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SYSTEMATIC REVIEW

What Are the Preferences of Patients With Rheumatoid Arthritis for Treatment Modification? A Scoping Review

Suz Jack Chan[1] · Hui Yee Yeo[2] · Lisa K. Stamp[3] · Gareth J. Treharne[4] · Carlo A. Marra[1]

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Abstract

Objectives Optimal care of rheumatoid arthritis (RA) patients entails regular assessment of disease activity and appropriate adjustment of disease-modifying antirheumatic drugs (DMARDs) until a predefined treatment goal is achieved. This raises questions about the approach to treatment decision making among RA patients and their preference for associated treatment changes. We aimed to systematically identify and synthesize the available evidence of RA patients' preferences regarding DMARD modification with an emphasis on escalating, tapering, stopping, or switching of DMARDs.

Methods A scoping review was undertaken to gauge the breadth of evidence from the range of studies relating to RA patients' preferences for DMARD modification. Pertinent databases were searched for relevant studies published between 1988 and 2019. Conventional content analysis was applied to generate themes about how patients perceive changes to their RA treatment.

Results Of the 1730 distinct articles identified, 32 were included for review. Eight studies investigated RA patients' perceptions of switching to other DMARDs, 18 studies reported RA patients' preferences for escalating treatment, and six studies explored the possibility of tapering or stopping of biologic DMARDs. Four overarching themes relating to RA patients' preferences for treatment modification were identified: (i) patient satisfaction, (ii) patients' beliefs, (iii) information needs, and (iv) patient–clinician relationships.

Conclusion Uptake of treatment changes in clinical practice can be improved by understanding how RA patients approach the decision to modify their treatment and how this relates to their satisfaction, beliefs, information needs, and relationships with clinicians. Future work is needed to systematically determine the significance of these factors in RA patients' decision-making processes.

Key Points for Decision Makers

Rheumatoid arthritis patients' approach to treatment decision making and their perspectives towards disease-related outcomes differs to those of clinicians. Decisions that are shared between RA patients and clinicians lead to better disease response and higher patient satisfaction.

Patients draw upon self-reported satisfaction, past experiences, self-belief, and possible future impact when considering treatment modification. A strong patient–clinician relationship and meeting patients' needs for information influences the social context of decision making among RA patients.

Understanding the underlying reasons for RA patients' preference for treatment modification and addressing their concerns may improve the uptake of treatment changes in clinical practice.

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✉ Carlo A. Marra
carlo.marra@otago.ac.nz

1 School of Pharmacy, University of Otago, PO Box 56, Dunedin 9054, New Zealand

2 Department of Preventive and Social Medicine, University of Otago, Dunedin, New Zealand

3 Department of Medicine, University of Otago, Christchurch, New Zealand

4 Department of Psychology, University of Otago, Dunedin, New Zealand

1 Introduction

Rheumatoid arthritis (RA) is a chronic debilitating disease characterized by pain, inflammation, and potential erosion of the joints and resultant reduced quality of life [1]. It is one of the most prevalent chronic inflammatory diseases, affecting 0.5–1.0% of the population [2]. The primary therapeutic goal in RA is to attain a state of clinical remission or low disease activity (LDA), which typically can only be achieved through the use of disease-modifying antirheumatic drugs (DMARDs). At present, a wide array of DMARDs are available for the treatment of RA, including conventional synthetic DMARDs (csDMARDs), biologic DMARDs (biologics), and targeted synthetic DMARDs (tsDMARDs) [3]. Biologics now include the originator biologic and 'generic' biologics known as biosimilar agents [4].

Optimal care of people with RA entails regular assessment of disease activity and appropriate adjustment of medications until the predefined treatment goal is achieved [5]. Clinical trials have demonstrated that tight disease control significantly improves clinical and radiographic outcomes of RA [6, 7] and is associated with higher rates of remission in clinical practice [8]. Tight disease control requires systematic escalation of DMARD treatment either by increasing DMARD dose, combination use with prednisone and/or other DMARDs, or switching DMARDs when RA is not well controlled. For patients who achieve sustained remission for at least 6 months, a reduction in DMARD dose/frequency can be considered to reduce medication burden [9]. Considering the high cost of biologics, tapering or switching to less expensive biosimilars may be an attractive option to reduce individual, medical and societal health care costs if they are equally effective [10].

Providing patient-focused care that is responsive to patient preferences is paramount to achieving therapeutic success [11]. Previous studies have shown the approach to treatment decision making, as well as perspectives on disease-related outcomes among RA patients, differ substantially between patients and clinicians [12, 13]. Therefore, the decision to modify treatment to achieve better disease control and improve RA patients' quality of life should ideally be aligned with both clinicians' recommendations and patients' preferences [14]. Decisions that are shared between people with RA and their clinicians are associated with good disease response [15], overcoming patients' resistance towards treatment changes [16], and can lead to better health outcomes with regards to treatment adherence and satisfaction [17]. Patients' values and preferences are advocated as essential elements of decision making and are acknowledged in international guidelines for treating RA patients [18, 19].

Previous literature reviews have focused on describing patients' experiences of DMARD treatment, and preferences for DMARD, health states, and DMARD-related treatment outcomes [20, 21]. Based on our literature search, no systematic or scoping reviews have examined patients' values and preferences surrounding treatment modification in RA. Therefore, the aim of this review was to systematically identify and synthesize the available evidence of RA patients' preferences towards DMARD modification, with an emphasis on escalating, tapering, stopping, or switching of DMARDs. A secondary aim of this review was to determine factors influencing RA patients' decision making when considering treatment modification. The notion of preference varies between disciplines and can be regarded as a quantitative valuation of outcomes [22] or construction of a utility function based on selection among a set of alternatives [23]. For this review, preference was defined in a broad sense and encompasses not only patients' perspectives, but also their attitude towards health and health care [24].

2 Methods

A scoping review was undertaken to map the existing body of literature [25] to provide the breadth of evidence from a range of studies but not necessarily the depth that is consistent with a systematic review [26]. A scoping review is appropriate for our research questions because the scope of our review covers a wide range of factors associated with treatment modification. Guided by Arkey and O'Malley's framework for conducting scoping reviews [27] and further refined by the Joanna Briggs Institute [28], this review followed five iterative stages: (1) identifying the research question, (2) identifying relevant studies, (3) selecting suitable studies, (4) extracting the data, and (5) collating and summarizing the results.

2.1 Research Questions

The research questions applied in this review were intentionally broad to capture a wide breadth of literature relating to RA patients' preferences for treatment modification encompassing initiation of a new medication, switching to an alternative medication, altering the dose, or stopping a current medication. The term 'medication' refers to any DMARD used to treat rheumatoid arthritis, including csDMARDs, biologics, tsDMARDs, or biosimilars. The Patient, Intervention, Comparison, and Outcome (PICO) strategy was used to formulate our research questions and to identify the keywords that were used in the next stage of the review:

a. What are the preferences of RA patients regarding the modification of their DMARD regimen?
b. What are the key factors affecting RA patients' decision making for DMARD modification?

