ORIGINAL REPORT: QUALITATIVE RESEARCH

Attitudes towards Oral Health in Patients with Rheumatoid Arthritis: A Qualitative Study Nested within a Randomized Controlled Trial

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Abstract: ***Introduction:*** *Patients with rheumatoid arthritis (RA) present a higher incidence and severity of periodontitis than the general population. Our study, Outcomes of Periodontal Treatment in Patients with Rheumatoid Arthritis (OPERA), was a randomized waiting-list controlled trial using mixed methods. Patients randomized to the intervention arm received intensive periodontal treatment, and those in the control arm received the same treatment with a 6-mo delay.*

Aim: *The nested qualitative component aimed to explore patients' experiences and priorities concerning oral health and barriers and facilitators for trial participation.*

Methods: *Using purposive sampling until thematic saturation was reached, we conducted 21 one-to-one semistructured interviews with randomized patients in either of the 2 treatment arms as well as with patients who did not consent for trial participation.*

Results: *The patients described their experiences about RA, oral health, and study participation. Previous experiences with dental care professionals shaped patients' current perceptions about oral health and the place of oral health on their list of priorities compared with other conditions. Patients also highlighted some of the barriers and facilitators for study participation and for compliance with oral health maintenance. The patients, in the control arm, presented their views regarding the acceptable length of waiting time for the intervention.*

Conclusion: *The associations between periodontal and systemic health are increasingly recognized by the literature. Our study provided an insight into RA patients' experiences and perceptions about oral health. It also highlighted some of the barriers and facilitators for participating in a periodontal interventional study for this group. We hope that our findings will support the design of larger interventional periodontal studies in patients with RA. The complex challenges faced by the burden of RA and the associated multimorbidities in this patient group might highlight opportunities to improve access to oral health services in this patient population.*

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Knowledge Transfer Statement: *This article provided insights into the experiences and perceptions of rheumatoid arthritis patients about their oral health to improve patient participation in a definitive clinical trial.*

Keywords: periodontitis, qualitative research, patient preference, feasibility study, multimorbidity, dental focal infection

Introduction

Chronic periodontitis is a very common chronic inflammatory condition. It affects nearly half of the UK adult population and over 60% of the elderly (White et al. 2012; Chapple 2014). Several observational studies have reported an association between chronic periodontitis and rheumatoid arthritis (RA), and chronic periodontitis has been suggested as a potential risk factor for RA (Ribeiro et al. 2005; de Pablo et al. 2009; Mikuls et al. 2009; Okada et al. 2013; Konig et al. 2016). Given the high prevalence of chronic periodontitis, this association could have significant clinical and public health implications.

The first symptoms of RA are noticed usually between the age of 35 and 50 y, and it affects mostly women. Within 5 y of diagnosis, 40% of patients reduce their working week from full-time to part-time, with an increase to 50% at 10 y from the first diagnosis (Mathers et al. 2006). RA affects patients' personal and professional relationships, transforming their daily routines and quality of life. Often they have to change their working circumstances or retire early, adapt their living conditions, rely on help from external sources (family, friends, or social workers), and increase their feeling of vulnerability, which is added as a psychological burden to their condition (Lapsley et al. 2002).

Besides the direct impact of RA on patients' quality of life, it is important to consider also the indirect impact caused by the comorbidities secondary to RA and the side effects of the long-term use of polypharmacy in this patient group.

RA has been frequently associated with other conditions, including depression, elevated blood pressure, cardiovascular disease, and respiratory conditions (Dougados et al. 2014).

There are several potential mechanisms linking RA and periodontal disease. Some studies have suggested that bacteremia caused by periodontal pathogens could be an etiological agent for RA progression (Martinez-Martinez et al. 2009).

Another widely supported model relates to an aberrant immune response to periodontal pathogens in certain susceptible individuals. One of the main periodontal pathogens is *Porphyromonas gingivalis*. With the recent recognition of the importance of anticitrullinated protein antibodies (ACPAs) in RA and the discovery that *P. gingivalis* expresses peptidyl arginine deiminase, which is responsible for the posttranslational citrullination of peptide antigens on arginine residues (Rosenstein et al. 2004), there is potential evidence to support a plausible pathobiologic mechanism by which periodontitis may cause or sustain the ACPA response in RA.

Recent studies have also demonstrated that the uncitrullinated peptides play a major role in the antibody response for periodontitis, resulting in a systemic spread of citrullinated epitopes in the presymptomatic phase of RA. Autoantigens modified by citrullination through exposure to periodontal pathogens might sustain synovial inflammation in the context of untreated periodontitis (Rosenstein et al. 2004; Lopez-Oliva et al. 2018). Antibodies for uncitrullinated RA autoantigens precede the ACPA formation and facilitate the loss of tolerance to uncitrullinated peptides (de Pablo et al. 2013).

Treatment of chronic periodontitis involves control of the dental biofilm, typically using nonpharmacological means. Whether or not such treatment can reduce the incidence and severity of RA is unknown. However, a small number of interventional studies have reported encouraging results in terms of reduced RA disease activity following periodontal treatment (Al-Katma et al. 2007; Ortiz et al. 2009; Okada et al. 2011).

Our trial, Outcomes of Periodontal Treatment in Patients with Rheumatoid Arthritis (OPERA), was a randomized waiting-list controlled feasibility study. This trial provides feasibility data for a larger, multicenter randomized controlled trial, which would investigate the efficacy of nonsurgical periodontal treatment in reducing disease activity in patients with RA.

