

Haematology



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Home-Based Daratumumab in Patients With Multiple Myeloma

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ABSTRACT

Objective: Multiple myeloma is an incurable cancer with lifelong treatment needs. This, together with a global nursing shortage, calls for new approaches for future treatment. In this study, we therefore investigated the feasibility of home-based subcutaneous daratumumab administered by primary care nurses outside the hospital.

Methods: Applying a mixed-methods prospective design, we included 30 patients; 18 had completed \geq 6 cycles of daratumumab treatment, and 12 were newly started. New patients were followed for six 28-day cycles, with every second treatment administered outside the hospital. Patients already on treatment were followed for seven cycles with 2/3 treatments administered outside the hospital.

Results: Of 123 administrations planned at the hospital, 122 (97.6%) were administered and three were cancelled. Of 144 administrations planned outside the hospital, 133 (92.4%) were administered, six were redirected to the hospital, and five were cancelled. No significant difference between numbers of cancellations/redirections was observed. Patients spent significantly longer time on treatment at the hospital, even when deducting travel time. Reducing patients' visits to the hospital did not cause additional unplanned contacts with the healthcare system.

Conclusion: This study thus concludes that administration of daratumumab outside the hospital is safe, feasible, and time saving.

Trial Registration: ClinicalTrials.gov ID: NCT05306587

1 | Introduction

Patients with multiple myeloma (MM) benefit from increased overall survival because of more effective and less toxic treatments that can be given for a prolonged period of time. However, the disease remains incurable, necessitating continuous, often lifelong, treatment. This means that patients end up spending an inordinate amount of the time they have gained receiving treatment at the hospital. Furthermore, the centralization of MM treatment at a few specialized hematology departments in several countries, including Denmark, has caused increased travel time for many patients. Moreover, as MM primarily affects the elderly population and as the general population gets older [1], the prolonged time on active treatment strains the healthcare systems, which are already under pressure [2]. To efficiently free up hospital resources and help patients return to their normal lives, treatment relocation is

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@ 2025 The Author(s). European Journal of Haematology published by John Wiley & Sons Ltd. becoming increasingly popular [3–6]. Different models, including self-administration and home visits by hematology nurses, have been tested. However, in light of the current shortage of nurses [7], implementing a set-up requiring hospital nurses to spend a lot of time transporting themselves to the patients' homes might not be preferable nor financially viable. Therefore, the time might have come to involve the primary healthcare sector in oncology treatment to a greater extent [5].

Daratumumab has revolutionized the treatment of MM as an effective anticancer drug and plays an important role in current treatment [8]. Often, it is administered over a long period of time with many visits to the hospital. In 2020, subcutaneous (SC) daratumumab administered by registered healthcare professionals was approved by the European Medicines Agency. This paved the way for involving nurses from the primary sector in administering the treatment. Therefore, we set-up the present study to investigate the feasibility of SC daratumumab being administered by a primary care nurse in the primary healthcare sector (hereafter: Primary care nurse) either at the patients' homes or at a local healthcare clinic.

2 | Methods

2.1 | Design

This prospective, single-centre, nonrandomized study (NCT05306587) utilized a mixed-method approach with a convergent parallel design to integrate quantitative and qualitative findings [9]. Quantitative results adhere to the EQUATOR STROBE guidelines [10], whereas qualitative results were reported per COREQ criteria [11].

2.2 | Setting and Patient Population

Between March 2022 and June 2023, this study was conducted at the Department of Haematology, Odense University Hospital (OUH), Denmark, which services patients from 22 different municipalities in the Region of Southern Denmark. Aiming to evaluate the feasibility of home-based treatment in a real-world population, patients were broadly recruited based on a few criteria. They were eligible for inclusion if they had relapsed MM receiving SC daratumumab, were \geq 18 years, and could receive treatment either at the hospital or, depending on municipal agreements, at home or a local healthcare clinic. Patients were allowed to receive daratumumab in combination with other anti-myeloma drugs, as long as it did not require attendance at the hospital on days when the protocol required home treatment; for details regarding co-treatment, see Table 1. Eligible patients were identified by the hematology team and included in one of two groups with courses of treatment as illustrated in Figure 1:

- New on daratumumab: Followed for six 28-day cycles with daratumumab administered once weekly for the first two cycles and once every second week for the last four cycles. In Cycle 1, the first two treatments were administered at the hospital, and the other two were administered at home or at a healthcare clinic. In Cycle 2, only the first treatment was administered at the hospital, and the last three were administered at home or at a healthcare clinic. In Cycles 3–6, Day 1 was administered at the hospital, whereas Day 15 was administered at home or at a healthcare clinic.