2.2 Search Strategy

Following the finalization of keywords, a search strategy was developed in collaboration with an academic librarian. Medical Subject Heading (MeSH) terms and Boolean operators were used to narrow, widen, and combine the search (see Appendix 1 in the electronic supplementary material [ESM]). We used five diverse databases (PubMed, EMBASE, PsycINFO, CINAHL, and Web of Science) to identify potentially relevant studies. Complementing the database search were four grey literature databases: Google Scholar, Proquest dissertation and theses, Ethos, and OpenGrey using keywords as search filters. We also manually scanned the reference lists from included studies for potentially relevant studies.

2.3 Study Selection

Studies were included if they fulfilled the inclusion and exclusion criteria as outlined below.

Inclusion criteria:

- Population (P): Patients age 18 years and above with RA. Studies involving a mixed population of patients with rheumatic diseases were accepted if patients with RA were included.
- Intervention (I): Treatment modification surrounding DMARDs use in the treatment of RA. Treatment modification includes escalation, tapering, stopping, or switching of DMARDs.
- Comparator (C): Continuing on current DMARD treatment.
- Outcome (O): Patient values, preferences, or attitudes related to treatment modification.
- Study type (S): Original, peer-reviewed studies of any design published in English only.
- Full-text studies published between Jan 1, 1988 to Dec 31, 2019.

Exclusion criteria:

- Studies describing patient-reported outcome measures of health-related quality of life only.
- Studies assessing patients' preferences about non-DMARD modifications including non-steroidal anti-inflammatory drugs (NSAIDs) or glucocorticoids.
- Studies assessing patients' perspectives towards non-pharmacological interventions in the management of RA which include, but are not limited to psychological therapies, physical activity/exercise, or complementary/alternative medicine.
- Studies evaluating patients' preferences for medication attributes as these were assessed in an existing systematic review [20].
- Studies only published as abstracts or conference proceedings.
- Studies describing treatment modification due to DMARD-induced adverse effects.
- Studies describing patients' self-adjustment of DMARD.

The references were first screened by title and abstract independently by two reviewers (JC and HY). If the eligibility of the study could not be determined from the title or abstract, the full-text article was retrieved and assessed. The final step before the full-text review involved a comparison of the screened results between the two reviewers. Any discrepancies were resolved through discussion until consensus was achieved.

2.4 Data Extraction and Synthesis

Data elements included were chosen through discussion between two authors (JC and HY), drafted, and revised iteratively throughout the stages of the review. The finalized data extraction form was designed to capture identifiers and variables including author(s) and year of publication, country of origin, sample size and characteristics (e.g., mean age and/or age range, proportion of males/females), study type, methodology, study objective, and key findings relevant to the research questions. All study data were extracted by JC, while HY validated the accuracy of the data by cross-checking against the included studies.

2.5 Collating and Summarizing the Results

Data collation and summarization was conducted in two steps. First, descriptive statistics were used to summarize studies by methodology and types of treatment changes. No inferential statistical testing or meta-analysis was performed due to the small numbers of studies using specific methods. Subsequently, a conventional content analysis was performed on all the data, and themes were developed to summarize study findings [29]. Conventional content analysis is appropriate when it is used to describe a phenomenon without using predetermined categories or theoretical perspectives, as is the case for this study [29]. All study data were read repeatedly to obtain a sense of the whole body of literature. Next, codes, which constituted a word or short phrases identifying features of data relevant to the research questions, were extracted and inductively sorted into categories based on how different codes were related and linked. Within each category were themes that represent how participants perceived changes to their RA treatment.

This process was completed by JC and reviewed for appropriateness to the theme by two independent reviewers (HY and CM). Any differences were resolved through discussion among these three authors.

3 Results

3.1 Search Results

An initial electronic search of five databases yielded 1801 articles. An additional 289 studies were identified through searches of the grey literature for a total of 2090 articles. The screening for duplicates removed 360 articles, and another 1591 articles were excluded after title and/or abstract screening. Full texts of the remaining 139 articles were retrieved for further review, of which 107 articles were excluded leaving 32 studies included in the review. The main reasons for exclusion were studies eliciting patient preference for medication attributes only ($n = 23$), patient-reported outcomes ($n = 19$), and not involving treatment modification ($n = 17$). The study flow diagram is illustrated in Fig. 1.

3.2 Description of Included Studies

The 32 eligible studies are summarized in Table 1. A total of 20 quantitative studies were identified, together with 10 qualitative studies and two studies using mixed methods. Eight studies investigated RA patients' perspectives on switching to DMARDs of a different route of administration [30–37], 18 studies reported RA patients' perspectives for escalating RA treatment [38–55], and six studies explored the possibility of tapering or stopping biologics [56–61]. These studies were grouped into three broad categories that represent (i) switching medication, (ii) escalation of treatment, and (iii) tapering or stopping medication. A sub-analysis of findings that were unique to each category is presented separately in Table 2.

3.3 Themes

Four broad themes related to RA patients' perspectives towards treatment modification were identified: (i) patient satisfaction, (ii) patients' beliefs, (iii) information needs, and (iv) patient–clinician relationships. These themes and the constituent subthemes and identifying codes are summarized in Table 3.

Theme 1: Patient Satisfaction Satisfaction with current treatment or health state strongly influences RA patients' preferences towards treatment changes in past research. Patients who perceive their disease to be stable [38–41, 48, 51, 52, 59] or were satisfied their current treatment was working [37, 41, 52, 56] preferred to maintain their current treatment. They did not perceive a need to add or change their treatment [42, 52], which may risk losing the currently acceptable health state [53, 61]. In particular, one study found that patients who were satisfied with RA control were almost seven times more unwilling to change therapy than those not satisfied with their disease control [52]. In contrast, patients who experienced persistent RA symptoms and declining functional capacity affecting their current quality of life were more willing to accept treatment modification [43, 46]. The more severe the RA symptoms were perceived by patients (pain and fatigue), the more likely patients were to change their treatment [42, 52, 54].

Three studies found discrepancies between patient-reported satisfaction and assessment of disease activity in RA [46, 51, 52]. Takahashi et al. reported more than half of RA patients wanted to remain on current therapy and were satisfied with their current disease state despite having moderate to high disease activity [51]. Raczkiewicz et al. found a majority of RA patients (74.5%) declared satisfaction with therapy but only 44% of their sample had low disease activity or were in remission as defined by Disease Activity Score-28 (DAS28) [46]. Wolfe and Michaud discovered that of RA patients who reported being satisfied with their current treatment, 71.3% had moderate or high disease activity levels [52]. It therefore appears that patient-rated satisfaction does not depend on disease activity alone, but also on other factors such as perceived functional status and patients' age [51, 52].