Our trial focused on issues of recruitment and retention, acceptability and feasibility of the trial procedures including the intervention, assessments, and data collection, using a mixed-methods approach. The quantitative component of our trial gathered pilot clinical data about the efficacy of periodontal treatment in patients with RA and subsequently its influence on health-related quality of life.

Considering the severe burden that RA can have on the patient's quality of life, both directly and through the comorbidities associated with this condition, it is important to gain a better understanding of patients' priorities with regards to accessing different types of health care services. In addition, it is important to ensure that the design of any interventional studies would take this into account and patients' trial participation would not create an additional burden on their quality of life. As successful periodontal treatment is heavily dependent on compliance and adherence and the treatment and trial participation both require multiple visits to the secondary care setting where this treatment was being delivered, we considered it important to explore the barriers and facilitators for study participation in this patient group.

Furthermore, to encourage recruitment and retention rates in the trial, it is important to consider that outcomes that are relevant for clinicians and researchers might be less relevant for the patients. This could be especially the case for RA patients with multimorbidities as suggested in the literature (Cohen et al. 2004; Fleischmann et al. 2016). Understanding

the health care priorities of this specific patient population and the place of oral health on their list of priorities was one of the most important objectives of the qualitative component of our study.

Our study used a mixed-method approach with a quantitative and a nested qualitative component. The quantitative aspects of the trial will be presented in detail in a separate article. This article focuses on the nested qualitative component of this study.

Aims and Objectives

The aim of the qualitative component of our study was to evaluate patients' experiences, values, and priorities that shape their choices in accessing oral health services and identify the barriers and facilitators for participation in a randomized controlled trial. To meet this aim, we developed the following objectives: 1) understand the impact of RA on the patients' quality of life and the place that oral health occupies on their scale of health priorities, 2) identify barriers and facilitators for study participation, and 3) understand RA patients' views about randomization to the intervention or control group (delayed intervention).

Methods

The OPERA trial recruited patients with RA, fulfilling the revised 1987 American College of Rheumatology (ACR) classification criteria for RA (Aletaha et al. 2010). The recruitment sites were the outpatient rheumatology clinics of the Queen Elizabeth Hospital (QE), City Hospital, and Heartlands Hospital all in Birmingham, United Kingdom.

A total of 691 RA patients were identified as potential participants from the 3 recruitment sites. Of these, 118 declined participation in the trial predominantly due to the severity of their comorbidities and the numerous medical appointments that they already have to attend.

Of these, 296 patients consented to participate in the trial and 201 attended the periodontal screening visit at Birmingham Dental Hospital. Of these, 60 met both the RA and periodontal criteria for randomization and were allocated to either immediate intervention or waiting-list control (delayed intervention) group (Fig. 1). The intervention consisted of nonsurgical periodontal therapy delivered by a dental hygienist in 2 or more sessions in a secondary care setting.

Figure 1. Study flow diagram. FU, follow-up; HEFT, Heart of England NHS Foundation Trust; QEHB, Queen Elizabeth Hospital Birmingham; RA, rheumatoid arthritis; SWBH, Sandwell and West Birmingham Hospitals.

Study Oversight

Ethical approval for the OPERA trial was granted (11/WM/0235, protocol number RG_10-138) and registered via the Integrated Research Application System (IRAS) with project ID 53163.

Recruitment

The recruitment for the trial started in January 2014, and data collection ended in December 2016. Research and development (R&D) approval was obtained for all the participating sites.

Some of the inclusion criteria for the periodontal screening were, among others, fulfilment of 2010 American College of Rheumatology/European League Against Rheumatism (ACR/EULAR) classification criteria of RA (Aletaha et al. 2010) and stable medication. For randomization, patients had to have a disease activity score 28 (DAS28) of at least 3.2 and generalized moderate to severe chronic periodontitis as evidenced by pocketing with clinical attachment loss (clinical attachment loss ≥4 mm on at least 2 nonadjacent teeth and cumulative probing depth ≥40 mm).

For exclusion criteria, we considered history of, or current, inflammatory joint disease other than RA (including, but not limited to, gout, reactive arthritis, psoriatic arthritis, seronegative spondyloarthropathy); any surgical procedure, including bone/joint surgery/synovectomy (including joint fusion or replacement) within 12 wk prior to baseline or planned during study; and periodontal treatment within 12 mo prior to baseline.

A detailed description of the clinical methodology and findings will be reported in a separate article.

Screening

Patients were approached for consent during their rheumatology follow-up appointments at the participating hospitals. After consenting, clinical rheumatologic data were collected and a screening appointment was offered at the OPERA research clinic at Birmingham Dental Hospital. As some patients expressed an unwillingness to participate because of the logistic difficulties in getting to the Dental Hospital, further assistance was offered with transportation to these patients. Reminder letters with the appointment date and time for the screening visit were sent out by post to each newly booked patient. One or 2 d before the appointment, a research nurse called the patients to remind them of their appointment.

At Birmingham Dental Hospital, patients were assessed in a dedicated clinic available for OPERA trial patients. This involved general clinical examination; rheumatologic assessment, including the DAS28; full-mouth probing; and biological sample collection.

Randomization and Follow-up

If patients fulfilled the eligibility criteria for randomization and treatment, they were offered participation in the interventional phase of the study. After consenting for randomization and treatment, patients were randomly allocated to either immediate treatment or delayed treatment (waiting-list control). For the patients allocated to the immediate treatment arm, 3 appointments were booked with a dental hygienist allocated for this project at a maximum of 3 wk after the screening visit. Patients in the delayed treatment arm had 1 appointment with the same hygienist for instructions on oral health maintenance.

