


# BMJ Open Qualitative factors shaping MS patients' experiences of infusible disease-modifying drugs: a critical incident technique analysis

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## ABSTRACT

**Objective** To explore factors shaping the experiences of patients with relapsing-remitting multiple sclerosis with infusible disease-modifying drugs in a hospital setting.

**Design and settings** The critical incident technique served as a framework for collecting and analysing patients' qualitative account practices involving infusible disease-modifying drugs. Data were collected through semistructured interviews and one single-case study. Participants were recruited from all five regions in Denmark. Inductive thematic analysis was used to identify and interpret factors shaping patients' infusion journey over time.

**Participants** Twenty-two patients with relapsing-remitting multiple sclerosis receiving infusion with disease-modifying drugs (natalizumab, alemtuzumab and ocrelizumab).

**Results** Four time scenarios—preinfusion, day of infusion, long-term infusion and switch of infusion—associated with the infusion of disease-modifying drugs were analysed to reveal how different factors could both positively and negatively affect patient experience. Time taken to make the treatment decision was affected by participants' subjective perceptions of their disease activity; this may have set off a treatment dilemma in the event of a pressing need for treatment. Planning and routine made infusion practices manageable, but external and internal surroundings, including infusion room ambience and the quality of relationships with healthcare professionals and fellow patients, affected patients' cognitive state and well-being irrespective of the infusion regimen. Switching the infusion regimen can reactivate worries akin to the preinfusion scenario.

**Conclusion** This study provides novel insight into the positive and negative factors that shape patients' experience of infusion care practices. From a patient's perspective, an infusion practice is not a solitary event in time but includes planning and routine which become an integral part of their multiple sclerosis management. The quality of space and the ambience of the infusion room, combined with the relationship with healthcare professionals and fellow patients, can be a significant source of knowledge and support people with relapsing-remitting multiple sclerosis in their experience of agency in life.

## Strengths and limitations of this study

- This is the first qualitative study exploring factors that influence patients' long-term experiences of infusible disease-modifying drugs for relapsing-remitting multiple sclerosis.
- The critical incident technique provided us with a practical and time-efficient framework to explore patient perspectives.
- The study combined personal interviews with a case study, enabling as such the examination of phronetic knowledge, which is otherwise difficult to capture in studies based on a positivistic research paradigm.
- External factors could have been explored in more detail by using field observations.

## INTRODUCTION

Relapsing-remitting multiple sclerosis (RRMS) is an autoimmune-mediated neurological disease characterised by inflammatory lesion activity, axonal demyelination, and atrophy of the brain and spinal cord, leading to neurological symptoms and functional and cognitive impairments.<sup>1</sup> RRMS accounts for up to 85% of new cases of multiple sclerosis (MS),<sup>2–4</sup> with an estimated global burden of two to three million people.<sup>2</sup> Expanded treatment options and recognition of the need for more active disease control have changed the landscape of MS treatment.<sup>5</sup> Disease-modifying drugs (DMDs) to treat RRMS became available in the late 20th century, thus creating new prospects for preventing neural damage and associated disabilities that characterise the disease.<sup>2,4</sup> Since then, immunosuppression and pulsed immune reconstitution therapies have expanded the DMD armamentarium.<sup>4,6</sup> Treatment strategies have changed in line with these enhanced medical possibilities, with research indicating that early initiation of high-efficacy therapy is a way to obtain prolonged disease control

and stabilise or improve outcome measures of quality of life.<sup>5 7 8</sup> The aforementioned conditions have increased the overall number of patients referred to DMD treatment, including infusible administrations.<sup>9</sup> Moreover, as new agents are developed, a growing number of patients will likely begin newly approved treatments, while others remain on currently available infusible therapies in the coming years.<sup>7 10 11</sup> Administering infusible DMDs in a hospital setting requires specialist care provided by physicians and nurses. To help staff navigate the different administration regimens, best practice guides have been published for alemtuzumab and natalizumab.<sup>12 13</sup> Several updated guidelines have been produced for these drugs based on long-term postmarketing follow-up, while no similar recommendations are currently established for ocrelizumab, which was only approved by the Food and Drug Administration in 2017.<sup>14–16</sup>

