Improving treatment adherence in patients with rheumatoid arthritis: what are the options?

Low adherence to therapeutic regimens is a prevalent and persistent healthcare problem, particularly for patients with chronic disorders. Many patients with rheumatoid arthritis (RA) show inadequate therapeutic adherence resulting in poor health outcomes. Reasons for nonadherence can be unintentional or intentional. The characteristics of patient–doctor interactions are also likely to play a role although they have not been well studied for patients with RA. While many educational and cognitive behavioral interventions have been proposed to improve adherence, the few studies that have examined the efficacy of these programs in RA have had disappointing results. Future studies involving the use of mobile technologies have shown promise in other chronic diseases and could prove useful for patients with RA.

**Keywords:** • adherence • educational interventions • patient education • rheumatoid arthritis

Medical prescribing is the most common intervention in daily clinical practice. The treatment of chronic illnesses commonly includes the long-term use of pharmacotherapy. Although drug therapy can be effective in chronic disease, full benefits are often not realized because many patients do not take their medications as prescribed [1,2]. Poor adherence contributes to poor clinical outcomes and increased healthcare utilization and costs [3].

Rheumatoid arthritis (RA) is a chronic, inflammatory, destructive joint disease, characterized by painful, tender and swollen joints. It is associated with major consequences for affected individuals, causing loss of function, poor quality of life, work disability and important societal economic consequences. Treatment with disease-modifying antirheumatic drugs (DMARDs) typically begins shortly after RA diagnosis. Different agents are currently available, including conventional or targeted synthetic DMARDs, and biologic DMARDs. Patients often also use NSAIDs and steroids to alleviate pain and swelling [4]. Currently, recommendations for treatment endorse ‘treat-to-target’ strategies, including increasing drug dosages, adding therapeutic agents or switching drugs to achieve remission or at least low-disease activity. ‘Treat-to-target’ disease management can reduce symptoms, structural and radiological progression and improve long-term outcomes in patients with RA [5]. In order to achieve therapeutic goals, this strategy requires adequate patient adherence to physician recommendations. Low adherence in patients with RA may result in substantial costs, disease progression, increased disability and additional medical therapy, and sometimes surgery, later on [6]. Enhancing adherence can therefore improve the effectiveness of medical recommendations and reduce health and financial costs associated with RA. The objective of this review is to summarize the recent literature on determinants of adherence, and related interventions, that can improve therapeutic adherence in patients with RA.

**Compliance, concordance & adherence: evolution of terminology**
Nonadherence: a complex process

Seeking, evaluating and following medical advice involves many steps, which can be influenced by individual clinical aspects, psychosocial constructs, elements of the medical interaction, specifics of the treatments recommended, and external environmental and societal factors. Examples of nonadherence include not filling a prescription, taking an incorrect dose or the medication at wrong times (underuse and overuse), stopping the treatment too soon without a physician’s or healthcare provider’s advice (secondary noncompliance) and failing to make or attend recommended healthcare appointments [13].

Nonadherence behavior can conceptually be categorized into unintentional or intentional. Unintentional nonadherence is generally due to forgetfulness, lack of understanding of recommendations or intercurrent illnesses or events. Intentional nonadherence is based on the patient’s decision to stop treatment or modify prescribed regimen, for example, lower dosages than those prescribed. Intentional nonadherence is influenced by the patients’ beliefs about the effectiveness of the
Table 1. Studies assessing adherence to treatment in patients with rheumatoid arthritis.

