daagse post-HBO cursus "Fysiotherapie bij reumatische aandoeningen" gevolgd. Daarna hebben zij gedurende 18 maanden elke twee maanden deelgenomen aan een workshop en praktische vaardigheidslessen op de eigen locatie. Na 18 maanden nam de kennis significant toe en verbeterde de zelfgerapporteerde communicatie met collega-fysiotherapeuten en reumatologen. Bij de fysiotherapeuten die deelnamen aan de netwerken nam het aantal patiënten met inflammatoire reumatische aandoeningen significant toe in vergelijking met een controlegroep van fysiotherapeuten die niet in een netwerk participeerden. Achttien maanden na de start van het project was de tevredenheid in een steekproef van patiënten met RA behandeld binnen de netwerken significant hoger dan de tevredenheid van een controlegroep van RA patiënten die door fysiotherapeuten buiten de netwerken werden behandeld. Geconcludeerd werd dat het opzetten van een systeem van netwerken van fysiotherapeuten, waarin het continu leren is geïmplementeerd met als doel de zorg voor patiënten met een reumatische aandoening te verbeteren, haalbaar is. Tevens kan het de tevredenheid van patiënten over de fysiotherapeutische zorg verbeteren.

Hoofdstuk 3 beschrijft een studie waarin het effect werd onderzocht op de klinische effectiviteit van het gebruik van een op de International Classification of Functioning, Disability, and Health (ICF) gebaseerd revalidatie-instrument (het Revalidatie Activiteiten Profiel; RAP), toegepast in de multidisciplinaire teamzorg in de reumatologie; tevens werd de patiënttevredenheid betrokken in dit onderzoek. In deze studie werden alle opeenvolgende patiënten met RA die in twee perioden van 12 maanden (vóór en na de introductie van het RAP) werden opgenomen geïncludeerd. De primaire uitkomstmaat was een patiëntgerichte maat voor het functioneren in het algemeen dagelijks leven (McMaster Toronto Arthritis Patient Preference Disability Questionnaire; MACTAR) en de secundaire uitkomstmaten waren metingen van fysiek en psychisch functioneren, kwaliteit van leven, ziekteactiviteit en patiënttevredenheid. In het algemeen verbeterden alle patiënten significant tussen opname en ontslag en tussen opname en zes weken na ontslag. Er was echter geen aantoonbaar verschil in verbetering tussen de beide perioden. De patiënttevredenheid was significant hoger in de periode na de introductie van het RAP, maar het absolute verschil was klein. De conclusie van de studie was, dat de introductie van het RAP in de multidisciplinaire teambehandeling van patiënten met RA geen effect had op de klinische effectiviteit, maar wel een gunstig effect had op de patiënttevredenheid.

Tegelijk met de studie naar de klinische effectiviteit van de introductie van het RAP in de multidisciplinaire teamzorg in de reumatologie, werd onderzocht welke invloed dit revalidatie-instrument, inclusief de bijbehorende computertoepassing, heeft op de tevredenheid van de teamleden met betrekking tot het functioneren van het team, de team-

vergadering en de administratieve belasting. *Hoofdstuk 4* beschrijft de resultaten van dit onderzoek, waaruit blijkt dat de introductie van het RAP alleen bij het team werkzaam op de dagbehandelingafdeling een positief effect had op de tevredenheid over het teamfunctioneren, de teamvergadering en de kwaliteit van de schriftelijke informatie-uitwisseling. Bij de teamleden, werkzaam in de kliniek, was dit effect niet aanwezig of zelfs tegenovergesteld. Op beide afdelingen bleek de administratieve werklast te zijn toegenomen. Omdat dit onderzoek slechts op een relatief kleine groep teamleden betrekking had, is het moeilijk algemene conclusies te trekken over het effect van de introductie van het RAP en de bijbehorende computertoepassing in de multidisciplinaire teamzorg in de reumatologie in het algemeen. De bevindingen uit deze studie geven wel aan dat op het terrein van onderzoek naar teamzorg, de settings waarin de zorg wordt aangeboden (dagbehandeling of kliniek) van elkaar onderscheiden dienen te worden.

In de vorige hoofdstukken, werden de kwaliteiten van het RAP als een instrument ten behoeve van het structureren en faciliteren van processen binnen de teamzorg onderzocht. *Hoofdstuk 5* rapporteert de klinimetrische eigenschappen van het RAP als evaluatie-instrument van de effecten van multidisciplinaire teamzorg in de reumatologie. Hiertoe zijn de klinische data gebruikt van RA patiënten die in de periode van 12 maanden na de introductie van het RAP in de multidisciplinaire teamzorg, zoals beschreven in hoofdstuk 3, werden opgenomen in een reumakliniek. Uit het onderzoek bleek dat de RAP-scores bij opname significant gecorreleerd waren met alle andere uitkomstmaten zoals fysiek en psychisch functioneren, ziekteactiviteit en kwaliteit van leven. De gemiddelde RAP-score verbeterde significant in de periode tussen opname en ontslag en in de periode tussen opname en zes weken na ontslag. De responsiviteit van het RAP bleek 'gemiddeld' tot 'goed' te zijn volgens alle drie de gebruikte responsiviteitsmaten ('effect size', 'standardized response mean' en 'responsiveness ratio'). Uit deze studie bleek dat het RAP valide en responsief is en gebruikt kan worden als evaluatie-instrument in de multidisciplinaire teamzorg bij patiënten met RA.