Theme 2: Patients' Beliefs Patients' health beliefs and their impact on decision making are critical in the understanding of patients' receptiveness towards treatment changes in past research on RA. Three sub-themes were generated to illustrate the broad concept of patients' beliefs, namely perception about medications, perception towards the consequences of change, and past experiences.

Perception about medications RA patients' perceptions of medications and treatment modification have been found to range between two extremes. At one end, patients view DMARDs as a necessity as they provide symptom relief and/or prevention of joint damage [55]. At the other end, medications have been described as 'poison', unnatural, and toxic chemical substances that should be avoided [53, 54]. In addition, the action of taking medication is associated with the identity of being sick and of being a patient with a chronic, serious illness, influencing patients' willingness to accept new treatments [53, 54]. DMARDs, in particular, are perceived as aggressive and harmful treatments [55]. However, patients often tolerate DMARDs as a 'necessary evil' to relieve RA symptoms [53] but often have strong desires to reduce DMARDs to alleviate medication burden [61].

For RA patients considering switching, escalating, or tapering treatment, information about the efficacy [48, 49], safety, and adverse effects profile [35, 38, 42, 48, 49, 51,

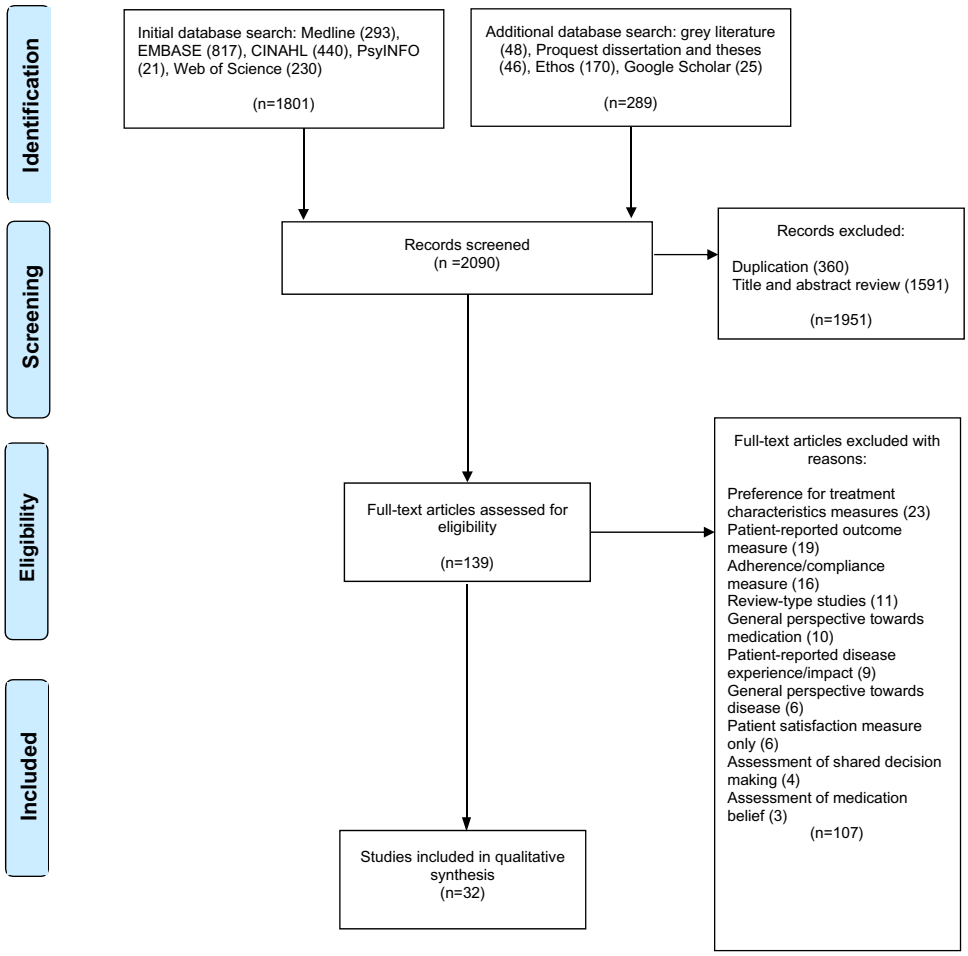

Fig. 1 Literature search flow diagram based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

52, 57], and potential long-term use issues such as the risk of a weaker immune system and risk of developing cancer over time [48, 55] have been found to be equally important. For example, Funahashi and Matsubara found RA patients wanted to know about the types and frequency of adverse effects before starting a new treatment [49]. The route of drug administration was also mentioned as a potential barrier to the uptake of new treatment [35, 48]. Studies exploring RA patients' perspectives towards biosimilars have revealed that patients generally prefer bio-originators over biosimilars for their perceived superior drug attributes (e.g., efficacy and safety) [30–34]. Frantzen et al. reported one of RA patients' major concerns about biosimilars was the perception of inferior quality compared with the bio-originator [31], whereas van Overbeeke et al. reported patients are concerned about the suitability of biosimilars in treating RA [33].

Perception of the consequences of change RA patients were more likely to accept changes to their treatment if they perceived the change would significantly improve their current condition and future prognosis [40, 41, 43, 44, 47, 49, 53, 60]. The desire to return to normality has been found to be a recurrent theme motivating RA patients to accept treatment changes [35, 38, 42, 53, 55–57, 60, 61]. Some RA patients are even willing to accept potential adverse effects associated with treatment and did not mind taking large amounts of medication if this could improve their quality of life [38, 43, 53]. RA patients may be discouraged from accepting the proposed treatment changes when the risks of treatment are perceived to outweigh the benefits, and when there is uncertainty surrounding treatment outcomes [35, 36, 48, 52, 53, 55–60]. For instance, adding medication to control the disease was perceived as an additional health burden that some were unwilling to accept or it was perceived as a 'threat' that may jeopardize their perception that their disease is well controlled despite clinical indicators showing otherwise [56–59]. RA patients also considered the possible impact of treatment change on their family and employment situation when evaluating competing risks and benefits [42, 55, 61].