The same clinical examinations were carried out at the follow-up visits as at baseline. The patients allocated to the delayed treatment group were offered 3 appointments with the same dental hygienist for periodontal treatment at the end of the study. All the patients at the end of the study received £150 to cover the possible costs regarding their commitments for study participation. Most patients who did not wish to consent for screening were offered the possibility to participate in the qualitative interview process, either face to face or over the telephone. Inviting patients who did not consent to take part in the clinical trial to participate in the qualitative interviews was particularly important to meet our aims and objectives in identifying barriers and facilitators for study participation.

Sample Selection

For the purposes of the qualitative component of this study, we used a purposeful sampling technique aimed to include a variety of patients and to ensure broad representation of views relevant to the various aspects of study participation. We therefore invited patients who

- Had declined to consent for the clinical intervention
- Were screened but were not eligible for randomization for the clinical intervention
- Were randomized to the immediate periodontal treatment group
- Were randomized to the control group
- Were representing gender diversity
- Presented different lengths of time since diagnosis (RA)

One-to-one, semistructured interviews were conducted with patients from all these groups until thematic saturation was reached. As new themes emerged from the discussions, the topic guide was constantly adapted and new themes were added until saturation was reached. Saturation was defined as the stage at which no new themes emerged from the interviews and the data started to become mainly repetitive. After saturation, 3 more interviews were conducted for quality assurance purposes. All interviews were carried out by the same researcher to ensure consistency. All interviews were recorded and fully transcribed. The first 5 interviews were conducted by a dentist under the supervision of an expert in qualitative research (psychologist). The interviews were conducted at Birmingham Dental Hospital, Queen Elizabeth Hospital Birmingham, and over the telephone between October 2014 and January 2016 and lasted on average 30 min. Sixteen interviews were conducted face to face and 5 over the telephone. Some participants preferred to have the interview conducted over the telephone for convenience, especially those who did not wish to consent for trial participation. In relation to the other aspects of the study, the first patient was screened in February 2014, and the last patient was randomized in October 2015.

Topic Guide

The initial topic guide developed by the research team included oral health maintenance, treatment preferences (dental and medical), access to dental care, priorities and values placed on oral health, quality-of-life issues, acceptability of the periodontal treatment, and, if applicable, reasons for nonparticipation. This initial topic guide was piloted with 3 patients who consented to participate.

The piloting phase was developed and implemented by the research team to ensure methodological accuracy of the interview process. The results of these 3 interviews were included in the overall findings. Based on the dynamics of the discussions and the flexible structure of the interviews, new themes emerged that were incorporated in the topic guide and added to the interviews with subsequent participants.

Data Analysis and Validation

A framework approach to data analysis was adopted in the manner suggested by Pope and Mays (2006). The framework was developed using the topic guide, and additional columns were added to the framework as new themes emerged from the interviews. One researcher (dentist) carried out the interviews and the analysis to ensure consistency and robustness. The transcripts were read and analyzed independently by a second researcher (psychologist) following NICE guidelines (Tan et al. 2009). The 2 researchers discussed and reached consensus of the findings. A third independent researcher was available to oversee the findings in case a consensus was not reached.

Results

Patient Demographics

Twenty-one participants (15 females, 6 males) with a median age of 60 y were interviewed to participate in the interviews (Table).

RA disease duration ranged from 1 to 60 y (median, 19 y). More than half of the participants (n = 13) had consented for periodontal screening in the study, while the remaining participants did not (n = 8) (Table).

The main emerging themes from the framework analysis are presented in Figure 2. These can be clustered into 3 main areas: RA and quality of life, oral health, and the study. The new topics that emerged from the discussions were related to patients' perceptions of oral health and their previous experience with dental care professionals.

Table.
Demographic Characteristics of Participants in the Qualitative Component.

Patient No.	Sex	Age	Years Since Diagnosis	Patient Group
1	Female	60	19	Randomized—delayed
2	Male	86	20	Refused trial participation
3	Female	83	60	Refused trial participation
4	Female	37	9	Refused trial participation
5	Male	52	13	Randomized—delayed
6	Female	59	20	Refused trial participation
7	Female	68	22	Refused trial participation
8	Male	65	30	Randomized—delayed
9	Female	60	67	Refused trial participation
10	Female	65	6	Randomized—delayed
11	Female	55	12	Randomized—immediate
12	Female	59	2	Refused trial participation
13	Male	54	14	Refused trial participation
14	Male	64	10	Not eligible for randomization
15	Female	62	36	Randomized—delayed
16	Female	47	15	Randomized—delayed
17	Female	61	15	Randomized—delayed
18	Female	62	25	Randomized—immediate
19	Female	62	30	Randomized—delayed
20	Male	57	20	Randomized—immediate
21	Female	57	1	Randomized—immediate
Median (IQR)		60 (57–64)	19 (12–25)	

IQR, interquartile range.