Zoals al eerder in hoofdstuk 1 is aangegeven, is er behoefte aan het verder ontwikkelen van onderzoeksmethoden voor de evaluatie van zorgvernieuwingen, inclusief het gebruik van informatietechnologie (IT), in de gezondheidszorg. In *hoofdstuk 6* wordt de ontwikkeling en evaluatie beschreven van een instrument, dat gebaseerd is op een communicatietheorie; met dit instrument kan de communicatie tussen teamleden tijdens een multidisciplinaire teamvergadering worden geanalyseerd. Twee onderzoekers hebben onafhankelijk van elkaar met behulp van dit instrument 20 video-opnamen van multidisciplinaire teamvergaderingen geanalyseerd die betrekking hadden op de bespreking van 10 patiënten met RA opgenomen in een reumakliniek. De interbeoordelaarsbetrouwbaarheid werd uitstekend bevonden.

De validiteit van het instrument werd onderzocht door het vergelijken van de patronen van communicatie tussen de teamleden tijdens de teamvergaderingen. Hiervoor werden 25 eerste teambesprekingen van een patiënt en 86 vervolgbesprekingen van in totaal 25 patiënten met RA beoordeeld. Het instrument vertoonde de mogelijkheid

onderscheid te maken tussen communicatiepatronen van eerste teambespreking en vervolgbesprekingen. Gezien de betrouwbaarheid en validiteit van het instrument lijkt een verdere evaluatie van de bruikbaarheid van het instrument bij de analyse van complexe communicatieprocessen in de zorg gerechtvaardigd.

Het instrument, beschreven in hoofdstuk 6, werd gebruikt om het effect te meten van de introductie van een revalidatie-instrument met de bijbehorende computertoepassing op de communicatiepatronen tijdens de multidisciplinaire teamvergaderingen in de reumatologie. In relatie met de klinische studie zoals beschreven in hoofdstuk 3, beschrijft *hoofdstuk 7* een studie waarin de communicatie tijdens het multidisciplinaire teamoverleg in de dagbehandelingafdeling werd vergeleken tussen de periode waarin het RAP niet werd gebruikt en een periode waarin het RAP wel werd gebruikt. In beide perioden werden met behulp van het in hoofdstuk 6 ontwikkelde instrument, de video-opnames van de eerste bespreking en de vervolgbesprekingen van 25 patiënten met RA geanalyseerd. De introductie van het RAP had een significant effect op het communicatiepatroon tijdens de multidisciplinaire teamvergadering waarin een patiënt voor het eerst wordt besproken. Hoewel de absolute duur van deze bespreking wel langer werd trad er een verschuiving op ten gunste van de tijd besteed door de teamleden aan het gezamenlijk afstemmen van behandeldoelen en evaluatie van de behandelplannen. De tijd besteed aan het verkrijgen van een gemeenschappelijk beeld van de huidige gezondheidstoestand van de patiënt (grounding) en de tijd besteed aan het maken van praktische afspraken werd korter. Tijdens de vervolgbesprekingen is dit effect minder duidelijk aanwezig. De conclusie van deze studie was dat de introductie van het RAP met de bijbehorende computertoepassing in een dagbehandelingafdeling alleen een significant effect had op het communicatiepatroon tijdens de eerste bespreking van een nieuw opgenomen patiënt.

Discussie

RA is een chronische ziekte, waarbij voor veel patiënten, ondanks de vooruitgang in de medische behandeling, zorg nodig is van verschillende health professionals (zoals bijvoorbeeld de reumatoloog, de fysiotherapeut, de ergotherapeut, de verpleegkundige en de maatschappelijk werker).

Het traditionele multidisciplinaire zorgmodel dat lange tijd gehanteerd werd is kostbaar en beperkt beschikbaar. Het is daarom een uitdaging om nieuwe modellen voor mensen met reumatische aandoeningen te ontwikkelen (1). De modellen kunnen betrekking hebben op diverse dimensies van zorg, zoals bijvoorbeeld het gebruik van IT, deskundigheid van professionals, patiëntgerichtheid en taakverschuivingen tussen health professionals.

De onderzoeken, beschreven in dit proefschrift, hebben betrekking op twee innovatieve zorgmodellen.

Als eerste wordt een zorgmodel voor patiënten met artritis beschreven dat betrekking heeft op een systeem van transmurale en regionale netwerken en continu leren voor fysiotherapeuten werkzaam in de eerste lijn en de tweede lijn.