<table>
<thead>
<tr>
<th>Study (year)</th>
<th>Medication</th>
<th>RA patients (n)</th>
<th>Study type</th>
<th>Adherence method</th>
<th>Adherence</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deyo et al. (1981)</td>
<td>NSAIDs, Penicillamine</td>
<td>171</td>
<td>6 months longitudinal</td>
<td>Refill rates</td>
<td>NSAIDs: 58–73% Penicillamine: 84%</td>
<td>[54]</td>
</tr>
<tr>
<td>Owen et al. (1985)</td>
<td>NSAIDs, Traditional DMARDs</td>
<td>178</td>
<td>Cross-sectional</td>
<td>Interview</td>
<td>64%</td>
<td>[55]</td>
</tr>
<tr>
<td>Pullar et al. (1988)</td>
<td>Penicillamine</td>
<td>26</td>
<td>Cross-sectional</td>
<td>Patient interview</td>
<td>96%</td>
<td>[56]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pill count</td>
<td>77%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pharmacokinetic marker</td>
<td>58%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Estimation physician</td>
<td>42%</td>
<td></td>
</tr>
<tr>
<td>Doyle et al. (1993)</td>
<td>Penicillamine</td>
<td>59</td>
<td>Cross-sectional</td>
<td>Pharmacokinetic marker</td>
<td>39%</td>
<td>[57]</td>
</tr>
<tr>
<td>Taal et al. (1993)</td>
<td>Global treatment</td>
<td>96</td>
<td>Cross-sectional</td>
<td>Interview</td>
<td>93%</td>
<td>[58]</td>
</tr>
<tr>
<td>Brus et al. (1999)</td>
<td>Traditional DMARDs</td>
<td>55</td>
<td>6 months randomized clinical trial</td>
<td>Pill count</td>
<td>Intervention group: 82% Control group: 91%</td>
<td>[59]</td>
</tr>
<tr>
<td>Viller et al. (1999)</td>
<td>Global treatment</td>
<td>592</td>
<td>Longitudinal (36 months)</td>
<td>Interview</td>
<td>Baseline adherence: 59–65% Consistent adherent: 36% Consistent nonadherent: 24%</td>
<td>[60]</td>
</tr>
<tr>
<td>Park et al. (1999)</td>
<td>Global treatment</td>
<td>121</td>
<td>Longitudinal (1 month)</td>
<td>MEMS</td>
<td>Perfect adherence: 38%</td>
<td>[60]</td>
</tr>
<tr>
<td>De Klerk et al. (2003)</td>
<td>Traditional DMARDs</td>
<td>127</td>
<td>Longitudinal (6 months)</td>
<td>MEMS</td>
<td>NSAIDs: 76–82% Methotrexate: 107% Sulfasalazine: 72%</td>
<td>[17]</td>
</tr>
<tr>
<td>Tuncay et al. (2007)</td>
<td>Global treatment</td>
<td>100</td>
<td>Longitudinal (6 months)</td>
<td>Interview</td>
<td>Baseline adherence: 52% Consistent adherent: 30% Consistent nonadherent: 12%</td>
<td>[61]</td>
</tr>
<tr>
<td>Curkendall et al. (2008)</td>
<td>Etanercept, Adalimumab</td>
<td>2285</td>
<td>Longitudinal (12 months)</td>
<td>Refill data</td>
<td>22–56% (depending copayment)</td>
<td>[62]</td>
</tr>
<tr>
<td>Garcia-Gonzalez et al. (2008)</td>
<td>Global treatment</td>
<td>70</td>
<td>Cross-sectional</td>
<td>Interview</td>
<td>50%</td>
<td>[63]</td>
</tr>
</tbody>
</table>

CQR: Compliance questionnaire on rheumatology; DMARD: Disease-modifying antirheumatic drug; MARS: Medication Adherence Report Scale; MEMS: Medication event Monitoring System; RA: Rheumatoid arthritis.
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</thead>
</table>
| Borah et al. (2009) | '                                 | 3829           | Longitudinal (12 months) | Refill data               | Adalimumab: 63% (naive users) 70% (existing users) 
Etanercept: 65% (naive users) 73% (existing users) | [64] |
| Van der Bernt et al. (2009) | Traditional DMARDs              | 228            | Cross-sectional      | Interview                  | 99%                             | [65] |
| Contreras-Yañez et al. (2010) | Traditional DMARDs            | 93             | Longitudinal (6 months) | Interview                  | 51%                             | [66] |
| Grijalva et al. (2010) | Traditional and biological DMARDs | 14,586         | Longitudinal         | Refill data                | Methotrexate: 59%                | [67] |
| Waimann et al. (2013) | Traditional DMARDs and steroids | 107            | Longitudinal (24 months) | MEMS                      | DMARDs: 64%40%                  | [19] |
| Rauscher et al. (2015) | Traditional DMARDs            | 78             | Longitudinal (3 months) | CQR (results expressed using overall weighted CQR) | Adherent based on taking compliance: 14% 
Adherent based on correct dosing: 4% | [22] |
| Chu et al. (2015) | Etanercept (n = 1587) 
Adalimumab (n = 564) | 2151           | Retrospective (24 months) | Refill data               | Proportion of days covered for etanercept: 67% 
Proportion of days covered for adalimumab: 63% 
Attrition rate for etanercept: 32% 
Attrition rate for adalimumab: 43% | [68] |