From a patient's perspective, receiving an infusible DMD (compared with injectable or oral DMDs) likely results in a changed relationship with healthcare professionals (HCPs) and adaption to recurring visits to receive scheduled infusions. Although treatment by infusion is a common hospital practice, there seem to be very few published studies exploring patients' perspectives once treatment is commenced.<sup>17</sup> Foley and Dunne<sup>18</sup> discussed management and operational settings, including a section on staffing and costs, in addition to mentioning patient preferences concerning in-office facilities, arguing this to be a more 'comfortable and familiar' setting. Ostrov<sup>17</sup> and colleagues reported on patient preferences and satisfaction with an infusion centre, but only to quantify if patients preferred receiving their infusion in specialty or multispecialty care. In a report by Baker<sup>19</sup> and colleagues on the relocation of rheumatology patients receiving a similar disease-modifying infusion, a detailed description was provided of the organisational challenges associated with moving, rearranging equipment, staff training and reimbursements. Although relocation was in part augmented by patients' discomfort of receiving treatment in an oncology setting, patients' experiences or satisfaction with the new infusion location were not mentioned in the conclusion of the report. Assessing patients' perspectives and values can help to build a holistic infusion practice, and as current research literature is limited in voicing patients' experience specifically in infusion practices, this calls for a study on how patients experience their 'infusion-journey', from the novel beginning to the 'long-term' treatment trajectory, as well as the impact of such treatments on everyday life. As a guide for patient-focused infusion practices, the present study aims to explore factors influencing patients' experiences of receiving infusible DMD treatments for RRMS.

## METHODS

### Study design and data collection

To explore qualitative experiences within an organisational setting, the critical incident technique (CIT)

### Box 1 Analysis stages of the critical incident technique

- Determining the aim of the activity.
- Setting the plans, specifications and criteria.
  - ▶ The observer(s).
  - ▶ The observations.
  - ▶ Behaviours or experiences.
  - ▶ Collecting the data.
  - ▶ Analysing the data.
  - ▶ Reporting the findings.

(box 1) was chosen as a functional framework to explore contextual factors such as experiences, activities, values and behavioural activities.<sup>20 21</sup>

The CIT originated from Flanagan<sup>22</sup>, who performed psychological studies of aviation personnel during World War II in an effort to develop a rapid qualitative analysis of air fighters' actions and reactions during different combat conditions in the cockpit. The CIT is now recognised as a focused and time-efficient method and has proven highly practical to collect and analyse human experiences in various professional contexts and to address problems in the cross-field between human actions and health organisations.<sup>23–28</sup>

In the present study, an 'incident' was broadly defined as any experiences, behaviours, thoughts or feelings related to a patient's infusion therapy, including the time before the infusion day, during the infusion day, time after and between infusion days, and in between clinical monitoring (ie, blood monitoring). Semistructured interviews supplemented by a single-case study served as complementary data collection methods from which incidents were later extracted. The Consolidated criteria for reporting qualitative research list for qualitative studies was used in drafting the present manuscript.<sup>29</sup>

### Recruitment and settings

Participants were recruited between February and August 2019 from five main regions in Denmark. A written invitation stating the study's purpose and assuring confidentiality and anonymity and researchers' background were broadly explained in a leaflet. A snowball effect was used by distributing the leaflet through social media, circulated by participating neurologists, and through the Danish Multiple Sclerosis Society web page. More information could be obtained by contacting the study manager. Eligibility criteria were RRMS and receiving intravenous treatment with DMD, minimum age of 18 years, and able to provide informed consent on his/her behalf. Patients with primary progressive and secondary progressive sclerosis were excluded. If a patient was eligible and willing to participate, a detailed letter and informed consent form were forwarded. Final inclusion was at the discretion of the patient. If choosing to participate formally, a meeting was scheduled and interview questions emailed in preparation for the forthcoming interview. Interview settings (face-to-face or Skype) was at the discretion of the participants. Attending an interview was further reassured with

## Box 2 Reflective semistructured interview guide

### Background

- ▶ Age and years with relapsing-remitting multiple sclerosis.
- ▶ Years on current infusible treatment.