Ten tweede richt dit proefschrift zich op de evaluatie van de introductie van een revalidatie-instrument met bijbehorende computertoepassing in de multidisciplinaire teamzorg.

De resultaten kunnen worden gebruikt om specifieke onderdelen van het complexe, multidisciplinaire zorgproces van patiënten met artritis en de toepassing van multidisciplinaire teamzorg te verbeteren.

Netwerken van health professionals in de eerste lijn

De regionale netwerken van fysiotherapeuten beschreven in dit proefschrift dienen twee doelen: het vergroten van de kennis en vaardigheden van de deelnemende fysiotherapeuten en het verbeteren van de communicatie tussen fysiotherapeuten en reumatologen. Het bieden van de juiste zorg door fysiotherapeuten in de eerste lijn wordt steeds belangrijker, mede doordat opnamen in ziekenhuizen, reumaklinieken of revalidatiecentra voor multidisciplinaire zorg steeds korter worden. Belangrijke voorwaarden voor de overgang van zorg van gespecialiseerde centra naar de eerste lijn is de aanwezigheid van voldoende en actuele kennis en vaardigheden en duidelijke, directe communicatielijnen.

De evaluatie van het systeem van netwerken van fysiotherapeuten met het bijbehorende continue leren in hoofdstuk 2 bevestigt de haalbaarheid van dit artritis zorgmodel. Deze gunstige resultaten komen overeen met de positieve resultaten gevonden in een Canadees project waarin op lokaal niveau fysiotherapeuten, huisartsen en andere health professionals gedurende een tweedaagse workshop werden geschoold met betrekking tot de diagnostiek en behandeling van inflammatoire artritis (2). Er bestaan echter wel verschillen tussen deze twee projecten, zoals o.a. de professionele achtergrond van de betrokken health professionals en de uitgebreidheid van het scholingsprogramma.

Naast de netwerken in de twee regio's, zoals beschreven in dit proefschrift, heeft zich in Nederland in de loop van de tijd een aanzienlijk aantal van gelijksoortige netwerken ontwikkeld. Het systeem van regionale netwerken met het bijbehorende systeem van continu leren voor fysiotherapeuten lijkt geschikt voor een bredere implementatie in ons land. Als dit een doel zou zijn, dan moet er echter nog aan een aantal voorwaarden worden voldaan:

– Het ontwikkelen van standaarden voor onderwijsprogramma's voor de zorg voor patiënten met artritis, alsmede standaarden voor het proces van continu leren ter behoud van de verworven competenties van de fysiotherapeuten.
– Het ontwikkelen van een kwaliteitscyclus waarin de kwaliteit van zorg wordt geëvalueerd en gewaarborgd.
– Het erkennen van de benodigde competenties door relevante partijen zoals de beroepsorganisatie van de fysiotherapeuten, patiëntenorganisaties, reumatologen en de zorgverzekeraars.
– Zichtbaarheid van dit specifieke zorgaanbod.

De hierboven genoemde voorwaarden geven aan dat een implementatie op grote schaal met voldoende kwaliteitsgaranties alleen uitvoerbaar is wanneer alle relevante partijen een gezamenlijke actie ondernemen. In dit proces van implementatie moet niet alleen rekening gehouden worden met deelname van reumatologen en fysiotherapeuten, maar moeten ook andere relevante health professionals en de patiënten zelf worden betrokken.

Voorbeelden uit andere landen hebben ons geleerd dat gezamenlijke scholing op post-HBO niveau van health professionals vanuit verschillende disciplines uitvoerbaar is (2-5). Naast deze efficiënte wijze van scholing zijn er mogelijk gunstige neveneffecten zoals verbetering van de onderlinge communicatie en samenwerking en afstemming van de multidisciplinaire zorg. Bovendien kunnen gezamenlijke opleidingsmodellen bijdragen aan de nivellering van de grenzen tussen de verschillende disciplines. De gunstige uitkomsten van het 'primary therapist model', waarin fysiotherapeuten en ergotherapeuten zijn getraind om geïntegreerde fysiotherapeutische en ergotherapeutische zorg voor patiënten met artritis aan te bieden (4,5), geeft aan dat een verregaande integratie van post-HBO scholing in de zorg door health professionals voor patiënten met artritis haalbaar is.

Optimalisatie van de multidisciplinaire teamzorg door het gebruik maken van revalidatie-instrumenten: de waarde van het Revalidatie Activiteiten Profiel (RAP)

In het kader van de ontwikkeling en optimalisatie van complexe zorgmodellen voor mensen met reumatische aandoeningen, richtte dit proefschrift zich op de verbetering van de kwaliteit van een traditionele vorm van zorg, namelijk multidisciplinaire teamzorg.