CQR: Compliance questionnaire on rheumatology; DMARD: Disease-modifying antirheumatic drug; MARS: Medication Adherence Report Scale; MEMS: Medication event Monitoring System; RA: Rheumatoid arthritis.
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</tr>
</thead>
<tbody>
<tr>
<td>Bliddal et al. (2015)</td>
<td>Methotrexate</td>
<td>18,703</td>
<td>Retrospective</td>
<td>Refill data</td>
<td>Mean adherence time in private practice: 1925 (IQR: 467–3056) days Mean adherence time in patients treated in hospital: 1892 (IQR: 452–3316) days</td>
<td>[69]</td>
</tr>
</tbody>
</table>

CQR: Compliance questionnaire on rheumatology; DMARD: Disease-modifying antirheumatic drug; MARS: Medication Adherence Report Scale; MEMS: Medication event Monitoring System; RA: Rheumatoid arthritis.

Prevalence & consequences of nonadherence in rheumatoid arthritis

Reports of patients’ adherence to their medications range from 14 to 80% [18–22]. Table 1 shows a summary of studies reporting treatment adherence in RA. Adherence to biologic agents appears to be higher than adherence to conventional synthetic DMARDs. Studies using Medication Events Monitoring System devices and refill data generally show lower adherence than those using self-report measures. The variation in adherence rates in RA can be related to the patient population under study, the method used to measure adherence and the drug class. Adherence to biologic agents seems to be higher.

Low adherence has been shown to negatively impact RA outcomes, with increased disease activity and radiological progression rates in patients who do not adhere to recommended therapeutic regimens [19].

Determinants of adherence in patients with rheumatoid arthritis

Nonadherence is most often multifactorial, and can fluctuate over the course of the disease. Prompt recognition of factors leading to nonadherence can assist healthcare providers in identifying patients at risk of poor adherence.

The WHO has identified several factors as determinants of adherence to healthcare recommendations including: healthcare systems, patient–provider relationship, disease characteristics, recommended treatment and socioeconomic factors [1]. In addition, a number of psychosocial factors related to patients’ attitudes toward their disease and treatment, their self-efficacy to manage their disease, and their social support and environment also play a major role in adherence behaviors.

Healthcare systems

Patients with poor access to healthcare facilities, often from disadvantaged socioeconomic strata, can encounter multiple barriers that interfere with their adherence to healthcare recommendations. They can experience problems navigating the health system, financial difficulties to pay for services or therapies not covered and gaps in coverage. A study of patients with RA and systemic lupus erythematosus with low socioeconomic status reported that patients experienced financial problems and barriers to appointment keeping, which included transportation and difficulties in scheduling, which hindered their ability to adhere to healthcare recommendations [23].

Patient–provider relationship

Several studies have reported that good quality communication between physician and patient increases patient adherence to treatment in the primary care setting [24–26]. Studies that have addressed patient–doctor communication in patients with rheumatic disease have not specifically addressed adherence [27–29]. Nevertheless, these studies have shown that rheumatic patients have difficulties in the interaction with their providers, especially those from ethnic minorities and lower education. This emphasizes the need to focus on patients’ preferences and values to deliver individualized patient-centered care that could potentially enhance adherence [27,30–33].

Disease characteristics

Clinical characteristics and disease severity can influence adherence. Patients with RA who had shorter disease duration, better mental health and lower disease activity were shown to have better adherence than patients without opposite characteristics [19].
Recommended treatment
Type of therapy, including administration route, frequency of dosing and incidence of adverse events are all factors that can determine adherence to therapy. In general biologic DMARDs show higher rates of adherence than oral agents. Medication burden, including number of pills, injectables or drugs administered through other routes for various indications also can determine individual adherence; the more complex the regimen, the lower the adherence. The effect of pill burden in RA has not clearly been established, although one study did not show a clear impact [19].

Demographic & socioeconomic factors
While some studies have reported that older patients are more adherent to therapy than younger ones, others have not found this relationship [18]. Being married has also been associated with higher adherence [19]. In general, patients with lower education and socioeconomic status are more likely to have poor adherence than those in higher socioeconomic strata; however, these findings are often difficult to discern because they are closely inter-related to barriers in access to care. While health literacy has been proposed as a determinant of adherence, a study in patients with RA did not find a significant association between these two constructs [34].

Psychosocial factors
Many factors related to patients’ knowledge, attitudes and behaviors have been associated with nonadherence, specifically intentional nonadherence. Lack of knowledge about the disease and its treatment, perception of lack of effectiveness and fear of adverse events can result in patients’ intentional discontinuation or irregular adherence to prescribed medications [35]. These beliefs can result in poor self-efficacy and self-management skills, which have been related to the ability of patients to follow and maintain prescribed recommendations.