### Reflections of infusion treatment experiences

- ▶ How do you experience your life with infusion treatment (past, present, future)?
- ▶ Please tell me about how the infusion began.
- ▶ Please describe how a normal day looks like when you are going to infusion treatment.
- ▶ Please describe an event, in relation to infusion treatment, which has affected you positively.
- ▶ Please describe an event, related to infusion treatment, which has had a negative effect on you.
- ▶ Please describe what makes it difficult going to/or receiving infusion treatment.
- ▶ What makes it easier?
- ▶ What affects your situation (both positive/negative) related to monitoring and follow-up on infusion treatment?

confidentiality and anonymity before final inclusion into the study. No correlation measures were planned for this qualitative study; thus, no hospital records on disability status or other clinical characteristics were collected.<sup>30</sup>

### Interviews

Individual semistructured interviews were conducted with patients with RRMS who were being treated with an infusible DMD. Irrespective of the product brand the interviews sought unifying experiences which could explore beyond preference treatment frequency and provide insights about meaningful conditions to consider in practical MS management. The interview was governed by seven interview questions exploring situations and experiences, which could prompt further descriptions of key areas along the infusion journey (box 2) and lasted between 31 and 75 min.

The interview questions were emailed to all participants before the interview to prompt reflections and served as a semistructured guide. Each interview was preceded by the collection of demographic and treatment data. The participants were motivated to start their story from the time when infusible treatment was brought up by the neurologist. Probing questions, such as ‘how do you feel about this’ or ‘please, tell me more about this’, were used and encouraged participants to provide rich details. All interviews were concluded by asking the participants if any other issues were missing from the conversation. The interviews were recorded and conducted by the first author, who was a trained qualitative interviewer, and all transcripts were returned to the participants for comments. The interviews lasted between 30 and 80 min and were transcribed verbatim by an external professional transcriber.

### Single-case study

A single-case study was chosen to supplement interviews and provide an indepth perspective of a typical first-time DMD infusion.<sup>31</sup> Case studies are characteristic methods to explore practical virtues (phronetic knowledge), which are otherwise problematic to capture in large-scale cohorts.<sup>32</sup> Different types of case studies can apply and serve as complementary data collection for a larger set of interview data.<sup>33</sup> In this study, the motivating assumption to choose a representative case was that a patient, unfamiliar with the DMD infusion procedure, would have unique proximity to the events and procedures surrounding infusion practices and provide insights which could be difficult to collect in patients who had become more familiar to their treatment procedures. The case selection was thus based on a request to include a patient who was naive to treatment with DMD and infusion procedures. This way a ‘first-hand’ impression could be explored as it were forming. The inclusion criteria for the case study were then a patient who could represent a typical patient with RRMS, female, aged between 20 and 50 years, and newly diagnosed.<sup>2</sup> Field notes and interviews, including peers on three of the four observations, formed the data set. An overview of the case study is presented in table 1.

### Data analysis

Given the paucity of previous studies on this particular subject, an inductive thematic analysis approach was considered appropriate, including criteria for good thematic analysis.<sup>34</sup> Data were structured using the NVivo V.12 Pro software. The analysis started by revisiting the interviews by first listening to the sound recordings and reading the transcripts several times, to obtain an overall impression of each patient’s infusion journey. To structure the analysis, the time scenarios—*preinfusion*, *first day of infusion*, *long-term infusion* and *switch of infusion*—were chosen to frame the progressing analysis. Following the CIT requirements, incidents which either affected the infusion experience or had a more subtle connection to the infusion were explored. Using the NVivo software, transcriptions were imported and a detailed approach was undertaken to arrange and rearrange the text data into each of the high-level time scenarios. Supported by the written field notes from the case study and interviews, initial notes on emerging themes were added into the software program. All transcripts were searched through and relevant incidents captured into the different time scenarios, a line-by-line approach completed the analysis, and positive and/or negative experiences were explored for each domain. Interviewer expectations and possible prejudice were dealt with by adopting a reflective stance towards emerging themes. Furthermore, the research team, consisting of a trained qualitative researcher and three neurologists involved in MS research and with experiences in patient-centred research projects, reflected and discussed emergent themes during the NVivo analysis and writing of the results. This systematically paved the