Past experiences RA patients tend to draw upon past disease or treatment experiences to help them make sense of potential treatment change decisions. Past experiences of poor disease control prior to biologics treatment and negative experiences of access to biologics were among

Table 1 Characteristics of included studies of treatment modification

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Switching to biosimilars or other DMARDs					
Jacobs et al. (2016), USA [30]	To evaluate the awareness, usage, and knowledge of biosimilars among pts, caregivers, and the general population in the US and EU	Quantitative, web-based survey	3198 (503 RA pts)	Not mentioned	Awareness of biosimilar was low among pts in EU and US (25–29%). Pts who were aware of biosimilars had a more favorable perception towards their efficacy, safety, and affordability. Pts considered manufacturers of biosimilars as a very to extremely influential factor to try or switch to a biosimilar
Aladul et al. (2017) UK [32]	To assess the understanding and attitude towards infliximab and etanercept biosimilars among RA and AS pt	Quantitative, web-based survey	182 (91 RA pts)	Not mentioned	Biosimilar-treated pts had more knowledge, awareness, and confidence in biosimilars compared with those treated with bio-originator. Fewer pts on bio-originator were willing to switch to other biosimilars compared with those on biosimilars (28% vs 74%; $p < 0.01$) because of safety and efficacy concerns. More evidence from trials, safety information, and side effects of biosimilars was required. Both groups of pts wanted more clarity about the reasons for switching and assurance of switching back to their previous medication. Pts on bio-originator emphasized cost should not be considered when prescribing biologics. Further involvement in decision making would increase their acceptance of biosimilars

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Overbeeke et al. (2017), Belgium [33]	To investigate the knowledge and perception of biosimilars among rheumatologists and RA pts	Quantitative, web-based survey	121	57% 40–60 years 87% female	Pts were more familiar with biologics than with biosimilars (79% vs 49%) but had no preference for either medication. 6% refused to be treated with biosimilars. 65–76% of pts trusted their clinician to switch or initiate treatment with biosimilars for RA. 48–53% indicated the importance of biosimilars' efficacy in clinical trials for them to switch or start on biosimilars
Waller et al. (2017), Germany [34]	To explore factors motivating rheumatologists to prescribe biosimilars and to understand pts' attitudes towards biosimilars	Quantitative, cross-sectional self-administered online survey	261 (133 RA pts)	Not mentioned	19.6–23.5% of pts treated with bio-originator were reluctant to switch to biosimilars compared with 16.1% biologic-naïve pts. 10.8–18.5% of pts on bio-originator and 7.3% of bDMARD-naïve pts refused biosimilars and accepted only bio-originator. 2–18% of pts were unhappy when switched from bio-originator to biosimilar. Pts' concerns included insufficient knowledge of the drug (25–41%), adverse effects (26–32%), and long-term problems (19–30%) when starting on bio-originator or biosimilar. Pts who switched from bio-originator to biosimilars felt they were given a cheaper and less effective drug and perceived there is a better alternative

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Desplats et al. (2017), France [35]	To explore pts' reason for choosing IV infusion of ABA or TCZ or to switch to SC injections	Quantitative, cross-sectional survey	201	58.4 (mean) 81.1% female	Pts preferred to maintain IV infusions than to switch to SC injections. Common reasons included fear of lack of follow-up (72.1%) and lack of medical assistance (61.2%) after changing to SC route. Pts tended to choose the option based on familiarity and previous experience. Lack of knowledge about alternative routes of administration was a barrier for pts to consider switching
Frantzen et al. (2019), France [31]	To assess pts' information, knowledge, and perspectives about biosimilars	Quantitative, nation-wide cross-sectional survey	629 (408 RA pts)	57 (median) 77.3% female	Only 9% of pts were familiar with biosimilars. However, 55% would accept biosimilar despite concerns with quality (52%), safety (42%), efficacy (37%), and potential flare (37%). 15% rejected switching to biosimilars. Safety and efficacy data of biosimilars (47%), information (37%), and potential cost saving (20%) facilitated pts' decision to switch to biosimilars. Fear of biosimilar having less efficacy (61%) and lower safety (71%), and poor trust in pharmaceutical companies (40%) were barriers for pts to accept biosimilars treatment

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Teeple et al. (2019), USA [37]	To evaluate pts' attitude towards switching to biosimilar for non-medical reasons	Quantitative, cross-sectional survey	1696 (37% self-reported RA)	Age not mentioned 70% female	64% of pts had no knowledge of biosimilars. 85% did not want to switch if the current treatment was working. About 85% of pts had concerns about the efficacy and toxicity of biosimilar. 71% of pts feared losing co-pay support if they were to switch. Pts felt the decision to switch to biosimilars should be primarily between them and the clinician, rather than dictated by other stakeholders. 52% of pts were willing to pay USD50–200 extra per biologic administration/fill to avoid a switch to biosimilars. Clinician's recommendations, the efficacy of the biosimilar, and out-of-pocket costs had a large influence on the decision to switch to biosimilars
Chau et al. (2019), USA [36]	To explore pts' perspective on switching to biosimilar	Quantitative, cross-sectional telephone survey	52	60 (mean) 76.9% female	The majority of pts (80%) were generally satisfied with disease control after switching to biosimilars. Major concerns for switching included not knowing enough about biosimilars (38%), safety (35%), and efficacy (35%). Main reason for patients refusing to switch was a lack of information

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Initiation/escalation of csDMARDs or biologics					
Wolfe and Michaud (2007), USA [52]	To investigate pts' acceptance and satisfaction with therapy, willingness to change therapy, and reasons for not changing	Quantitative, longitudinal observational study	6135	62.7 (median) 79.9% female	63.8% of pts preferred to maintain their current treatment rather than future improvement. Reasons given were concern for new medication side effects (72.5%), risk of losing disease control (68.5%), and belief their current medication was the best option (66.3%). 53.3% were satisfied with their current disease control and saw no reason to change medication. Unwillingness to change was predicted by satisfaction with arthritis control (OR 6.8), concern for the risk of side effects (OR 4.4), and clinician opinion (OR 1.9). Medication needed to be 52.3–75.8% better than current treatment to motivate pts to consider changing their therapy
van Tuyl et al. (2008), the Netherlands [43]	To understand rheumatologists' and pts' views towards combination therapy	Qualitative, focus group discussions and telephone interviews	13 (11 RA pts)	Age not mentioned 10 females	Pts were focused on improving quality of life after having recalled past experiences with the disease and ineffective treatment. Pts were positive about aggressive treatment despite being aware of the potential side effects and a large number of pills. Trust in clinicians was regarded as important

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Lisicki and Chu (2008), USA[48]	To identify factors considered by pts and clinicians when deciding biologic therapy for their RA	Quantitative, blinded, web-based survey	729	53.0 (mean) 74.9% female	Pts considering switching to biologics valued clinician experience with drug (4.4), cost (4.2), and safety (2.8). 64% reported choosing not to start biologics because of costs (37%), fear of side effects (28%), uncertainty of biologics' additional benefit (27%), and satisfaction with current treatment (26%)
van Hulst et al. (2011), the Netherlands [41]	To quantify the importance of factors influencing pts' and rheumatologists' decision to escalate care	Quantitative, maximum difference scaling survey	213	60 (mean) 69.5% female	Pts were most strongly influenced by physical function and mobility (RIS mean score: 4.3), motivation to get better (3.55), trust in their clinician (3.46), and satisfaction with current DMARDs (3.41) when considering treatment escalation. Rheumatologists and patients were distinctly different in their approach to escalating treatment
Funahashi and Matsubara (2012), Japan [49]	To understand RA pts expectation for treatment	Quantitative, anonymous survey	165	36% in their 70's 84% female	Pts were concerned about the type and frequency of side effects, and efficacy when considering switching treatment. The cost of treatment was a concern among pts treated with biologics. Pts prioritized long-term improvement in quality of life, maintaining stable conditions, and prevention of disease progression