Tot nu toe is er slechts weinig bekend over welke componenten van multidisciplinaire teamzorg bijdragen aan de effectiviteit ervan. Onduidelijk is bijvoorbeeld welke rol het aantal en de professionele achtergrond van betrokken zorgverleners, het multidisciplinair teamoverleg, en de actieve betrokkenheid van de patiënt zelf spelen. Onderzoek waarin verschillende organisatorische, procesmatige aspecten van multidisciplinaire teamzorg worden meegenomen, wordt dan ook aanbevolen (6-9).

Wij hebben deze aanbeveling overgenomen en hebben gekeken naar een systeem waarbij we ons meer richten op de door de patiënt ervaren beperkingen en problemen, waarbij alle betrokken zorgverleners hetzelfde systeem hanteerden om deze te inventariseren en waarbij ook van te voren was vastgesteld welke zorgverleners welk deel van de inventarisatie voor zijn rekening nam. Onze resultaten laten zien dat de introductie van een revalidatie-instrument in de multidisciplinaire teamzorg, het RAP, met de bijbehorende computertoepassing, geen effect heeft op de klinische uitkomstmaten, maar wel een klein, statistisch significant effect heeft op patiënttevredenheid vooral wat betreft gerichtheid op door de patiënt ervaren problemen. Ook de betrokken zorgverleners in de dagbehandelingsetting vonden de kwaliteit van de multidisciplinaire teambespreking met betrekking tot de patiëntgerichtheid toegenomen; in de klinische setting werd dit resultaat niet gevonden.

Met betrekking tot het effect op de betrokken health professionals blijkt dat het communicatieproces en het functioneren van het team zijn beïnvloed, waarbij de resultaten van de twee bij deze studie betrokken teams (dagbehandeling en kliniek) elkaar tegenspreken. In beide teams nam de administratieve werkdruk toe.

De kleine aantallen betrokken professionals en de discrepanties tussen de waargenomen resultaten in de twee verschillende settings (dagbehandeling en kliniek) maken het moeilijk om algemene conclusies te trekken. Mogelijk hadden verschillen tussen klinische en dagbehandelingsetting te maken met het feit dat patiënten die werden verwezen naar de kliniek andere verwachtingen hadden met betrekking tot de doelen en uitkomsten dan de patiënten verwezen naar de dagbehandeling. In het algemeen hadden de patiënten die opgenomen waren in de kliniek met name intensieve medische en verpleegkundige zorg nodig, waarbij de zorg van fysiotherapeuten, ergotherapeuten of maatschappelijk werkers in tweede instantie werd geboden.

Mogelijk is een revalidatie-instrument zoals het RAP meer geschikt voor gebruik in een 'echte' revalidatieomgeving dan voor een klinische verpleegafdeling.

In dit opzicht is het van belang te onderkennen dat ook economische overwegingen van belang zijn om de voor- en nadelen van zorginterventies te wegen. De onderzoeken beschreven in dit proefschrift bevatten geen economische analyse, waarin de kosten van het ontwikkelen van de computertoepassing van het RAP, de training, de bijeenkomsten en contacten in het kader van het implementatieproces, de duur van het teamoverleg en de administratieve procedures en de opnameduur zijn betrokken. Met betrekking tot het ontbreken van effect van de introductie van het RAP op de klinische uitkomstmaten kan het zo zijn dat de verbeteringen die zijn opgetreden in de klinische uitkomstmaten in de periode voor de introductie van het RAP op zich al klinisch relevant waren en daarom er weinig ruimte is om nog meer te verbeteren. Mogelijk kan ook een rol spelen dat het RAP in zijn huidige vorm geen optimale inhoud heeft voor het bieden van zorg voor patiënten met artritis. Het RAP is overwegend gericht op het niveau van activiteiten en participatie. Echter, het spectrum van problemen ervaren door patiënten met RA is breder en bevat een aantal aspecten op het niveau van lichaamsfuncties en lichaamsstructuren, als ook omgevings- en persoonlijke factoren (10). Beperkingen en problemen op het niveau van activiteiten en participatie moeten altijd gezien worden in relatie met de andere niveaus van de gevolgen van een ziekte, zodat het aandachtspunt van het RAP mogelijk te beperkt is. In dit verband kunnen we bijvoorbeeld denken aan pijn en vermoeidheid die op de voorgrond staan en alle problemen op niveau van activiteiten en participatie kunnen beïnvloeden. Ditzelfde geldt voor invloeden vanuit de fysieke omgeving, zoals bijvoorbeeld het hebben van zwaar werk. Sommige domeinen binnen het RAP, zoals bijvoorbeeld het domein communicatie, dat zich vooral richt op cognities, zijn mogelijk minder relevant voor patiënten met RA.