**Table 1** Case study overview

Case study	Baseline	Follow-up 1	Follow-up 2	Follow-up 3
Time	June	June	July	August
Infusible Disease-modifying drug	First course	Blood monitoring	Second course	Third course
Interviews at the hospital site, after infusion treatment	37 min (parent included)	–	20 min (partner included)	27 min (partner included)
Home interview	–	23 min (no peers included)	–	–
Field notes	✓	✓	✓	✓
Transcript summary	✓	✓	✓	✓

way for a reflective and rigorous presentation of possible infusible DMD experiences. Quotations are in this article chosen to provide a possible human experiential account of the themes and should thus not be correlated to other labels such as gender, age or disease duration.

### Patient and public involvement

There was no time or resources allocated to include patient and public involvement (PPI) in this study. Patients and the public will be invited to discuss and refine the usability of the results.

### RESULTS

Twenty-eight patients responded to the study invitation from either the social media ad or the flyer present at the MS clinics. Twenty-five were considered eligible for inclusion and 22 responded to follow-up scheduling. Twenty-one participated in the interviews and one female patient was approached to represent the single-case study, which she acknowledged. Patient demographics and summary of infusion treatment are shown in [table 2](#).

Incidents were arranged into the four time scenarios, and nine subthemes were found to be factors affecting participants' infusion journey ([table 3](#)).

### Preinfusion initiation

#### The decision

A clear factor promoting the decision to proceed with infusible treatment was connected to a personal perception of participants' own physical functioning, with decisions reached more rapidly if the physical decline was ongoing: "I had this period with all those attacks. So, I had these physical situations which prompted me to (swear word)...whatever they would give me I would have accepted." Another participant described infusion treatment as an opportunity to get better when her body had become unmanageable, saying "It was a lifeline. I just wanted to be (bodily) at peace." Conversely, if an infusion treatment was suggested by the neurologist but a decline in functioning was not felt explicitly, they took their time to weigh up the consequences. In the case of patients being newly diagnosed and suffering from debilitating attacks, the seriousness of the situation made it particularly clear that radical action was needed. In participants

who had previously experienced daily side effects from oral or injectable DMDs, the prospect of an infusion treatment was considered as a 'relieve'. One participant said: "The shift to infusion was nice. My body was quite worn out after having to inject myself for so many years."

### Treatment dilemma

A delaying factor in the decision phase was caused by the inherent dilemma of having to decide on a treatment for which the clinical response and long-term outcomes were ultimately unknown. Further discussions about treatment were dealt with within the family and additional information was actively pursued via online social media. Discussions with peers made the preinfusion time more bearable. Moreover, confidence in the neurologist helped to make the decision-making process smoother. From the case study, we learnt that continuity of a designated neurologist and the department's efforts to coordinate

**Table 2** Patient demographics and summary of infusion treatment

	(N=22)
Gender (female/male)	17/5
Age (years)	
Mean	40.18
Median	41.5
Range	25–54
Disease duration (years)	
Mean	9.4
Median	9.5
Range	1 month–23 years
Infusion duration (years)	
Mean	2.49 years (29.90 months)
Median	8.5
Range	1 week–12 years
Infusion treatment	
Natalizumab	13
Ocrelizumab	5
Alemtuzumab	4



**Table 3** Time scenarios and themes

Preinfusion initiation	<ul style="list-style-type: none"> <li>▶ The decision.</li> <li>▶ Treatment dilemma.</li> </ul>
First day of infusion	<ul style="list-style-type: none"> <li>▶ Framing the day.</li> <li>▶ Support and external conditions.</li> </ul>
Long-term infusion	<ul style="list-style-type: none"> <li>▶ Planning and routine.</li> <li>▶ The infusion room.</li> <li>▶ Relationships and knowledge.</li> <li>▶ A 'breathing' space.</li> </ul>
Switching infusion	<ul style="list-style-type: none"> <li>▶ Reappearing worries.</li> </ul>

necessary diagnostic examinations kept waiting times to a minimum. The case participant and family said: “you are not just a number.” Regardless of any hesitation about proceeding with infusion treatment, participants summed up the situation as a proactive decision to control their disease. The dilemma was resolved for some by choosing what they considered best for the time being. A participant said: “It sounds dramatic, but I have made peace with it” (infusion treatment).