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Takahashi et al. (2012), Japan [51]	To examine pts' satisfaction, attitude, and reasons for unwillingness to change medication	Quantitative, cross-sectional self-reported survey	220	61.4 (mean) 70% female	70% of pts preferred to maintain their current treatment. Reasons given were satisfaction with disease state (58%), side effects (34%), and cost of medications (5%). Among pts with moderate-to-high disease activity, 65% preferred to maintain current treatment because of satisfaction with current disease state (46%) and side effects (43%). 20% of pts unwilling to change because of adverse effect concern had no significantly higher history of DMARD adverse effects. Satisfaction appears to be associated with functional disability and not levels of disease activity
Martin et al. (2013), USA [39]	To evaluate the influence of pts' characteristics on risk perception and likelihood to consider DMARDs	Quantitative, cross-sectional mail survey	1009	61.6 (mean) 73.2% female	Willingness to consider DMARD was affected by satisfaction with disease control ($p = 0.03$), post-decision regret related to previous DMARD choice ($p = 0.019$), and health literacy ($p = 0.03$). The perception of medication risk was influenced by current and past DMARD-related adverse effects ($p = 0.016$–0.03) and negative disease experience ($p = 0.025$). Health literacy, independent of low educational achievement, or other demographics was a predictor of willingness to consider a DMARD and risk perception. Much of the effect of health literacy on willingness to consider DMARD was mediated through risk perception

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Fraenkel and Cunningham (2014), USA [50]	To explore how disease activity, pts' illness beliefs, and combination of both predict future treatment changes	Quantitative, Face-to-face interview 6-month prospective study	142	58.7 (mean) 86% female	Pts were more likely to escalate treatment if they perceived the impact of illness, burden of symptoms, concern of illness, emotional impact of illness was high, in combination with high disease activity (OR 2.95–5.06). High disease activity without the accompanying high physical and/or emotional impact as perceived by pts was unlikely to motivate them to accept additional risk, inconvenience, and cost associated with escalating treatment
Raczkiewicz et al. (2015), Poland [46]	To identify the differences in opinions between RA pts and clinicians concerning DMARD escalation	Quantitative, self-administered questionnaire	82	61.4 (mean) 68 females	The presence of physical symptoms, including persistent pain, deterioration in functional capacity, and radiographic progression were important factors valued by pts to escalate treatment. Clinician's opinion to escalate treatment was also highly regarded by pts. Most patients (74.5%) reported being satisfied with current treatment despite only 44% with low disease or in remission
Fraenkel et al. (2015), USA [45]	To examine the influence of subjective numeracy on pts' preferences for current or new treatment	Quantitative, self-reported adaptive conjoint analysis survey	156	58.8 (mean) 85.3% female	Pts preferring to maintain treatment had lower subjective numeracy compared with those preferring to change treatment ($p < 0.001$). Older pts (>65 y) preferred to maintain treatment regardless of the numeracy level. Pts with higher subjective numeracy valued slowing joint damage and placed less importance on treatment risk compared with those with lower subjective numeracy

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Pasma et al. (2015), the Netherlands [54]	To explore the reasons for DMARD initiation in first-time user pts	Qualitative, individual interview and focus groups	33	51 (median) 87.9% female	Pts were more likely to initiate treatment if the symptoms were severe. Past positive/ negative experience with medication influenced their decision. Negative perception (dependence, adverse effect, perceived as poison) were associated with reluctance to initiate DMARD. Information shaped pts' perception of medication, and in turn, influenced adherence. Trust and open communication with rheumatologists were regarded as the most effective way to modify pts' perception
Nota et al. (2015), the Netherlands [55]	To understand pts' consideration when deciding about DMARDs	Qualitative, in-depth face-to-face interview	32	54 (mean) 81% female	Pts were in favor of DMARD therapy because (i) necessity to relieve symptoms and future joint damage, (ii) trust their rheumatologist to make the best decision, and (iii) a better benefit–risk profile compared with other options. Pts were against DMARD when (i) perceived it as dangerous and harmful as well as future options, and (ii) emotionally affected by needing to take 'powerful' drugs. Most pts were satisfied with the information provided when initiating DMARD. Some pts preferred to know what other options were available and potential adverse effects that could affect their daily lives (e.g., inability to drive, consuming alcoholic drinks)

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Fraenkel et al. (2015), USA [42]	To understand how pts' approach risk–benefit trade-offs with treatment escalation	Qualitative, think-aloud protocol	88	55 (mean) 74% female	Pts weakly or strongly impacted by disease were not open to engage in decision making. Pts moderately impacted by disease evaluated treatment options beyond medication characteristics. Age and role responsibility motivated pts to refuse or accept additional treatment. Pts frequently mentioned a lack of trust and poor communication with clinicians acted as a barrier to escalating treatment
Prothero et al. (2016), UK [38]	To explore the views and expectations of RA pts and carers about intensive management strategies	Qualitative, semi-structured face-to-face individual interview and focus groups	14 (9 RA pts)	59 (mean) 6 females	A majority (7/9) of pts had high expectations that intensive management would improve their symptoms and restore normality and independence. Pts who failed treatment were more willing to accept intensive management and the inconvenience of frequent monitoring. Pts discussed the importance of relevant information such as potential side effects (4/9) and long-term effects of the drugs on their health (2/9) prior to commencing intensive management. Continuity of care with access to rheumatologists when needed was emphasized. The importance of building trust, communication, and relationships with their health care provider was also mentioned

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Hendrikx et al. (2016), the Netherlands [40]	To investigate the association between pts' perception of disease, willingness to alter, and treatment escalation	Quantitative, prospective, longitudinal survey	453	59 (mean) 65% female	Pts' willingness to alter therapy strongly predicted the actual practice of escalating drug therapy in clinical settings, independent of disease activity and duration measures (OR 5.83, 95% CI 2.91–11.67). Correspondingly, pts' willingness to alter therapy was strongly associated with pts' satisfaction with current health state (OR 0.21, 95% CI 0.10–0.44), perceived past health change (OR 0.45, 95% CI 0.33–0.62) and expected future health change (OR 1.87, 95% CI 1.33–2.63). The effects of pts' perception of actual medication escalation decisions were mediated through willingness to alter therapy
Bolge et al. (2016), USA [44]	To examine the preferences of RA pts towards biologics therapy attributes prior to treatment initiation	Quantitative, self-administered web survey	243	52.5 (mean) 85.2% female	53.1% of pts were open to IV or SC route of administration. 49.3% of pts somewhat and strongly preferred the SC route of administration. Most pts considered the impact of treatment on their present and future condition (74.5%) when deciding between treatments. 49.0% of pts would make the final decision after considering their rheumatologist's recommendations and 21.8% mentioned the decision would be shared with their rheumatologist