Interventions to enhance treatment adherence
Interventions targeting adherence must incorporate health behavior changes. Not only is it difficult to change established behavior patterns, maintenance of these behaviors can be even more challenging. Evidence suggests that simply providing patients with information and advice, or using dominant or persuasive communication, do not result in permanent changes in adherence health behaviors.

Historically, adherence interventions have proposed logistic techniques such as simplifying dosage regimens and providing adherence aids or education to address the practical issues of adherence; however, these interventions have only demonstrated marginal effects [36]. While they might be somewhat useful, alone, they are unlikely to change intentional behaviors in the majority of nonadherent patients.

The transtheoretical model [37] proposes that changes in behavior follow consecutive steps: an initial motivational stage, when people become motivated to take action; an action stage, when people engage in active changes in behavior, requiring support and guidance; and a maintenance or disengagement stage, where the efforts are placed in maintaining desired behaviors and preventing relapse into maladaptive or unhealthy behaviors [38]. Through an understanding of the challenges faced in changing behaviors, novel cognitive-based behavioral techniques have emerged. These interventions aim to change a patient’s behavior by altering their thoughts, feelings, confidence or motivation to adhere. These interventions can vary widely in content and can include techniques and skill-based instruction to enhance patients’ sense of self-efficacy, motivation and problem solving [36].

Educational interventions
Historically, patient education has been an integral part of the clinical care. Traditionally, education was imparted informally by the physician or nurse [39]. It was shown that simply providing patients with information or advice was not sufficient enough to change health behaviors [38]. More recent educational interventions have included other activities beyond providing information on the disease and its treatment [39]. More current patient education programs include activities designed and planned to result in the adoption of skills and behaviors, beyond disease knowledge alone.

Knowledge-based informational interventions primarily provide educational materials designed to improve patients’ knowledge about their disease and treatment, and the importance of adherence. The information can be delivered as lectures, or using educational tools – booklets, workbooks, audiotapes videos or computer-based lessons. These interventions may include reinforcement or support from healthcare professionals. Information is the primary emphasis.

Psychoeducational interventions can encompass a broad range of activities such as counseling and supportive interventions [40]. These interventions can be delivered individually or in groups and can include peer support and family participation. Psychoeducational interventions in addition to providing patients with information about their disease and therapy, also provide resources and services and training on skill-building and problem-solving strategies for coping with the disease. They can include booklets, videos,
audiotapes or computer interactive programs and can also provide direct interaction with professionals and peers [39,41]. Studies using these interventions are heterogeneous, varying in specific content, format, frequency and timing of interventions.

Cognitive behavior programs based on the social learning theory propose that humans observe the behaviors of people around them, encode their behavior and later on imitate the behavior they have observed [42]. Programs based on this theory encompass three phases: information (simple explanation of the disease and the inter-relationships between its emotional, cognitive, physical and behavioral components), learning new skills (e.g., relaxation, diversion, cognitive restructuring) and maintenance (transferring new skills to everyday life). These programs need to be led by psychologists or specially trained professionals.

Self-management programs are based on the self-efficacy theory. Self-efficacy is the belief that one has the power to produce a desired effect by completing a given task or activity related to that competency [43]. Self-efficacy programs provide a combination of disease-related information and assistance in learning and adopting new activities and skills. The emphasis is in changing behaviors by presenting disease-related information, learning skills activities (e.g., exercise, relaxation, energy saving techniques) and using group interaction and mutual support. This program emphasizes improving self-efficacy and may be led by trained laypersons or peers.

Motivational interviewing is based on cognitive behavior change techniques. It aims to change behaviors by attaining the motivation necessary to achieve change. It attempts to change thoughts, feelings, confidence or motivation through a personalized patient-centered approach [27]. Through brief interactions, counselors can assist patients in exploring and resolving their ambivalence regarding a specific behavior and ultimately to consider what might be gained through change. Motivational interviewing elicits information from the patient, supporting his/her autonomy and attempts to activate his/her own internal motivation for change [28].

Motivational interviewing has been gaining increased interest in healthcare settings, as it appears to result in better health outcomes than traditional advice giving. It has been used to enhance medication adherence in pharmacy and healthcare settings [29,30]. Alternatives to the more traditional face-to-face interviewing include telephone-based interventions, self-help printed workbooks and computer-based programs [30]. While motivational interviewing primarily addresses intentional nonadherence, it can also aid patients in identifying unrecognized unintentional barriers to adherence and in seeking out patient-centered solutions [36].