### First day of infusion

#### Framing the day

Participants were often met by a designated infusion room nurse who explained the procedures that were to be followed. Providing patients with a schedule and showing them the departmental facilities helped to frame an otherwise tense day and create a safe and comfortable atmosphere. For some participants, pretreatment descriptions of the forthcoming infusion had sounded harsh, and in retrospect they felt that they had worried excessively. However, the inherent uncertainty of the whole situation lent room for much concern, even more so in the case of participants who were newly diagnosed: “To sit there... as recently diagnosed and with all bodily functions overturned. That was actually pretty stressful.” As a control for possible side effects, some patients were asked to return to the infusion centre for a check-up a few days after treatment initiation. This initiative made participants feel safe while still being in a vulnerable situation. Starting on infusion was also perceived as providing valuable access to specialist care: “It was a relief for me to come in (to the hospital) and receive the infusion because I gained access to something which provided me with security.”

#### Support and external conditions

Participants were often in the company of a relative on the first days of infusion and were afraid of not capturing important messages from healthcare staff: “I had my husband with me. I needed the extra ears. I think he needs to hear about the treatment as well.” Additionally, the shared experience of being together with family members made it easier afterward to talk about procedures and communication with staff. The informal talk

between the regular patients and the staff in the infusion room could cross personal boundaries for newly diagnosed participants: “At the beginning, I couldn’t take in what the others were talking about. I think I will bring my headphones next time. There was a conversation going on in the room, which you wouldn’t normally be a part of.” Practical conditions like finding a parking spot or directions to department or laboratory were factors that complicated the initial infusions and often mentioned as stressful.

### Long-term infusion

#### Planning and routine

Participants described how quickly they got into the routine of going to the hospital for infusions. Having a routine, before and after infusion visits, was a factor that made the different procedures workable. Experienced to the infusion practices a participant said: “It follows a straight line. I know what to do, where to go, and where to sit. It’s like when I need my morning routines; otherwise, I get confused and stressed. It’s nice to have the routines.” Having a frame in place added to cognitive stability. Moreover, routines were an important way to control stress and fatigue and additionally served to release energy for other life priorities. Factors hampering participants’ routines could, for example, be a forthcoming relocation of the infusion centre. In such cases, participants worried about transportation and how it might affect their job situation: “It stresses me physically to move location and not knowing where to park and if there will be available spaces.” Overall, the hassle of finding a free parking space was mentioned as a major contributor to stress and poor cognitive functioning.

#### The infusion room

External surroundings and conditions were mentioned as stressful, for example, if chairs were broken and the room temporarily placed, for example, in a busy corridor or not shielded from other hospital activities. Although recognising the staff’s effort to make it as comfortable as possible, these circumstances made infusion treatment a strenuous affair and left participants feeling stressed and unprioritised. The atmosphere of the room also formed part of the overall experience, both positive and negative. One participant bluntly said: “We all know that it’s a (swear word) situation, but the atmosphere (in the infusion room) doesn’t have to be.” A ‘good infusion day’ was a balance between being able to relax while also having light and humorous conversations: “We have a lot of fun. I don’t feel like it’s a hospital. I feel at home.” Conversely, participants described how loud noises, overcrowding or just the tone in the room from fellow patients or staff affected their experience and contributed to stress and fatigue for the remainder of the day.

#### Relationships and knowledge

Relationships between fellow patients developed over time, and participants described how being in the

infusion room became a source of continuous education about MS management as well as a connection to new research knowledge about MS. The informal exchange of knowledge, especially from the nurses, was something the participants valued, making them feel part of a community and giving them hope for the future. Access to staff during or between the infusions provided participants with opportunities to ask questions and to receive more direct answers and feedback from a nurse or doctor compared with when they had to call the department during specific phone-in hours.