Daarnaast moet de setting en de duur van de revalidatieperiode in aanmerking genomen worden. Doelen die gesteld zijn op het niveau van activiteiten en participatie kunnen gewoonlijk alleen worden bereikt als de patiënten in de eigen omgeving zijn en dus niet gedurende of direct na ontslag uit de reumakliniek en zeker niet direct na een klinische opname. Het RAP in zijn huidige vorm lijkt daarom minder bruikbaar voor

het volgen van de voortgang en de evaluatie bij ontslag in die settings waar de opname-duur relatief kort is. Deze overwegingen wijzen in de richting van het aanpassen van de inhoud van het RAP voor wat betreft die domeinen die eerder al door patiënten met RA en door experts als relevant zijn aangeduid (10) en verder met het rekening houden met de revalidatiesetting waar het RAP zal worden gebruikt. In dit opzicht kan het lonend zijn de inhoud en kwaliteiten van andere revalidatie-instrumenten te onderzoeken. De IRES-3 (Indicators of Rehabilitation Status) (11,12) is bijvoorbeeld ook een op de ICF gebaseerd revalidatie-instrument die de ICF niveaus lichaamsstructuren, lichaamsfunc-ties, activiteiten, participatie, persoonlijke en omgevingsfactoren bestrijkt. De betrouw-baarheid, validiteit en gevoeligheid voor klinische veranderingen van dit instrument zijn aangetoond in verschillende revalidatiesettings met verschillende groepen van patiën-ten (11-13). Een voordeel van de IRES-3 is dat het door de patiënt zelf ingevuld kan wor-den, terwijl bij het invullen van het RAP één of meerdere health professionals zijn betrokken. In onze studies werd het RAP voornamelijk tegelijkertijd gebruikt door ver-schillende health professionals, met elk een eigen specifiek onderdeel. Voor deze toepas-sing werd het scoringssysteem van het RAP niet gebruikt en werden de items en subi-tems beantwoord in een ja- en nee-formaat. In onze studie naar de responsiviteit van het RAP, werd het scoringssysteem wel gebruikt door één health professional, op een wijze zoals dat ook in eerdere studies waarin het RAP werd gebruikt werd toegepast (14-20).

Verdere studies naar de optimalisatie van het gebruik van het RAP zouden een eva-luatie moeten bevatten van de verschillen in de toepassing van het RAP door één health professional, door een verdeling van items onder verschillende health professionals en een door de patiënt zelf ingevulde versie.

In tegenstelling tot het RAP wordt er zowel bij de IRES-3 (11-13) als bij andere revali-datie-instrumenten (21,22) geen onderscheid gemaakt tussen de ondervonden beper-kingen en de daarbij door de patiënt ervaren problemen. Alhoewel het RAP dit onder-scheid benoemt als een voordeel van het instrument, wordt er in het scoringssysteem geen rekening mee gehouden. Toekomstig onderzoek zou deze toegevoegde waarde van het RAP verder moeten verkennen.

Het meten van het effect van informatietechnologie (IT) in de gezondheidszorg
In dit proefschrift hebben we het effect van het toepassen van IT gemeten door ons te richten op de wijze waarop het communicatiegedrag in een duidelijk omschreven omge-ving veranderde. In het algemeen kan gesteld worden dat verandering van communica-tiegedrag één van de belangrijkste effecten is van het gebruik van IT in een organisato-rische setting (23,24). Het effect van communicatie kan worden gemeten door zowel met de effectiviteit als ook met de efficiëntie ervan rekening te houden.

Naar aanleiding van de observatie van Te'eni dat het belangrijkste doel van commu-nicatie is het bereiken van wederzijds begrip (25), kunnen we stellen dat de effectiviteit van communicatie wordt bepaald door het niveau van wederzijds begrip dat wordt bereikt. Deze hypothese stelt ons voor het probleem van het definiëren en meten van 'wederzijds begrip'. In de literatuur worden daarvoor een aantal methoden genoemd (25,26).

In dit proefschrift baseren we ons oordeel over de efficiëntie van de communicatie tijdens het teamoverleg op de vooronderstelling dat 'wederzijds begrip' is bereikt op het moment dat teamleden in staat zijn overeenstemming te bereiken over gemeenschappelijke behandeldoelen. De analyse van de communicatie gedurende een multidisciplinair teamoverleg in de reumatologie laat zien dat de introductie van een revalidatie-instrument met de bijbehorende computertoepassing het proces van 'het komen tot wederzijdse overeenstemming over behandeldoelen' bevordert.