Ongoing on daratumumab: Having completed at least six cycles of daratumumab and followed for seven 28-daycycles with daratumumab administered once per cycle. Cycles 1, 4, and 7 were administered at the hospital, whereas Cycles 2, 3, 5, and 6 were administered at home or at a healthcare clinic.

Hospital staff retained treatment responsibility, ensuring treatment readiness via pretreatment phone calls to assess possible side effects and via monthly biochemical disease evaluation. If eligible for treatment, treatment was ordered from the hospital pharmacy to be delivered to the patient's home the following day. All outsourced treatments were coordinated electronically by the hematological nurses and administered by a primary care nurse, who was trained by the hematological team prior to study initiation and provided with written administration guidelines. When treatment was administered at the hospital, patients consulted a physician for a clinical assessment.

2.3 | Data Collection

Quantitative data were gathered from patients, primary care nurses, and hematological nurses.

Throughout the study, patients registered unplanned healthcare contacts. Moreover, patients new on daratumumab registered time spent on treatment in Cycle 2, Days 1 and 15, and in Cycle 6, Days 1 and 15, whereas patients ongoing on daratumumab registered time spent on treatment in Cycles 3, 4, 6, and 7. Upon study exit, they completed a custom-built questionnaire evaluating home treatment. Patient-reported outcome (PRO) data were collected via the secure *My Hospital* app provided by the Region of Southern Denmark.

Hematology nurses recorded demographic data (age, gender, living status, and employment status) and reasons for declining participation during screening. They also documented treatment adherence and time spent on specific treatment days. In addition, primary care nurses registered time spent on selected treatment days for both patient groups.

Qualitative data were obtained from individual, semi-structured interviews with patients and primary care nurses, and a focus group interview with healthcare professionals at the hospital. Patients were interviewed at inclusion and when leaving the study. Primary care nurses were interviewed after having administered at least one dose of daratumumab. Healthcare professionals at the hospital were interviewed at the end of the study. Interviews were guided by semi-structured interview guides, recorded, and transcribed verbatim.

2.4 | Data Analysis

Quantitative data were analyzed descriptively. Numerical variables were presented as means and medians (range) and analyzed using Student's *t*-test. Categorical variables were presented

TABLE 1 Patient characteristics.

	Included patients number (%), $N=30$	Declining patients number (%), N=24	р
Age; mean	76 years	75 years	0.432
Median (range)	78 years (61–87)	76 years (60–83)	
Gender			0.100
Female	12 (40)	15 (62)	
Male	18 (60)	9 (38)	
Living status			0.443
Cohabiting	25 (83)	22 (92)	
Living alone	5 (17)	2 (8)	
Distance to the hospital; mean	31 km	44 km	0.232
Median (range)	24 km (3–153)	37 km (0.5–162)	
Year since primary MM diagnosis; mean	9 years	6 years	0.513
Median (range)	8 years (1–28)	6 years (2–13)	
New or ongoing on daratumumab			0.132
New on daratumumab	12 (40)	5 (21)	
Ongoing on daratumumab	18 (60)	19 (79)	
Mono or combination therapy			0.035
Daratumumab monotherapy	16 (54)	6 (25)	
Daratumumab combination therapy; hereof	14 (46)	18 (75)	
Daratumumab, lenalidomide	12 (86)	18 (100)	
Daratumumab, lenalidomide, cyclophosphamide	1 (7)	0 (0)	Not tested
Daratumumab, cyclophosphamide	1 (7)	0 (0)	

Note: Numerical variables were analyzed using unpaired *t*-test and categorical variables with frequencies < 5 were analyzed using two-tailed Fisher's exact test, whereas categorical variables with frequencies ≥ 5 were analyzed using chi-squared test. *p* values < 0.05 were considered significant and are marked in bold.