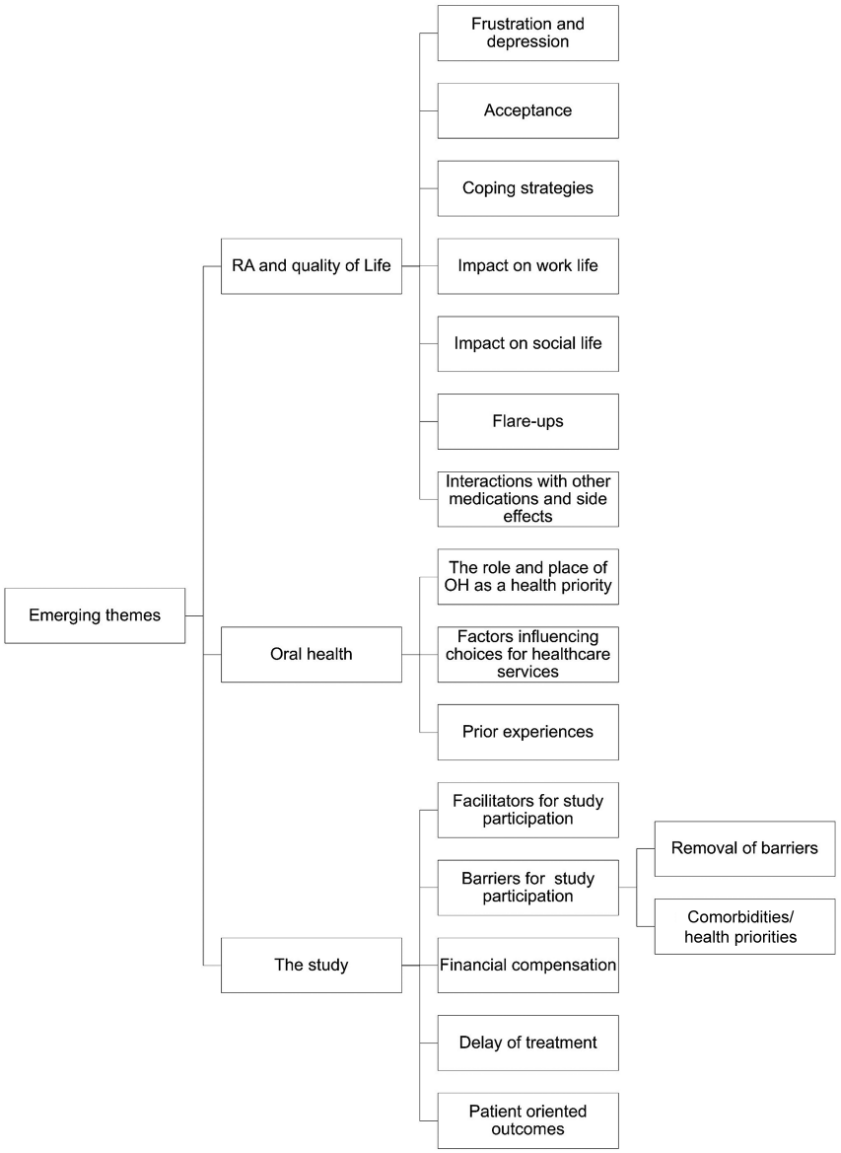
Furthermore, the patients elaborated on their health priorities, perceived barriers for study participation and potential solutions for the removal of those barriers.

RA and Quality of Life

Discussions started with participants describing their experiences regarding the onset and subsequent history of their RA and the effect it had on their quality of life. All participants described the onset of their condition as highly distressing.

> I remember going to pick my son up from school and walking up the high street and just with tears rolling down my face because I was in such pain . . . I had never known anything like it and then it just got worse from there. . . . Everyday things that I would have done without blinking an eye just became totally impossible to do because I had no grip in my hands, no strength then to actually get myself up in the bed. (P1)

Figure 2. Emerging themes from the interviews.



Each story carried a vivid and painful memory associated with anxiety and distress as patients and their families struggled to understand what was happening:

> The children thought I was going to die. I heard them talking to my wife and they said "Is dad going to die?" and I thought, blimey, I must look bad, but I was so thin me bones were sticking out all over the place. (P14)

Some of the patients shared their stories about the impact that RA had on their work and socioeconomic status. In some cases, this went as far as the patients having to change their living arrangements and make compromises to find ways to adapt to their new situation.

> I did retire early yes as a consequence and I had to give my home up because I couldn't get up the stairs any more. . . . So, within a very short space of time from 2010 to 2014 I retired early and I lost my home . . . I am living in a bungalow now, which has been adapted for my needs. I've got a wet room as opposed to a bathroom. (P10)

The majority of patients mentioned that they had taken early retirement or had to reduce their work schedule from full-time to part-time because of the impact of RA on their work life. Patients reported that this had a major negative impact on their socioeconomic status.

Besides work, RA also affected the ability of patients to enjoy their hobbies and social activities.

> I used to enjoy football, fishing, things like that. I couldn't go fishing 'cos I couldn't hold the rod any longer in that one position holding the rod. (P20)

As the discussions developed around the traumatizing experiences caused by the onset of RA, the patients started to describe also the challenges represented by several comorbidities that they had to deal with.

Comorbidities and Health Priorities

As the average age of the participants was around 60 y, comorbidities associated with RA were common. To gain a better insight into the reasons why they might or might not participate in the study, it was important to understand their health care priorities and the impact of their comorbidities and how they prioritize the health care services that they are accessing. Another factor was to understand where oral health was situated on their list of health care priorities.