Efficiëntie van communicatie komt neer op de moeite en tijd die het kost om 'wederzijds begrip' te bereiken. In dit proefschrift hebben we aangenomen dat een teamoverleg (een gezamenlijke vergadering die voor iedere deelnemende health professional een aanzienlijke hoeveelheid tijd kost) primair gericht zou moeten zijn op het discussiëren en onderhandelen over gemeenschappelijke behandeldoelen. Alle andere communicatieactiviteiten, zoals bijvoorbeeld het elkaar informeren over de gezondheidstoestand van de patiënt, zouden zoveel mogelijk moeten worden beperkt. Dit houdt in dat andere middelen moeten worden gezocht voor het uitwisselen van informatie over de patiënt. In ons geval hebben we de informatie-uitwisseling asynchroon gemaakt met behulp van een computertoepassing. Dit maakt het voor de betrokken health professionals mogelijk patiëntinformatie op te halen en vast te leggen op een tijdstip en vanaf een plaats die henzelf het beste uitkomt. Tijdens teamoverleg waarin een patiënt voor het eerst wordt besproken (initieel teamoverleg) blijkt inderdaad het percentage tijd besteed aan 'grounding' statistisch significant af te nemen. Grounding kan worden omschreven als het verkrijgen van een gedeelde visie op de huidige gezondheidstoestand van de patiënt, zoals bijvoorbeeld het geven van een beschrijving van de ernst en uitgebreidheid van ziekteactiviteit en de aanwezigheid van co-morbiditeit. Dit proefschrift toont aan dat specifiek tijdens het initieel teamoverleg, welke in de periode vóór de introductie van het RAP met de bijbehorende computertoepassing, een aanzienlijk deel in beslag werd genomen door grounding, een verschuiving in het proces van informatie-uitwisseling werd bereikt.

In onze optiek zijn uitkomstmaten, zoals patiënttevredenheid, verbetering in de gezondheidstoestand, beoordelingen van teamleden over het functioneren van het team en het teamoverleg, indirecte maten voor het bepalen van het effect van IT. Dit effect moet ook worden bepaald in termen van zowel de effectiviteit als de efficiëntie van het communicatieproces dat wordt beïnvloed. Verder onderzoek is nodig naar het definiëren en meten van 'wederzijds begrip' in verschillende situaties, als ook de relatie tussen communicatiematen (procesmaten) en uitkomstmaten. In dit proefschrift is getracht, met een uitgewerkte case study van multidisciplinaire teamzorg in de reumatologie, een duidelijk voorbeeld te geven van een dergelijke benadering.

References

1. Li LC, Bombardier C. Setting priorities in arthritis care: Care III Conference. J Rheumatol 2006;33:1891-4.

2. Glazier RH, Badley EM, Lineker SC, Wilkins AL, Bell MJ. Getting a Grip on Arthritis: an educational intervention for the diagnosis and treatment of arthritis in primary care. J Rheumatol 2005;32:137-42.

3. CARE IV Conference (homepage on the internet). Leeds: University of Leeds. Available from: http://www.leeds.ac.uk/CAREIV/.

4. Li LC, Maetzel A, Davis AM, Lineker SC, Bombardier C, Coyte PC. Primary therapist model for patients referred for rheumatoid arthritis rehabilitation: a cost-effectiveness analysis. Arthritis Rheum 2006;55:402-10.

5. Li LC, Davis AM, Lineker S, Coyte PC, Bombardier C. Effectiveness of the primary therapist model for rheumatoid arthritis rehabilitation: a randomized controlled trial. Arthritis Rheum 2006;55:42-52.

6. Vliet Vlieland TP. CARE: international conference on multidisciplinary care in rheumatoid arthritis. Int J Adv Rheumatol 2003;1:34-6.

7. Petersson IF, Bremander AB, Klareskog L, Stenstrom C. Who cares about team care? Ann Rheum Dis 2005;64(suppl):644.

8. Petersson IF. Evolution of team care and evaluation of effectiveness. Curr Opin Rheumatol 2005;17:160-3.

9. Petersson IF. Team care. Traditions and new trends. J Rheumatol 2006;33:1895-6.

10. Stucki G, Cieza A, Geyh S, Battistella L, Lloyd J, Symmons D, et al. ICF Core Sets for rheumatoid arthritis. J Rehabil Med 2004;44(Suppl):87-93.

11. Schochat T, Pilz C, Neuner R. The Indicators of Rehab Status questionnaire version 3 (IRES-3) in 1818 rehabilitees with musculoskeletal Diseases. Rehabilitation (Stuttg) 2003;42:236-44. In German.

12. Buhrlen B, Gerdes N, Jackel WH. Development and psychometric testing of a patient questionnaire for medical rehabilitation (IRES-3). Rehabilitation (Stuttg) 2005;44:63-74. In German.

13. Igl W, Zwingmann C, Faller H. Sensitivity to change of questionnaires measuring subjective health--results of a prospective comparative study. Rehabilitation (Stuttg). 2006;45:232-42. In German.

14. Jelles F, van Bennekom CA, Lankhorst GJ, Sibbel CJ, Bouter LM. Inter- and intra-rater agreement of the Rehabilitation Activities Profile. J Clin Epidemiol 1995;48:407-16.

15. Van Bennekom CA, Jelles F, Lankhorst GJ, Bouter LM. The Rehabilitation Activities Profile: a validation study of its use as a disability index with stroke patients. Arch Phys Med Rehabil 1995;76:501-7.

16. Van Bennekom CA, Jelles F, Lankhorst GJ, Bouter LM. Responsiveness of the rehabilitation activities profile and the Barthel index. J Clin Epidemiol 1996;49:39-44.

17. Van Balen R, Essink-Bot ML, Steyerberg E, Cools H, Habbema DF. Quality of life after hip fracture: a comparison of four health status measures in 208 patients. Disabil Rehabil 2003;25:507-19.