A New on Daratumumab



as numbers and percentages, and variables with frequencies < 5 were analyzed using two-tailed Fisher's Exact test, whereas variables with frequencies ≥ 5 were analyzed using chi-squared test.

p values <0.05 were considered statistically significant. Data were analyzed using Stata BE 17 and illustrated using GraphPad Prism 10.2.1.

Qualitative data were analyzed applying a hermeneutic approach. A systematic text condensation was performed using the software program NVivo. In this way, the meanings in the interviewees' statements were summarized and divided into themes and descriptive statements [9].

Meta-inference between the quantitative and qualitative analyses was explored through explicit and thorough discussion of qualitative and quantitative findings. Comparison was visualized using a summary table [12–14]; see Table 2.

3 | Results

3.1 | Study Population

Between March 2022 and June 2023, 54 patients with MM were invited to participate in the study. Of these, 30 patients (56%), hereof 18 males, accepted. Participants had a median age of 78 years (range 61-87); 12 were new to daratumumab, and 18 were ongoing. There was no statistically significant difference between included and nonincluded patients in age, gender, living status, years since diagnosis, or distance to the hospital, but significantly more patients receiving daratumumab monotherapy accepted participation (p = 0.035) compared with patients in combination therapy; see Table 1. Reasons for declining participation were inconvenient logistics (n = 14), preference for hospital treatment (n=7), and not in possession of a smartphone (n=3). Twenty-two patients completed the whole study period. Reasons for non-completion were progressive disease (n=3), inconvenient logistics (n=3), side effects (n=1), and the patient's consent withdrawal because of a wish to discontinue daratumumab treatment (n = 1).

For the qualitative part, we included 19 consecutive patients and 9 consecutive primary care nurses until data saturation [15, 16]. For the focus group interview, we included four healthcare professionals (one physician and three nurses) from the hospital with a minimum of 2 years of experience in hematology.

3.2 | Safety and Feasibility

In total, 255 of 269 (94.8%) planned administrations of daratumumab were given, all without unforeseen events, and none were given unplanned. Of 144 outsourced administrations, 133 (92.4%) were given as planned, six (4.2%) were redirected and given at the hospital (two due to suspicion of infection and four for administrative reasons), and five administrations (3.4%) were cancelled after redirection to the hospital (three due to infection and two due to nausea and diarrhea). Of 125 hospital-planned administrations, 122 (97.6%) were given, and three were cancelled (two due to infection and one due to disease progression). There was no significant difference in the proportion of treatments that were administered as planned at the hospital compared with the patients' at own homes (Figure 2).

From the interviews, it was also evident that home treatment worked well. However, hospital staff reported a specific case in which communication and coordination between the outpatient clinic and the hospital ward failed, causing the treatment to be discarded.

3.3 | Time Consumption

On average, patients spent 29 min (range 5–120) on treatments administered at home, 63 min (range 31–120) on treatments administered at a local healthcare clinic, and 206 min (range 135–345) on treatments administered at the hospital (Figure 3A). They spent 104 min (range 35–258) traveling back and forth to the hospital and 102 min (range 40–240) on treatments at the hospital. No data were collected on time spent on transportation to the local healthcare clinic. On average, patients saved 177 min per administration given at home compared with the hospital (p < 0.05). Even deducting transportation, time spent was reduced by a factor of 3.5. Patients treated at a local healthcare clinic had their time reduced by a factor of 3.25 compared with treatment at the hospital.

In total, primary care nurses and hematological nurses spent on average 38 min on treatment administered at home. Of these, 25 min were spent on direct contact with the patients, whereas 13 min were spent on administrative tasks. Hematological nurses spent on average 35 min (range 3–50) on each hospital administration. Thirteen minutes were spent together with the patients, and 22 min were used for administrative tasks. Summing up, nurses all in all spent an additional 3 min on each administration at home compared with a treatment administered at the hospital. This difference was not statistically significant (Figure 3B).

In the interviews, different views on time consumption and time savings emerged. In general, healthcare professionals thought of home treatment as being preferable and time saving for the patients, as it eliminated transportation. However, some patients emphasized that they spent a lot of time waiting at home: One day for a call from the hospital nurse, another day for the treatment to be delivered, and a third day for the primary care nurse to administer the treatment.