Although several patients declared oral health as a priority in the beginning of the interview, as the discussions evolved and they reported on comorbidities, they presented a tendency to prioritize other comorbidities compared to oral health:

> So, I have rheumatoid arthritis and I have asthma/COPD [chronic obstructive pulmonary disease], so I have breathing problems, but again somebody is looking after me. . . . And that is linked to what used to be a constant round of chest infections, but they now seem to have this under control and then oral health is the third most important thing in my life. (P9)

Patients' numerous different hospital appointments represent a burden to

some of the patients, and the dental care occasionally tends to become less of a priority:

> No, no I probably haven't been to the dentist, it has got to be a year now, so but part of that is that I have so many appointments for different things at the moment, that unless I am reminded of an appointment, or given an appointment they tend to slip away. (P5)

As most of the patients had multiple comorbidities, some of them tended to place oral health as the last one on the scale of importance. Their main priorities were systemic conditions including RA itself, cardiovascular disease, Crohn's disease, asthma, COPD, diabetes, and so on.

> My chest really, my chest is first then my rheumatoid. My teeth, round about third I think to be honest. (P7)

> But the other thing to remember is for patients like me who have got rheumatoid, they've probably got other ongoing conditions as well. There is so many things you have to try and focus on. (P4)

In light of these, some patients reported that they would prefer to have their teeth extracted rather than have multiple appointments for conservative treatment:

> If I had to have teeth out, I have to have them out and that's the end of it. (P4)

Periodontitis and Oral Health

Discussions focused on patients' perceptions about oral health, their self-reported oral health status, and previous experience that they had had with dental care professionals. Few participants reported having a good oral health status. Their past experiences regarding oral health care services shaped their perception regarding their current behavior for accessing oral health services:

> Then you never used to go to the dentist, they used to come around the school, this is going back a long time nineteen fifties and sixties. . . . And then most of the time they just pulled your teeth out. That was, they never did any fillings or anything they just looked at your teeth and if they didn't like the look of it, they just pulled out your teeth. (P14)

Patients acknowledged the importance of good oral health and reported making efforts to try to help their children to maintain good oral health:

> I mean my kids so soon as they were old enough, like two or three, I would take them, we would take them to a dentist just to get them used to a dentist, because I think fear of dentists. (P14)

Many patients reported that maintaining their oral hygiene was more difficult on the days with flare-ups:

> If I have a bad flare-up of arthritis, I can't . . . and I miss it and I am not able, I don't have the strength to hold my electric toothbrush, because it is quite heavy. (P9)

> If my shoulder hurts then it's . . . it can be a bit difficult to brush. (P13)

Even holding the toothbrush could be challenging for some patients:

> I could about hold it, I haven't got many teeth left anyway. It's my fear is dentists. (P2)

Participants mentioned the importance of developing a relationship based on trust with their dental care provider. This played an important role in their attitudes toward oral health and their behaviors in seeking oral health care services:

> Well I am concerned that my dentist hasn't done what needed to be done to save my teeth from breaking. (P13)

Respondents reported being afraid of needles and consequently being afraid of dentists. Some patients stated that they would prefer to have extractions instead of restorative treatments.

> I suppose out would be the best at my age I suppose out, you know. (P2)

When participants were asked about the way they felt regarding their oral health and how they regarded the visit to their dentist, many patients (particularly the more elderly) reported negative attitudes. Younger patients, on the other hand, reported that they would prefer to keep their natural teeth and have them treated.

As the discussions continued and patients described their comorbidities secondary to RA and how oral health fitted on their list of health care priorities, they also expressed their views regarding the outcomes that matter the most for them with regards to their quality of life and well-being. Among the most important health-related outcomes considered by the patients were autonomy, mobility, and lack of pain.

One of them mentioned how she needed to plan her everyday activities depending on whether or not she had a flare-up:

> You know, where before I used to think nothing of it, I would go off and do what I needed to do. Now, I can't do that, if I'm in pain I have think right I can only do one shop today, or I can't walk that far today. (P12)

Other stories were similar:

> Health, mobility that's very important to me that my feet were not as compromised as my hands. Oh, that is very, absolutely I would tie those two together. (P3)

> The difficulty I was facing whilst I was working was the inability to hold a pen properly. . . . And work and a computer. Erm, sitting down meant that my joints got really stiff, my knee joints and my back. And my feet and as a consequence mobility as I say became very bad . . . I couldn't get upstairs to the upstairs offices. (P10)

Personal mobility and the ability to keep their independence were key priorities for this patient population. This was also highlighted through the potential barriers that hindered study participation.

Barriers for Study Participation

The interviews explored the reasons why some patients would be reluctant to participate in the OPERA study to identify potential barriers that could be addressed by the research team. Several patients reported having negative experiences with dentists in the past, and this discouraged them to participate in our trial:

> Yeah, I, I think I woke up under the gas. And, I was there was blood all over the place and I was only about this high. At school. And I never went again. I stopped going for a long time. (P20)

The location of the Dental Hospital was mentioned as a hindering factor by several patients:

> That was because it was the Dental Hospital and I find it difficult to get from my part of the town to the Dental Hospital. (P2)

> It is a bit far away, you know the other side of town but they are moving to a new hospital shortly which will be more accessible, yes. (P18)

Due to classic features of RA such as mobility problems, fatigue, and morning stiffness as well as logistic issues with the traffic from their homes to the location of the Dental Hospital, they found that without help, they could not attend their clinical appointments.

Besides the location of the Dental Hospital, patients mentioned forgetfulness and the overlap of their dental appointment with other medical appointments as being important hindering factors for study participation.