18. Van Baalen B, Odding E, van Woensel MP, Roebroeck ME. Cognitive functioning of adolescents and young adults with meningomyelocele and level of everyday physical activity. Disabil Rehabil 2006;28:1237-42.

19. De Groot IJ, Post MW, van Heuveln T, van den Berg LH, Lindeman E. Measurement of decline of functioning in persons with amyotrophic lateral sclerosis: responsiveness and possible applications of the Functional Independence Measure, Barthel Index, Rehabilitation Activities Profile and Frenchay Activities Index. Amyotroph Lateral Scler 2006;7:167-72.

20. Van de Weg FB, Kuik DJ, Lankhorst GJ. Post-stroke depression and functional outcome: a cohort study investigating the influence of depression on functional recovery from stroke. Clin Rehabil 1999;13:268-72.

21. Wressle E, Lindstrand J, Neher M, Marcusson J, Henriksson C. The Canadian Occupational Performance Measure as an outcome measure and team tool in a day treatment programme. Disabil Rehabil 2003;25:497-506.

22. Steiner WA, Ryser L, Huber E, Uebelhart D, Aeschlimann A, Stucki G. Use of the ICF model as a clinical problem-solving tool in physical therapy and rehabilitation medicine. Phys Ther 2002;82:1098-107.

23. Winograd T and Flores F, Understanding computers and cognition, Boston: Addison-Wesley, 1986.

24. Cronholm S, Goldkuhl G. Communication analysis as perspective and method for requirements engineering. In: Maté JL, Silva A, editors. Requirements engineering for sociotechnical systems. London: Information Science Publishing; 2005: p.340-58.

25. Te'eni D. Review: A cognitive-affective model of organisational communication for designing IT. MIS Quarterly 2001;25(2):p.251-312.

26. Alpay L, Verhoef J, Toussaint P, Zwetsloot-Schonk B. What makes an "informed patient"? The impact of contextualization on the search for health information on the internet. Stud Health Technol Inform 2006;124:913-9.

Curriculum Vitae

John Verhoef werd geboren op 7 maart 1959 te Rotterdam. In 1977 behaalde hij het diploma Voorbereidend Wetenschappelijk Onderwijs aan de Scholengemeenschap Maarten Luther te Rotterdam. In datzelfde jaar startte hij met de studie Fysiotherapie aan de Academie voor Physiotherapie te Rotterdam. Deze studie werd met succes afgerond in 1981.

Banen als fysiotherapeut

In de periode 1981 tot en met 1991 was hij werkzaam als fysiotherapeut bij de afdeling fysiotherapie van het Rooms-katholiek Ziekenhuis te Dordrecht en als waarnemend hoofd bij de afdeling fysiotherapie van het Zuiderziekenhuis te Rotterdam. Vanaf 1991 was hij parttime werkzaam als fysiotherapeut en manueel therapeut in een eerstelijns praktijk (A. Visser te Rhoon) totdat hij van januari 1994 tot en met december 1996 in diezelfde functie ging werken aan de afdeling fysiotherapie van het Ziekenhuis "Dijkzigt" te Rotterdam. Vanaf januari 1997 was hij ongeveer drie jaar werkzaam als clusterleider fysiotherapie (cluster chirurgie en reumatologie) aan het Centrum voor Paramedische Behandeling en Revalidatie van het Universitair Medisch Centrum Utrecht.

Opleidingen en studies

In 1985 werd door hem het diploma Manuele Therapie bij de School voor Manuele Therapie Van der Bijl te Utrecht behaald. In september 1991 startte hij met de studie Bewegingswetenschappen aan de Vrije Universiteit te Amsterdam. In mei 1996 studeerde hij (cum laude) af in de richtingen 'Theorie en Geschiedenis van de Bewegingswetenschappen' (hoofdrichting) en 'Psychologie' (nevenrichting).

Onderzoeker

Sinds augustus 1999 tot heden is hij werkzaam als fysiotherapeut en wetenschappelijk medewerker aan de afdeling fysiotherapie van het Leids Universitair Medisch Centrum. In deze periode voerde hij zijn promotieonderzoek uit naar de effecten van het implementeren van een revalidatie-instrument met bijbehorende computerapplicatie op de multidisciplinaire teamzorg van de Reumakliniek Sole Mio (afd. Reumatologie; Hoofd: Prof. dr. T.W.J. Huizinga) onder leiding van Mevr. Dr. T.P.M. Vliet Vlieland (afd. Reumatologie) en Mevr. Prof. dr. J.H.M. Zwetsloot-Schonk (Klinische Informatiekunde). Tevens is hij in deze periode in dienst getreden bij Klinische Informatiekunde (hoofd: Prof. dr. J.H.M Zwetsloot-Schonk).

Sinds maart 2007 is hij tevens werkzaam bij de Hogeschool Leiden, afdeling Fysiotherapie voor het meewerken aan het opzetten van een opleiding tot Professional Master Fysiotherapie bij mensen met een chronische ziekte.