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Martin et al. (2017), USA [47]	To compare the effects of a pharmaceutical decision guide with pts decision aids on beliefs and choice to escalate therapy	Quantitative, single-blind, randomized controlled study	402	63.7 (mean) 69% female	Pts receiving pharmaceutical decision guides were twice as likely to choose to escalate therapy compared with pts who received the short and long version of the decision aid (31.3% vs 14.6% vs 14.0%, $p < 0.001$). The guide exerted influence on pts' beliefs about medication and social normative belief (how most people will choose) through persuasive communication techniques. Increasing knowledge did not impact pts' belief about medication, decisional conflict, or choice to escalate therapy
Shaw et al. (2018), USA [53]	To describe how feelings influenced treatment decision making from RA pts' perspective	Qualitative, semi-structured individual interview	48	59.7 (mean) 91.7% female	Motivation to return to normality and fear of future disability drove pts to accept DMARD treatment. Normality was a recurrent theme that made pts willing to accept DMARD therapy despite perceiving medication as 'evil'. Negative emotions were barriers to pts accepting DMARD. Pts feared taking medication because of toxicity and viewed medication as a threat to their need to feel/be in control of their health. Taking DMARD was also perceived as accepting the identity of being sick. Disappointment with poor treatment response and cognitive burden of navigating through treatment options affects pts willingness to continue taking DMARD

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Tapering/stopping of DMARDs					
Markusse et al. (2014) the Netherlands [58]	To explore the knowledge, expectations, and emotions of pts about tapering and stopping antirheumatic drugs	Qualitative, structured individual interviews	20	71 (median) 13 females	Most pts hoped to achieve a state of low disease activity and were relieved that long-term medication could be stopped. However, pts feared an increase in disease activity and joint damage progression after stopping. Concerns of a delay in medication effect upon restarting treatment were also mentioned. Some pts were willing to stop their medication if suggested by their doctor. Many pts felt positive about the option of tapering/stop but only a minority saw this as a realistic option
Hewlett et al. (2019), UK [56]	To understand the perspective of pts with inflammatory disease on biologics tapering	Qualitative, semi-structured individual interview	15	53.7 (mean) 10 females	Pts' decisions were influenced by their previous bad experience with uncontrolled disease and were satisfied with the transformative effect of biologics. Pts feared to return to a state of uncontrolled disease, risk of disease progression, and lower quality of life after tapering. Some questioned the rationale of tapering biologics when they were doing well. Many assumed tapering as a cost-saving exercise. Pts acknowledged tapering biologics would allow more freedom, lowered the risk of adverse effects, and reduced health care costs. Pts were willing to taper but needed more information about tapering and indicated the practice must be flexible and individualized with the assurance they could have access to treatment when required

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Wallis et al. (2019), UK [57]	To develop a questionnaire that explores pts' perspective towards tapering of biological therapy	Mixed method, focus groups and survey	Focus groups: 9 Survey: 239 (of the 166 identifiable respondents, 45% were RA patients)	Focus groups: 49 (mean) 8 females Survey: age range < 30–90 years 54% female	*Focus groups*The most common concerns identified were losing disease control, delay in access to the previous dose, and risk of drug not working when considering tapering their biological dose. Benefits included a lower risk of adverse effects and frequency of injection *Survey* 47% of pts were willing to taper their dose while 29% disagreed; 67% would consider stopping biologic if it were not required, 64% would prefer to taper and 18% preferred maintaining current dose. Pts were concerned about disease flare (73%), how quickly they would have access to rheumatologist advice (50%), and loss of efficacy of previously effective treatment after restarting therapy (38%). Most pts felt reducing frequency of biologic dosing would have no impact on their personal, work or social life

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Verhoef et al. (2018), the Netherlands [59]	To identify and to quantify factors influencing pts' decision to consider biologics dose tapering	Mixed methods, semi-structured interviews, Maximum Difference Scaling survey	22 (interview) 195 (survey)	Interview: 62 (mean), 68% female Survey: 59 (mean) 65% female	*Interview* Nine themes emerged from 43 potential barriers or facilitators of dose tapering identified. These included disease activity, functioning/ pain, adverse effects, practical use of biologics, attitude towards medication, previous experience(s) with dose tapering, social aspects, organizational aspects, and costs. *Survey* Pts ranked "possibility to increase the dose when symptoms worsen" (mean RPS score = 8.11)[a] as the most influential factor in their decision to taper, followed by "the risk that my disease activity will increase" (7.27), "my current disease activity" (6.92), and "the risk that my physical function will deteriorate" (6.27). Pts trusted rheumatologists and their advice about dose tapering. 73% were positive of tapering biologics after achieving a low disease state
Baker et al. (2019), UK [61]	To explore pts' perspectives on DMARD withdrawal	Qualitative, semi-structured interview	13	65 (median) 53% female	Pts favored DMARD withdrawal because (i) it alleviated their burden of immunosuppressive medicine, and (ii) regular blood monitoring and prescription filling hindered their lifestyle. Pts were against DMARD withdrawal because of past negative experiences with severe RA, feared future disease progression, and the possible impact on their personal and work life. Pts' opinions were heavily influenced by current personal situations and previous experience

Table 1 (continued)

Author (year), country	Primary study aim	Study type/ design	Number of participants	Age and gender	Findings
Chan et al. (2019), New Zealand [60]	To explore factors influencing pts' decision to taper biologics	Qualitative, individual interview and focus groups	45	61.9 (mean) 78% female	Pts were fearful of disease flare after tapering and prioritized quality of life over the risk of biologics toxicity. However, pts acknowledged tapering could relieve the burden of frequent biologics administration. They expressed a desire for more information about tapering and wanted assurance of access to health care services if they experienced a recurrence of RA symptoms after tapering

ABA abatacept, *AS* ankylosing spondylitis, *CI* confidence interval, *csDMARD* conventional synthetic disease-modifying antirheumatic drug, *DMARD* disease-modifying antirheumatic drug, *EU* European Union, *IV* intravenous, *OR* odds ratio, *pts* patients, *RA* rheumatoid arthritis, *RIS* relative importance score, *RPS* rescaled probability score, *SC* subcutaneous *TCZ* tocilizumab *UK* United Kingdom, *US* United States of America

[a]Higher score indicates the more important the factor

the barriers that discouraged RA patients to taper or to stop their biologics if they were in remission [56, 61]. Equally, previous bad experiences with the symptoms of RA such as morning stiffness, joint pain, and fatigue compelled patients to accept intensive treatment in the hope of improving their disease outcomes [38, 43]. Unfamiliarity with subcutaneous injection was one of the main reasons RA patients rejected switching biologics from the intravenous to the subcutaneous route of administration despite the latter being a convenient route [35]. Past and current experiences with DMARD-related adverse effects and disease symptoms also affected RA patients' perception of risks and beliefs, which in turn influenced their willingness to accept DMARDs [39, 52, 54]. RA patients who previously reported experiencing adverse effects of medications were more likely to be unwilling to change therapy (odds ratio [OR] 1.8, 95% confidence interval [CI] 1.6–2.1) [52].