Removal of Barriers

To address these, the participants were asked to suggest potential solutions for these problems. Some of the hindering factors were addressed by the research team, as described in the methodology section: patients received phone call reminders about their appointments, and those patients who required assistance for getting to the Dental Hospital received support in arranging the travel logistics around getting to their appointments.

> Because as I say I wouldn't have been able to undertake the study unless I'd have had payment for transportation. (P10)

Financial incentives were set in place to compensate for the loss of time and logistics for the research and treatment visits. As all patients are unique and so is their situation and their experiences, some patients did not feel that financial incentives should encourage patients' study participation:

> That always seems to help I did a lot of groups and the financial side of it isn't a big thing to me. When I did the conferences, it was all about expenses I was happy for my expenses to be paid, but a lot of the groups I also did erm, it would be like an interview, but there would be ten of us and we would sit around and the discussion would be recorded and you usually found that all those groups would be full because people were getting financial . . . they were being paid for it basically, but you would find that they were all full, all of them. (P5)

Some patients reported that they suffered from dental anxiety and indicated that the only way they would participate in the study would be if the screening and treatment were done under general anesthesia:

> I mean I did say to my son because he keeps telling me off he says, "Mom, you really need to go and get your teeth sorted. . . . And I said, I will go if they can put me to sleep." If they can knock me out. . . . Yeah. I said that's the only way I would have it done. (P12)

The Control Arm

The control arm in our study received the same treatment as the intervention group but with a delay of 6 mo. Patients had very diverse views with regards to the how long it was acceptable to delay their treatment. Some of them preferred to have no delay at all, and some were happy with a delay of up to a few years.

One of the patients who declined trial participation considered that treatment should be delivered immediately without any delay:

> I think it should be done straight-away . . . I don't think you should wait because with your mouth everything that goes in your stomach goes into your mouth so your gums are one of the main ones really aren't they? So, I think you know, it should be earlier than six months. (P6)

The majority of patients, however, felt that a delay of 6 mo to their treatment would be acceptable while more than that might influence them to seek treatment elsewhere.

> Oh, I think it's six months. . . . Six months would be alright . . .Well, perhaps 12 months is, I'm 84 don't forget. (P2)

This view was shared by the majority of patients:

> I was hoping not to be in the delayed group, but as I am in the delayed group then I leave it to you erm to help me as best you can . . . I wouldn't like the longer waiting time. (P15)

The Intervention

All patients who received the intervention, both in the immediate treatment group as well as in the delayed treatment group, reported having a positive experience concerning to the intervention.

> I'm really pleased actually that erm doing this study because erm had it not been for that, this could have gone on and on and it might have got to a really bad situation with my gums and I wouldn't have known so I am really pleased. (P11)

They highlighted the importance of being kept informed about the progression of the study and the protocol and having pleasant interactions with the research staff:

> Yeah, they have been good, I think the experience has been good. You

> staff have been really helpful and I am aware of what is happening every time I come and see you. The hygienist was great, she explained what she was going to do and what she expected to do in future, so I think it has been a really good experience as well and eye opening as well. (P5)

This view was shared by all the patients who received the intervention:

> She made me feel so comfortable and it's embarrassing as well when you go to dentist . . . I find I get embarrassed. And because of the state of my teeth. I didn't feel a bit like that from the moment. I met the hygienist and I felt quite confident that she was confident. She knew what she was doing. She explained everything. And she told me if anything hurt or to stop, to stop her. I just felt so comfortable with her . . . I would do it all over again. (P21)

Discussion

Most studies investigating the associations between periodontitis and RA have used quantitative methodologies (Ribeiro et al. 2005; Al-Katma et al. 2007; Pinho Mde et al. 2009). OPERA was a mixed-methods feasibility study with a nested qualitative component. We aimed to explore the acceptability of our study protocol and understand RA patients' experiences and perspectives about accessing oral health care services. Furthermore, we gained some valuable insights into the place of oral health on their list of priorities, identified barriers and facilitators for study participation, and gathered patients' views about the intervention and about being randomized to the control arm.

A large amount of the data regarding the oral health status of older people in England is generated from surveys of people living in residential and nursing care homes. This represents only a minority of the elderly population and has led to a gap in our knowledge and understanding of the dental treatment preferences of this age group (Public Health England 2015). Some data suggest that for some of the older patients, aesthetics are less of a priority and comfort and lack of pain are considered more important (Lord et al. 2015).

To our knowledge, our study is the first one to look at oral health preferences in patients with RA and at barriers and facilitators for participation in a dental trial for this patient group.

Our sample was diverse, and we purposefully included patients from all the possible groups involved in the study: 1) those who declined trial participation, 2) those who were found ineligible for randomization after screening, 3) patients who were randomized to the intervention arm, and 4) patients randomized to the control arm. We also aimed to include patients of both sexes and with different durations of RA diagnosis.

We have found that patients' prior experiences, values, and priorities tend to have a strong impact on shaping their choices for accessing different health care services. RA patients' treatments require a holistic approach, and while their rheumatologic care often takes into account their different systemic comorbidities, oral health is commonly missed out from this picture. Patients identified a set of barriers and facilitators that can influence their participation in an interventional study. Some of these barriers were related to patients' limited mobility and logistic difficulties associated with getting to their dental appointments.

Our patients' main concerns appeared to be represented by the ability to have as "normal" a life as possible—to live independently, autonomously, and pain free. These findings are in line with the literature with regards to RA patients with multimorbidities and how these shape their choices and priorities in terms of accessing health care services (Ward et al. 2007; Malm et al. 2017).