Nevenwerkzaamheden

Sinds 2005 is hij voorzitter van de Nederlandse Health Professionals in de Reumatologie (NHPR), een divisie van de Nederlandse Vereniging voor Reumatologie (NVR) en sinds juni 2007 van de Standing Committee Allied Health Professionals van de European League Against Rheumatism (EULAR).

Dankwoord

De totstandkoming van dit proefschrift is alleen mogelijk geweest door de enthousiaste medewerking van vele mensen. Het is hier de plaats om hen te bedanken.

Allereerst een woord van dank aan alle patiënten die aan de studie hebben deelgenomen, als ook aan alle netwerkdeelnemers van het FYRANET in Leiden en Enschede. Zij hebben het materiaal geleverd voor dit proefschrift.

In de tweede plaats moet ik noemen Wim Mulder (Hoofd afd. fysiotherapie, LUMC) die een grote steun is geweest bij het mogelijk maken van dit promotieonderzoek en Marten Munneke (destijds fysiotherapeut en wetenschappelijk medewerker afd. fysiotherapie, LUMC) voor zijn hulp en steun bij het opzetten van het onderzoek en alle collega's van de afdeling fysiotherapie voor hun belangstelling en medewerking. In het bijzonder ben ik de leden van de sectie wetenschap dankbaar voor hun adviezen en hulp tijdens het promotietraject. Verder dank ik Pienie Kamphuis (destijds managementassistent afd. fysiotherapie, LUMC), Astrid Luiten en Inge van Ierssel (destijds medewerker secretariaat afd. fysiotherapie, LUMC) voor de invoer van alle onderzoeksdata en Dies Boonman voor zijn bijdrage in het opzetten van de scholing van de netwerkdeelnemers en de voortzetting daarvan tot nu toe. Alex Vaassen (destijds oefentherapeut Mensendieck afd. fysiotherapie, LUMC) wil ik apart bedanken voor zijn waardevolle adviezen en hulp tijdens de implementatie van het RAP en het continueren en uitbreiden van de netwerkactiviteiten. Florus van der Giesen, Samyra Keus, Marleen van den Berg, Ingeborg de Boer (destijds beiden werkzaam op de afd. reumatologie, LUMC) en Peter Bekkering voor hun enthousiasme bij het uitvoeren van wetenschappelijk onderzoek, zodat menige koffie- en theepauze een meerwaarde kreeg. Eric Vermeulen, mijn kamergenoot, verdient een vermelding apart; hij was voor mij een steun en klankbord voor vele zaken die zich tijdens het promotietraject aandienden.

Daarnaast verdienen vele collega's afkomstig uit verschillende disciplines een extra woord van dank omdat zij ook bereid zijn geweest mee te denken en hun werkwijze aan te passen aan het werken met het RAP tijdens de implementatiefase en de periode daarna.

Ik denk aan alle ziekenverzorgenden en verpleegkundigen van de dagbehandeling en de kliniek van Reumakliniek Sole Mio, de fysiotherapeuten en oefentherapeuten Mensendieck, de ergotherapeuten, de maatschappelijk werkers, de reumatologen en reumatologen in opleiding. Zonder iemand tekort te willen doen noem ik enkele mensen bij naam: Dr. Zuzana de Jong en Dr. Margreet Kloppenburg (chefs de clinique van respectievelijk de dagbehandeling en de kliniek) die beiden de verantwoording hadden voor de patiëntenzorg en voorzitter waren van de multidisciplinaire teams. Verder een speciaal woord van dank aan het secretariaat van de dagbehandeling (Stannie Bakker en

Jacolize Smallenbroek) en van de kliniek (Marleen van den Broek). Zij hebben veel tijd geïnvesteerd in het vervolmaken van de logistiek rondom het gebruik van het RAP. Het multidisciplinair elektronisch dossier was nooit operationeel geworden zonder de hulp en grote inzet van Heleen Hoogvliet en Cees Louwerse (directoraat ICT, LUMC) en Nathalie Habing (destijds werkzaam Klinische Informatiekunde, LUMC). De medewerkers van Klinische Informatiekunde met hun getoonde belangstelling en adviezen mag ik niet vergeten te vermelden.

Tot slot wil ik mijn vrienden en familie bedanken voor alle momenten van ontspanning die het mogelijk maakte dit proefschrift te voltooien. In het bijzonder geldt dit voor de zeilvrienden en de fietsvrienden van 'Sur Place'. Mijn koksmaat Hendrik Franzen, die mij niet alleen enthousiast heeft gemaakt voor het koken, maar mij ook naar de weg van de wetenschap heeft geleid, noem ik hier graag.

Mies ... jouw onvoorwaardelijke steun laat zich niet in woorden vatten.

Omslag: 'Verbonden' door Jan Bakker, beeldend kunstenaar
Spijkenisse www.janbakkerart.nl