#### A 'breathing space'

Overall, participants seemed to associate infusion treatment by taking matters into their own hands and actively doing something to prevent MS worsening. While some participants had considered their self-administered treatment (orals or injections) at home to be convenient, a paradoxical aspect of spending time at the hospital meant that participants could put thoughts of MS aside: "It was an annoyance to have to remember this (the pills) all the time. You can let go of that. I could put MS aside." Related to this experience, an infusion at the hospital could also be associated with a positive break from everyday issues. "It ended up being a space I could breathe. I had small kids at home, so I found a space where I could relax and just be me without having to fix things or take care of a child." Once the worries of starting an infusion treatment had been reconciled, an infusion day could thus be a valuable time out or even a space to recharge from a busy life.

#### Switching infusion

##### Reappearing worries

A few of the participants had switched from one infusible DMD to another due to side effects with the former. Changing infusion intervals meant changing routines, and in most cases this was unproblematic. However, if communication about future treatment options concerning current side effects was not talked through with a neurologist, this could create significant new fear and worries resembling the pretreatment time point.

## DISCUSSION

This study explored factors shaping patients' experiences of receiving an infusible DMD for RRMS. Following four phases of the infusion journey, from preinfusion, first day, long-term treatment and switching to other DMD infusions, we found several different contextual factors affecting both positive and negative experiences during each time phase.

Physical function, present disease activity and medical uncertainty about treatment outcomes were factors that influenced time before the final decision and prompted a treatment dilemma. Likewise, in a study by Lee Mortensen and Rasmussen,<sup>35</sup> which explored preferences of patients with MS related to the quality of life, it was found that the perception of present

health subsequently impacted on choice and commitment to treatment. Our study raises the question of whether dissimilarities between clinical measures and patients' subjective symptoms might stall treatment initiation, making it even more important that patients understand that treatment delays can lead to a poorer long-term outcome.<sup>1</sup> Peer involvement, and trust and involvement from the neurologists and nurses were recognised as positive factors that supported participants' proactivity and autonomy. Coming to a firm conviction about treatment choice formed part of the process each patient went through when getting ready to incorporate a new treatment procedure in their life. In a qualitative study of patients with RRMS receiving a monthly infusion, Miller *et al*<sup>36</sup> concluded that fear and uncertainty were unavoidable factors suffered by persons with MS. They furthermore touched on the dilemma of treatment choice, summing up that patients valued 'quality over quantity' when deciding on a high-risk treatment. Choosing infusion treatments for RRMS can be viewed as a complex medical decision since a cure is not guaranteed and the potential benefit has to be weighed up towards possible side effects.<sup>37 38</sup> Our study extends these assumptions by empirically demonstrating that HCP and active family involvement in a treatment dilemma support patients' proactivity and lay the foundation for assuredness with the treatment decision and making personal peace with the situation. Further investigation is required to determine if talking about the dilemma inherently embedded in a complex MS treatment landscape and options could actually help to provide an optimal decision-making process.

By contextualising the first day of infusion, staff created a safe and comfortable environment for participants new to infusion treatment. While some associated the new infusion option as a way to gain the security of more regular medical monitoring and were happy with hospital visits, others had an overstated fear of the infusion procedure, contributing to overall worries and uncertainty about the day. Peer support continued to be a positive factor during infusion initiation, although less support was needed as patients became more confident with the infusion procedures. External factors such as easiness of parking or poor signage on the hospital grounds continued to hamper the overall experience. Moreover, the interior of the infusion room, for example, functionality of chairs and infusion location, also impacted participants' experiences. If an infusion room was placed far from the nurses' station or not shielded from other activities, hospital visits became stressful and fatigue was heightened. The atmosphere in the infusion room could also facilitate both positive and negative experiences; an optimistic and humorous tone from staff and fellow patients was valued as positive when balanced between seriousness and light-hearted ambience. In contrast, overcrowding or a loud negative tone in the room prompted participants to seclude themselves and avoid conversation.

Relationships with staff and fellow patients were an important positive factor in keeping participants up to date with new knowledge and research about MS. Moreover, during infusion hours or informal check-ups, participants felt a strong, easy and direct line of personal communication with hospital staff. Infusion hours provided some participants with much-needed sanctuary, ultimately allowing participants time to focus on life away from their illness.