Our patients described their personal experiences regarding RA and the impact of this condition on their quality of life. They reported how the condition affected their physical and emotional well-being as well as the influence it had over their socioeconomic status as a consequence of the reduction of work and/or early retirement based on disability.

Although many participants acknowledged the importance of good oral health and its potential impact on general health, when compared to RA and the other comorbidities that they have to live with, oral health was not a high priority.

The patients identified a number of hindering factors that might affect their ability for study participation, and some of these factors were addressed by the research team with adaptations of the study protocol.

In many cases, patients reported that they had to balance their life around the treatment they received for RA and for their comorbidities: this involved multiple medications, hospital visits, and so on. The overall burden of RA and of the associated comorbidities over the quality of life of these patients could be quite overwhelming. Compliance with regular oral hygiene maintenance is key to maintaining good oral and periodontal health, but it can become an extra burden for this cohort, especially on the days when they are dealing with flare-ups caused by their rheumatoid condition. Patients who struggle with a high burden of debilitating systemic multimorbidities, perhaps unsurprisingly, reported that oral health was a not key priority for them.

We have also identified a number of limitations to this study. This cohort presented a median disease duration of 19 (12–25) y. We acknowledge that the initial therapeutic options and approaches at the time of their diagnosis were quite different from those of today. Therefore, we can hypothesize that disease progression in this cohort could be significantly different compared to a cohort with a more recent onset of RA. This could potentially lead to different findings in a cohort with current early RA. When we developed the protocol for the randomized controlled trial, we aimed to include patients diagnosed with RA who were on stable treatment with disease-modifying antirheumatic drugs (DMARDs) for at least 2 mo to reduce

the likelihood of potential confounding factors caused by medication changes. It is often the case for early diagnosed RA patients to change classes of drugs and dosages; therefore, after discussing this issue with rheumatologists in the research team, we decided that to meet this goal, we would focus the recruitment on patients with stable established RA.

From a public health perspective, the burden of noncommunicable diseases (NCDs) is becoming more and more pressing on the limited resources available for national health systems. It is perhaps time to consider new, creative ways of developing care packages that may include oral health care for patients with NCDs. This idea is supported by the American Diabetes Association as well as by the French National Authority for Health, which recommends the inclusion of a comprehensive periodontal examination as part of the referrals for initial care management in diabetic patients (Haute Autorité de Santé 2014; American Diabetes Association 2018). A similar approach may have beneficial effects for patients with other NCDs such as rheumatoid arthritis, cardiovascular disease, kidney disease, and so on.

The nested qualitative component of the OPERA trial provided an insight into RA patients' experiences and perceptions with regards to oral health. Our study also highlighted some of the potential barriers and facilitators for participating in a periodontal interventional study in this patient population. We hope that these findings will support the design of larger interventional periodontal studies in patients with RA.

Author Contributions

S. Serban, K. Hill, contributed to conception, design, and data analysis, drafted the manuscript; T. Dietrich, contributed to conception, design, and data analysis, critically revised the manuscript; I. Lopez-Oliva, P. de Pablo, K. Raza, A. Filer, I.L.C. Chapple, contributed to conception and design, critically revised the manuscript. All authors gave final approval and agree to be accountable for all aspects of the work.

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References

Aletaha D, Neogi T, Silman AJ, Funovits J, Felson DT, Bingham CO, Birnbaum NS, Burmester GR, Bykerk VP, Cohen MD. 2010. 2010 Rheumatoid arthritis classification criteria: an American College of Rheumatology/European League against Rheumatism Collaborative Initiative. Arthritis Rheum. 62(9):2569–2581.

Al-Katma MK, Bissada NF, Bordeaux JM, Sue J, Askari AD. 2007. Control of periodontal infection reduces the severity of active rheumatoid arthritis. J Clin Rheumatol. 13(3):134–137.

American Diabetes Association. 2018. Comprehensive medical evaluation and assessment of comorbidities: standards of medical care in diabetes—2018. Diabetes Care. 41(Suppl 1):S28–S37.

Chapple IL. 2014. Time to take periodontitis seriously. BMJ. 348:g2645.

Cohen SB, Strand V, Aguilar D, Ofman JJ. 2004. Patient- versus physician-reported outcomes in rheumatoid arthritis patients treated with recombinant interleukin-1 receptor antagonist (anakinra) therapy. Rheumatology (Oxford). 43(6):704–711.

de Pablo P, Chapple IL, Buckley CD, Dietrich T. 2009. Periodontitis in systemic rheumatic diseases. Nat Rev Rheumatol. 5(4):218–224.

de Pablo P, Dietrich T, Chapple IL, Milward M, Chowdhury M, Charles PJ, Buckley CD, Venables PJ. 2013. The autoantibody repertoire in periodontitis: a role in the induction of autoimmunity to citrullinated proteins in rheumatoid arthritis? Ann Rheum Dis. 73(3):580–586.

Dougados M, Soubrier M, Antunez A, Balint P, Balsa A, Buch MH, Casado G, Detert J, El-Zorkany B, Emery P, et al. 2014. Prevalence of comorbidities in rheumatoid arthritis and evaluation of their monitoring: results of an international, cross-sectional study (COMORA). Ann Rheum Dis. 73(1):62–68.