Theme 3: Information Needs Fulfilling RA patients' need for information has been found to facilitate the decision-making process about treatment modification. Pasma et al. suggested information shaped RA patients' perception about medications, which in turn influenced adherence [54], whereas Frantzen et al. reported sufficient information was associated with reducing RA patients' fear of treatment [31]. RA patients consistently wanted more information about the efficacy and safety [31–34, 38, 49, 56] and long-term effects [34] of the medications to make an informed choice. Information about other treatments to compare the potential benefits and risks [55], practical information on how to manage medication in daily activities [55], and information about the experiences of other RA patients [53] was beneficial. Also, RA patients wanted a clear rationale about why the treatment change was proposed. RA patients expected changes to their treatment to be clinically relevant and aligned with improving health as a priority and not for other purposes such as potential cost-savings [32, 56]. Not knowing enough about the proposed treatment was frequently mentioned across studies as a reason why RA patients were reluctant to modify their treatment [31, 34–36, 42, 54]. Despite a need for information, providing information that will increase relevant knowledge of treatment may not necessarily influence RA patients' choice to escalate treatment [47]. Two studies further suggested that RA patients' willingness to escalate treatment correlates with their ability to interpret and use medical information they have been provided with to make effective decisions related to health [39] and perceived ability to evaluate numerical information of both positive and negative outcomes associated with each option [45].

Theme 4: Patient–Clinician Relationships The patient–clinician relationship has been found to be central to the facilitation of effective treatment decision making in RA. Among various aspects of a patient–clinician relationship, trust was commonly mentioned by RA patients

Table 2 Analysis by specific treatment modification

Treatment modification	Analysis
Escalation: dose increment or addition of another DMARD	Patients approach the decision to escalate treatment differently to the rheumatologist [41, 43, 48]. Rheumatologist prioritizes clinical presentation (e.g., presence and number of swollen, tender joints) and blood markers measurement results (e.g., c-reactive protein levels) when making treatment decisions whereas patients' decision is not limited to objective and prognostic markers alone but also the level of functioning and their desire to get better [41, 43] Sociodemographic factors including age and race have been shown to play a role in patients' willingness to accept treatment escalation [45]. Patients age 65 years and above and of Black race were more likely to prefer to maintain their treatment compared with younger, White, or Asian patients Where patients have to pay for prescription medicines, the high cost of medicines discourages patients from accepting additional medication [48, 51, 52] Patients expressed the need to be convinced that the new treatment is at least 52–75% better than their current treatment before they would consider escalating their therapy [52]
Switching to biosimilars	Patients' awareness of biosimilars as a comparable alternative to biologics to treat RA was generally low. A majority had not heard of biosimilars and those who were aware were predominantly those treated with biosimilars [30–33] The identity of the pharmaceutical manufacturer inspired trust in patients to accept biosimilars [30, 31] Patients acknowledged switching to biosimilars could result in significant cost savings [30–32]. Nonetheless, many strongly believed prescribing biosimilars should not be made solely on financial grounds but improvement in health should remain a priority [32]
Tapering/stopping biologics	Patients were receptive to tapering or stopping their biologics if they achieved a low disease activity level and stable disease state; however, only a few patients saw this as achievable [58] Patients recognized fewer dose administrations allows greater freedom without the inconvenience of taking biologics regularly [56]. However, for some, less frequent dosing did not seem to have any significant impact on their daily or working life [57]

as a key influential factor related to treatment decisions [31–33, 37, 41, 43, 46, 54, 55, 58, 59]. Markusse et al. reported RA patients expressed a high level of trust in their rheumatologist to consider stopping biologics despite believing they needed life-long medication [58]. Nota et al. highlighted some RA patients did not hesitate to initiate DMARD treatment without considering other options but rather had complete trust in their clinician and the health care system [55].

Besides trust, the ability to communicate and interpersonal skills of physicians were also considered an integral part of the relationship by RA patients. Aladul et al. and Pasma et al. reported that RA patients valued having communication with their clinician when making a decision to accept treatment changes [32, 54]. RA patients described communication in the context of clinicians showing interest to know and address their needs, doubts, and fears [54]. Accordingly, empathy and clinicians' experiences were held in high regard by patients when determining the next course of treatment action. RA patients felt their physician should be aware of their disease and medication history when prescribing treatment [42] and should have experience with the biologics [48] if initiating or changing.

Shaw et al. reported RA patients appreciate the role of clinicians as sources of information and opinion [53]. Patients described wanting guidance from clinicians to understand risk information associated with treatment. In other studies, clinicians were the most influential source of information [31], and their opinions were taken into consideration by RA patients when making treatment decisions [59]. RA patients recognized the value in taking a collaborative approach with clinicians in decision making [31, 32, 37, 56].

Continuity of care Six studies exploring continuity of care have been conducted with RA patients in Aotearoa New Zealand, France, the Netherlands, and the UK, all countries that have publicly funded universal health care [32, 35, 38, 57, 59, 60]. Having access to treatment [32, 57, 59, 60] and consultation with a clinician [38, 57, 60] when needed was valued by RA patients when considering changing their therapy. For RA patients considering whether they would accept biologics tapering, assurance of access to consultation with their clinician, and having the flexibility to increase the dose if disease symptoms worsened, were important determinants of the decision to taper [56, 57, 59, 60]. Similarly, RA patients emphasized the importance of convenient access to their rheumatologists if they were to escalate their treatment [38] and the ability to switch back to the bio-originator if they felt biosimilars were less effective [32]. In another study of intravenous infusions for RA, patients described the main reasons guiding the choice to refuse to switch over to subcutaneous injections were concerns about a lack of follow-up and medical assistance in the event of an adverse effect, given that subcutaneous injections were administered at home, unlike intravenous infusions [35].