Edvardsson and colleagues<sup>39</sup> found that an atmosphere of ease was shaped by how patients perceived the hospital environment, including being located in safe and familiar surroundings, being recognised by staff, and benefiting from communication with others. Moreover, natural light and the aesthetics of a hospital room were considered a strong accompaniment to overall well-being.<sup>40</sup> Studies examining how hospital environment, ambience, relationships and communication affect patients' well-being and recovery are not new, although it could be argued that hospital constructions and interior design only recently have begun to practically include knowledge of how hospital environment affects health. Our study contributes to this body of knowledge and extends it in the sense that the hospital environment, even in infusion rooms with short-term visits, significantly affects patients' cognitive state and overall well-being. While this study touches only briefly on external factors such as parking and signage, HCPs can relatively easily consider aspects of the interior of the infusion room, including ambience, lighting, equipment location and seating arrangements. Further research should focus on the external environment and how physical and mental perceptions of an infusion room might support the cognitive function and well-being of patients receiving infusions.

Within healthcare delivery services, including biologically infused treatments for RRMS, there is a trend towards moving complex medical treatments from the hospital environment to a homecare scenario.<sup>41</sup> While this may be a positive development for some patient groups, our study shows that hospital-based infusion treatment provides patients with significant security, knowledge and support in dealing with their MS and would be problematic if lost. A recent study on new models of care for the home-based infusion of DMDs serves as an example of this.<sup>42</sup> According to the report, patients were opposed to giving up relationships with departmental staff, and researchers had to promise the participants that they could return to usual hospital procedures after completion of the study. This stresses the need to explore patient perspectives before attempting to introduce new healthcare practices and organisations.

A few participants in this study had recently switched from one infusible DMD to another, which in some cases reactivated a similar experience of uncertainty as seen in treatment-naïve patients during preinfusion. Besides these worries, participants spoke about their

concerns related to changing treatment, for example, from infusion to oral treatment, even when this issue had not been raised by a neurologist. Future research could benefit from looking further into how patients can be supported during a treatment switch.

### Limitations

The voluntary nature of the recruitment might have motivated people with a positive outlook of infusions to participate. However, the participants raised both positive and negative incidents regardless and seemed motivated by a genuine wish to speak about their infusion journey. Considering the qualitative study design used here, our sample size of 22 was a balance between extraction of enough incidents and appropriate to perform a thorough qualitative analysis,<sup>33 43</sup> although repeated interviews with fewer participants could have provided more detailed narratives, particularly in consideration of possible recall biases. However, using a case study here strengthened the analysis concerning the initial infusion phase and provided a unique insight into how infusion treatment is experienced from the perspective of a newly diagnosed patient. The integrity of the results was further enhanced by the inclusion of a diverse patient population from three different infusible DMD regimens, which made it possible to collect unifying experiences across the different frequencies of treatment regimens. Some participants had understood the interview questions relating to procedural or medication errors. This was dealt with by repeating the research objectives before the interview and emphasising that compiling details of medication errors was not the aim of the study. A limitation of the study design was that no peers were included for the individual interviews. Undertaking a family perspective might enhance understanding of the context of treatment dilemmas and treatment switches with infusible DMDs.

### CONCLUSION

This study explored factors influencing patients' experiences with infusible DMD treatment for RRMS beyond individual preferences and reports on meaningful unifying conditions which can serve as a guiding point in MS infusion management in practice. Starting on an infusible DMD is a treatment dilemma involving both HCPs and families of patients with MS. Active MS with declining physical function seems to shorten patients' preinfusion decision phase, while dissimilarities between bioclinical markers and patients' subjective disease experience might prolong it. Patients with RRMS habituate treatment procedures with infusible DMDs into their daily lives regardless of treatment frequency. External and internal hospital surroundings, including infusion room ambience, affect patients' cognitive state and well-being. Positive relationships with staff and fellow patients transform the infusion experience to a time characterised by personal support, continuous learning and an opportunity for a positive 'time out' allowing patients to



redirect focus to other aspects of their lives. Peer relationships are vital in MS management and future research could benefit from including the role of peers, especially during treatment start of a new infusible and switch to other infusible treatments.

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