Fleischmann R, Strand V, Wilkinson B, Kwok K, Bananis E. 2016. Relationship between clinical and patient-reported outcomes in a phase 3 trial of tofacitinib or MTX in MTX-naive patients with rheumatoid arthritis. RMD Open. 2(1):e000232.

Haute Autorité de Santé. Guide parcours de soins–Diabète de type 2 de l'adulte 2014. 2014. Saint-Denis (France): Haute Autorité de Santé; [accessed 2019]. https://www.has-sante.fr/portail/upload/docs/application/pdf/2014-04/guide_pds_diabete_t_3_web.pdf.

Konig MF, Abusleme L, Reinholdt J, Palmer RJ, Teles RP, Sampson K, Rosen A, Nigrovic PA, Sokolove J, Giles JT, et al. 2016. Aggregatibacter actinomycetemcomitans–induced hypercitrullination links periodontal infection to autoimmunity in rheumatoid arthritis. Sci Transl Med. 8(369):369ra176.

Lapsley HM, March LM, Tribe KL, Cross MJ, Courtenay BG, Brooks PM; Arthritis Cost and Outcome Project Group. 2002. Living with rheumatoid arthritis: expenditures, health status, and social impact on patients. Ann Rheum Dis. 61(9):818–821.

Lopez-Oliva I, Paropkari AD, Saraswat S, Serban S, Yonel Z, Sharma P, de Pablo P, Raza K, Filer A, Chapple I, et al. 2018. Dysbiotic subgingival microbial communities in periodontally healthy patients with rheumatoid arthritis. Arthritis Rheumatol. 70(7):1008–1013.

Lord J, Longworth L, Singh J, Onyimadu O, Fricke J, Bayliss S, Meads C. 2015. Oral health guidance—economic analysis of oral health promotion approaches for dental teams. Birmingham, UK: Birmingham and Brunel Consortium External Assessment Centre.

Malm K, Bergman S, Andersson ML, Bremander A, Larsson I. 2017. Quality of life in patients with established rheumatoid arthritis: a phenomenographic study. SAGE Open Med. 5:2050312117713647.

Martinez-Martinez RE, Abud-Mendoza C, Patino-Marin N, Rizo-Rodriguez JC, Little JW, Loyola-Rodriguez JP. 2009. Detection of periodontal bacterial DNA in serum and synovial fluid in refractory rheumatoid arthritis patients. J Clin Periodontol. 36(12):1004–1010.

Mathers C, Symmons D, Pfleger B. 2006. The global burden of rheumatoid arthritis in the year 2000 [accessed 2019 Feb 5]. https://www.who.int/healthinfo/statistics/bod_rheumatoidarthritis.pdf

Mikuls TR, Payne JB, Reinhardt RA, Thiele GM, Maziarz E, Cannella AC, Holers VM, Kuhn KA, O'Dell JR. 2009. Antibody responses to Porphyromonas gingivalis (P. gingivalis) in subjects with rheumatoid arthritis and periodontitis. Int Immunopharmacol. 9(1):38–42.

Okada M, Kobayashi T, Ito S, Yokoyama T, Abe A, Murasawa A, Yoshie H. 2013. Periodontal treatment decreases levels of antibodies to Porphyromonas gingivalis and citrulline in patients with rheumatoid arthritis and periodontitis. J Periodontol. 84(12):e74–e84.

Okada M, Kobayashi T, Ito S, Yokoyama T, Komatsu Y, Abe A, Murasawa A, Yoshie H. 2011. Antibody responses to periodontopathic bacteria in relation to rheumatoid arthritis in Japanese adults. J Periodontol. 82(10):1433–1441.

Ortiz P, Bissada NF, Palomo L, Han YW, Al-Zahrani MS, Panneerselvam A, Askari A. 2009. Periodontal therapy reduces the severity of active rheumatoid arthritis in patients treated with or without tumor necrosis factor inhibitors. J Periodontol. 80(4):535–540.

Pinho Mde N, Oliveira RD, Novaes AB, Jr., Voltarelli JC. 2009. Relationship between periodontitis and rheumatoid arthritis and the effect of non-surgical periodontal treatment. Braz Dent J. 20(5):355–364.

Pope C, Mays N. 2006. Qualitative research in health care. 3rd ed. New York: John Wiley.

Public Health England. 2015. What is known about the oral health of older people in England and Wales: a review of oral health surveys of older people [accessed 2019 Feb 5]. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/489756/What_is_known_about_the_oral_health_of_older_people.pdf

Ribeiro J, Leao A, Novaes AB. 2005. Periodontal infection as a possible severity factor for rheumatoid arthritis. J Clin Periodontol. 32(4):412–416.

Rosenstein ED, Greenwald RA, Kushner LJ, Weissmann G. 2004. Hypothesis: the humoral immune response to oral bacteria provides a stimulus for the development of rheumatoid arthritis. Inflammation. 28(6):311–318.

Tan TP, Stokes T, Shaw EJ. 2009. Use of qualitative research as evidence in the clinical guideline program of the National Institute for Health and Clinical Excellence. Int J Evid Based Healthc. 7(3):169–172.

Ward V, Hill J, Hale C, Bird H, Quinn H, Thorpe R. 2007. Patient priorities of care in rheumatology outpatient clinics: a qualitative study. Musculoskeletal Care. 5(4):216–228.

White DA, Tsakos G, Pitts NB, Fuller E, Douglas GV, Murray JJ, Steele JG. 2012. Adult dental health survey 2009: common oral health conditions and their impact on the population. Br Dent J. 213(11):567–572.