A recent systematic review evaluated the effect of telephone-based motivational interview to improve medication adherence in chronic diseases (not RA), showing a beneficial effect of this intervention in increasing adherence in long-term treatments [44].

Peer support programs, in-person or virtual, are increasingly being proposed as a means to enhance positive health behaviors. However, while these groups can improve disease knowledge and sense of support, there is little information as to whether, on their own, they can foster improved health behaviors or adherence.

Mobile technology programs are increasingly being used to improve adherence with medication reminders, and to enhance self-efficacy through the use of informational and supportive messaging. A recent meta-analysis showed that the use of mobile phone messaging applications (short message service) may provide benefit in supporting the self-management of long-term illnesses in patients with diabetes, asthma and hypertension [45]. Multimedia message services can be developed for delivering tailored health strategies [13]. The appeal of these strategies is their market penetration and relative low cost compared with interventions requiring direct human interactions.

Patient–physician communication

Since the 1990s, the medical literature has emphasized the importance of changing the traditional paternalistic approach to patient–doctor interactions that assumes the need for medical control over patient behavior, to a more patient-centered approach. The patient-centered, shared-decision approach to the medical interaction proposes in addition to physician’s provision of information, a more holistic sensibility to patient concerns, reassurance and support and participatory decision making. This model requires understanding the perspective of patients about their disease and the care process. Meaningful and empathetic understanding of each patient’s experiences and health beliefs and perspectives is needed to empower the patient into becoming a more active participant in health decision making [13,36]. Good patient–physician interactions can enhance patients’ self-efficacy, increasing their trust in physicians and improving treatment adherence [36,46]. Limited patient contact time in clinical daily practice is the main limitation in this shared partnership model. Participation of other health providers (nurses, physical therapists, etc.) can also aid in establishing effective communication with respect to recommendations and patients’ needs.
Educational interventions in rheumatoid arthritis

Several studies have evaluated the role of educational, psychosocial and self-management programs in patients with rheumatic diseases. However, the majority have focused on the effects of these interventions on specific symptoms such as pain, psychological well-being and self-efficacy [39]. Few have addressed adherence as their primary outcome. Table 2 shows the characteristics and results of intervention studies for improving adherence in patients with RA.

Brus et al. [47] reported that adherence was not improved after 8 months of psychoeducational intervention in patients with RA taking sulfasalazine over a one-year period. However, Hill et al. [48] showed a significantly higher concentration of a pharmacological marker of sulfasalazine in the blood of patients who received an education program for 6 months compared with control patients. However, the study failed to demonstrate that better adherence impacted positively on clinical outcomes, perhaps, because the sample size of the study was small and lacked sufficient power to detect clinical outcomes. Clifford et al. reported that patients with a recent diagnosis of a chronic condition who were interviewed by trained pharmacists 2 weeks after they had started a new medication, self-reported significantly better adherence at 4 weeks of follow-up than controls [49]. This study also included patients with diseases other than RA.

Homer et al. compared individual and group counseling for patients with RA or psoriatic arthritis initiating treatment with methotrexate, sulfasalazine or leflunomide and found no differences between groups. Both groups had high adherence and there was no con-