Table 3 Overview of themes, subthemes, and codes across studies included

Treatment modification						
Patient satisfaction	Patients' belief			Information needs	Patient–clinician relationships	
	Perception of medication characteristics	Perception of the consequences of change [40, 44]	Past experience		Continuity of care	Relationship
Not willing to risk current state [53, 61] Content with current state [38–41, 46, 48, 51, 52, 59] Current treatment is working [37, 41, 52, 56] No need for new/additional treatment [42, 52] Tolerance level [42, 52, 54]	Burden of prescribed medicine [53–55, 61] Side effects and safety [30–38, 42, 48, 49, 51, 52, 57] Drug efficacy [30–33, 37, 48, 49] Lower quality grade [31] Suitability [33] Long-term issue [34, 48, 55] Fear injection [35, 48] Type and frequency of side effects [49] Identity as a patient [53, 54] Necessity [53, 55]	Fear of uncertainty [35, 36, 48, 52, 53, 55–60] Normality [35, 38, 42, 53, 55–57, 60, 61] Better quality of life [41, 43, 47, 49, 53, 60] Social circumstances [42, 55, 61] Health threat [42] Dependency [53, 55] Social norm [47] Making wrong decision [53]	Where I was [39, 43, 56, 61] Access to biologics [56] DMARD side effects [39, 52, 54] Treatment failures [38, 43]	Clear rationale [32, 56] Clinical evidence [31–33, 60] Not knowing enough [31, 34–36, 42, 54] Practical issues [55] Information of other treatment options [55] Other patients' experience [53] Patient education [38] Information processing [39, 45, 53]	Consultation with clinician [38, 57, 60] Access to medication [32, 59, 60] Delay in access [57] Lack of follow-up [35] Lack of medical assistance [35]	Collaborative decision making [31, 32, 37, 56] Trust [31–33, 37, 41, 43, 46, 54, 55, 58, 59] Source of opinion and information [31, 41, 52, 53, 59] Communication [32, 54] Assurance [32] Empathy [42] Experience [48] Quality of relationship [42]

4 Discussion

This scoping review found four overarching themes that influence patients' preferences when considering changes to their treatment for RA. Patient-reported satisfaction is an important determinant of treatment decisions in RA. Willingness to accept treatment modifications is guided by RA patients' past experiences, driven by their beliefs and the possible impact of the change on their disease and mental well-being. Accurate and complete information facilitates RA patients' decision-making processes and the importance of patient–clinician relationships was crucial when considering changes to treatment.

RA patients are presumed to consider the available options and their possible outcomes when making treatment decisions [62]. However, past research shows that RA patients do not necessarily systematically approach these decisions but tend to base them on the current level of satisfaction with their disease state and treatments. RA patients who reported being satisfied with the treatment and their disease state were generally more resistant to the idea of changing treatments, even when clinical assessments indicated active disease. In this instance, RA patients may need to feel significantly worse before considering changing their treatment [63]. Patients' beliefs about their future health are likely to modify the extent to which they are willing to accept treatment changes. Previous studies have shown RA patients' beliefs are drawn from a wide range of external sources that may not be necessarily congruent with recommended biomedical concepts and can hamper effective disease management [64–68]. Nevertheless, these beliefs are dynamic and can be influenced using educational interventions [64], effective consultation [69], and biopsychosocial approaches [70, 71].

RA patients' needs for information about medications have been found to be persistently high in past research [72–74] and informed patients tended to engage more in treatment decisions [75]. However, providing more information or increasing patients' knowledge of disease treatment does not necessarily translate into higher uptake of treatment modification. This indicates that more emphasis should be given to ensure the information content is most salient to reduce patients' cognitive load but still satisfy their need for information as well as meeting ethical requirements. Developing methods of effective dissemination of information that are easily accessible to patients can be improved by taking advantage of the widespread use of the internet and mobile-based technologies [76]. Online platforms have been used by health care organizations to provide news and information, patient education, and other various patient or stakeholder engagement activities [77]. It is equally important to recognize and acknowledge that health literacy varies across patients [78]. Therefore, clinicians and researchers should consider the ability of RA patients to process the information needed to make informed and appropriate health decisions.

Preferences for treatment have been shown to be motivated by what an individual thinks most people would choose in a given scenario (perceived social norm) [47] as well as their perception of the attending physician's abilities and attributes [79]. For some patients, interactions with physicians are given substantially higher importance over information provided about treatment or disease-related factors in enabling treatment decisions. Thus, patients' preference for treatment modification should also be understood in relation to the social context in which decisions are made, and not just focus on individuals making decisions in isolation.

The application of decision aids should be advocated to promote RA patient understanding and involvement in the decision-making process. Treatment decisions are often complex, and the process can be intimidating for RA patients to participate in and make a decision [80]. As discrepancy between patients and physicians regarding the management of RA is still an ongoing, significant concern [81], incorporating decision aids may help RA patients by eliciting, clarifying, and communicating their preferences to make decisions about a treatment modification that is aligned with their values [82]. Users of decision aids reported an increase in awareness and understanding of the choices made, as well as enhanced communication with the physician that led to improvement in the quality of the decision-making process [83]. In addition, past studies have demonstrated that decision aids can be integrated into practice to increase RA patients' knowledge and reduce the uncertainty and conflict surrounding treatment decisions [84, 85].

4.1 Strengths and Limitations of This Review

The main strength of this review is we systematically assessed and summarized past research on RA patients' preferences for treatment modification, which provided insights that enhance the understanding of factors influencing RA patients' acceptance or resistance towards changing their treatment, subsequently allowing the formulation of strategies that will improve patients' willingness to modify therapy. In addition, we included a broad but systematic search across multiple databases including the grey literature that enabled us to comprehensively map the evidence related to RA patient preferences towards treatment modification.

The results of this review must be viewed with appropriate caution given a formal quality assessment of the studies under review was not able to be conducted given the wide variation in methodologies in the literature. Language bias is another potential limitation since studies published in English only were included and future reviews could include relevant studies published in other languages. Another limitation is that the search term 'treatment modification' is not consistently defined in the literature. While we acknowledged the term is subject to interpretation, we believe that our search was appropriately inclusive to ensure the major issues related to treatment modification were adequately covered.

5 Conclusion

Facilitation of uptake of recent advances in RA treatment, including introduction of more powerful therapeutic agents, affordable alternatives, and novel treatment approaches in clinical practice requires the understanding of factors that may influence how RA patients approach the decision to modify their treatment. By using a scoping review methodology, the breadth of literature providing insights into RA patients' perspectives towards treatment modification were reliably captured, which adds to the depth of knowledge regarding RA patients' preference for treatment modification. Future work is now needed to systematically determine the significance of these factors in the patient decision-making process in RA.

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Declarations

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Conflict of interest The authors report no conflicts of interest in this work.

Availability of data and material The data supporting the findings of this scoping review was obtained from the literature. It is available within the article and its supplementary information files.

Code availability Not applicable.

Author contributions JC, HY, GT, LS, and CM contributed to the study conception and design. Data collection, synthesis, and analysis were performed by JC and HY with critical input from LS, GT, and CM. The first draft of the manuscript was written by JC and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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