<table>
<thead>
<tr>
<th>Study (year)</th>
<th>Patients and treatment</th>
<th>Adherence assessment</th>
<th>Experimental group</th>
<th>Control group</th>
<th>Follow-up</th>
<th>Adherence</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brus et al. (1998)</td>
<td>RA recent onset Oral drugs†</td>
<td>Pill counts</td>
<td>Educational group program Four meetings during the first month Reinforcement: 4 and 8 months (n = 32)</td>
<td>Brochure (n = 30)</td>
<td>3, 6 and 12 months</td>
<td>No effect at 12 months</td>
<td>[47]</td>
</tr>
<tr>
<td>Hill et al. (2001)</td>
<td>RA with active disease Oral drugs</td>
<td>Pharmacological marker in the blood</td>
<td>Psychoeducational program (n = 51)</td>
<td>Leaflet (n = 49)</td>
<td>Increased adherence favoring experimental group</td>
<td>[48]</td>
<td></td>
</tr>
<tr>
<td>Clifford et al. (2001)‡</td>
<td>RA and other chronic diseases. Oral drugs</td>
<td>Self-reported adherence</td>
<td>Telephone interview (n = 261)</td>
<td>Usual care (n = 239)</td>
<td>Increased adherence favoring experimental group</td>
<td>[49]</td>
<td></td>
</tr>
<tr>
<td>Homer et al. (2009)</td>
<td>RA starting Oral drugs</td>
<td>Pill counts, self-report diaries, prescription dispensation</td>
<td>Group counseling (n = 30)</td>
<td>Individual counseling (n = 32)</td>
<td>12 months</td>
<td>No effect</td>
<td>[50]</td>
</tr>
<tr>
<td>Unk et al. (2014)</td>
<td>RA</td>
<td>Self-reported adherence</td>
<td>15 min multimedia educational program (n = 54)</td>
<td>Education literature (n = 54)</td>
<td>1 month</td>
<td>No effect</td>
<td>[51]</td>
</tr>
<tr>
<td>Zwikker et al. (2014)</td>
<td>RA nonadherent Oral drugs</td>
<td>Self-reported adherence</td>
<td>Motivational interviewing (n = 63)</td>
<td>Brochure (n = 60)</td>
<td>12 months</td>
<td>No effect</td>
<td>[52]</td>
</tr>
</tbody>
</table>

†Physical exercises and joint protection also evaluated.
‡Study sample included chronic diseases other than rheumatoid arthritis.
DMARD: Disease-modifying antirheumatic drug; RA: Rheumatoid arthritis
Adherence is a complex multifactorial medication-related behavior, with intentional and unintentional components. Several studies using different methodologies have demonstrated suboptimal adherence to medications in patients with RA, resulting in deleterious health outcomes. While several interventions have been proposed to increase adherence in patients with chronic disease, few studies have examined patients with RA, and in these, the results have been disappointing.

Future perspective
Evidence over the past three decades has shown that patients with chronic diseases have suboptimal adherence to treatment. Nevertheless, the most frequently proposed interventions including self-management and cognitive behavioral programs have only shown modest results in improving adherence. Additional studies are needed to further establish whether novel interventions involving mobile technology and social support might be effective in enhancing medication-taking behaviors. Furthermore, the role of patient–doctor communication in enhancing adherence has not been well defined since most of the interventions proposed are external to the patient–doctor encounter. Furthermore, it is unclear how often providers discuss adherence with their patients, and if they do, whether these conversations are open and considered nonjudgmental by the patients. Future interventions addressing adherence should combine multiple strategies developed to increase knowledge, motivation and self-efficacy, and to address individual barriers. Finally, innovative, cutting-edge applications, such as those proposed within Health 2.0 may advance the use of technology in this field. These technologies can be used to enable and facilitate peer social networking, participation, apomediation, collaboration and openness between providers and consumers [53]. With increasing use of smart e-technologies, use of reminders and motivational interventions can be easily implemented with an aim to enhance chronic disease self-management and adherence, also reaching underserved communities with more ease, especially through smart phones. While these technologies are the future, additional work will be needed to determine how self-management programs can be implemented and what their ultimate effects are.

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No writing assistance was utilized in the production of this manuscript.

Executive summary

- Adherence is a dynamic complex behavior influenced by unintentional and cognitive intentional determinants.
- Many patients with rheumatoid arthritis (RA) have suboptimal adherence to medications resulting in deleterious health outcomes.
- Interventions for improving treatment adherence in RA have shown modest efficacy.
- The role of the patient–doctor communication on adherence has not been well established in patients with RA, but conceivably could be important as demonstrated for other chronic diseases.
- The role of innovative e-technologies is beginning to be explored and may prove valuable to enhance self-management and adherence in patients with rheumatoid arthritis.
References

Papers of special note have been highlighted as: • of interest; •• of considerable interest.


2 Lee JK, Grace KA, Taylor AJ. Effect of a pharmacy care program on medication adherence and persistence, blood pressure, and low-density lipoprotein cholesterol: a randomized controlled trial. JAMA 296(21), 2563–2571 (2006).


•• Definition and clarification of terms and scope of adherence to medications.


• Validation of the compliance-questionnaire-rheumatology against electronic medication event monitoring.


•• A study of adherence to oral therapies in rheumatoid arthritis, using electronic medication monitoring and evaluating the clinical consequences of low adherence.


Improving treatment adherence in patients with rheumatoid arthritis: what are the options? Perspective


** Systematic review of interventions that can change adherence behaviors.


** Well-established model that explains health behaviors.


Perspective Marengo & Suarez-Almazor