3.4 | Unplanned Contacts

Of 255 administrations, 230 doses (90.9%) were administered without any subsequent unplanned contacts with the healthcare system. There was no statistically significant difference between the number of unplanned contacts after a hospital administration versus an administration at home or at a healthcare clinic. After 13 of 122 treatments given at the hospital (10.6%), patients had unplanned contact with the healthcare system prior to their next treatment (Figure 3C) and likewise, 12 of 133 treatments administered at home or at a healthcare clinic (9.02%) were followed by unplanned contact with the healthcare system (Figure 3D). Reasons for contact were: Contact with a general practitioner or private specialist for various reasons (n = 5), contact with the Department of Haematology related to treatment (n = 5), contact with the Department of Haematology concerning infection (n = 8), contact with the Department of Haematology for other reasons (n = 2), and unknown (n = 5).

TABLE 2	Summary of qu	antitative and	qualitative	findings.
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Theme	Quantitative findings	Oualitative findings	Meta-inferences
Home based daratumumab is feasible.	Of 144 planned administrations, 133 (92.4%) were given at home or at a local healthcare clinic as planned. No doses were given unplanned or with unforeseen events.	Both patients and nurses found home based treatment to be safe and feasible.	This finding underlines that relocation of daratumumab from the hospital to the patients' home or a local healthcare clinic is safe and feasible.
Time spent is a subjective assessment.	On average, patients saved 177 min per administration given at home compared to the hospital. Nurses spent roughly the same amount of time on treatments at home or at a local healthcare clinic compared to the hospital. For home based treatments, time was shared between primary care nurses and hematologic nurses.	Some patients felt that they spent a lot of time waiting at home: One day for a call from the hospital nurse, another day for the treatment to be delivered, and a third day for the primary care nurse.	This finding shows that for patients living an active life, home treatment is not necessarily advantageous, if it causes them to have to wait for a long time at home. Especially if they live close to the hospital.
Home treatment does not cause additional work for others in the healthcare system.	There was no difference between number of unplanned contacts after a hospital administration versus an administration at home or at a healthcare clinic.	Patients expressed a wish to contribute to relieve the pressure on a strained healthcare system and did not feel additional need for contact to the healthcare system because of home based treatment.	This finding shows that there is no need to worry if treatment relocation adds extra workload to the healthcare system as a whole.

The use of healthcare services was also broached in the interviews. Patients expressed a desire to help alleviate the strain on the healthcare system. In recent years, they have observed that hospital staff have gotten busier, and they expressed a wish to relieve this by reducing their visits to the hospital. Moreover, both patients and hospital staff thought of home treatment as a way to release resources at the hospital for patients with the highest need of care and treatment.

3.5 | Preference and Satisfaction

Overall, patients were satisfied receiving treatment at home or at a healthcare clinic (68% agreed and 24% partly agreed) and would like to continue this after the study (60% agreed and 24% partly agreed). Most patients found treatment at home or at a healthcare clinic easier (68% agreed and 20% partly agreed) and they stated that it helped them maintain their normal everyday



FIGURE 2 | Administered doses. There was no significant difference in the proportion of treatments that were administered as planned at the hospital or at patients' own home/at a local healthcare clinic (Fishers exact test; p values > 0.05).

activities (60% agreed and 24% partly agreed). Responses to selected questions are presented in Figure 4. For a complete list of questions, see Appendix 1. There was no statistically significant correlation between patients' preference for treatment location and distance to the hospital.

In the interviews, patients also expressed their satisfaction. The majority stated that home treatment was less stressful compared with treatment at the hospital and that it made them feel more independent. They appreciated being in familiar surroundings, and some patients even stated that it provided them with more energy for going out. Further, they valued avoiding driving a long distance to the hospital and spending time looking for a parking space.

Some patients stated that they preferred receiving treatment at a healthcare clinic rather than at home, as they found it easier to attend the clinic at a specific time point rather than waiting at home for a primary care nurse for several hours.

Though patients, in general, felt confident reducing their visits to the hospital, a few patients preferred attending the hospital for all treatments. One patient described a feeling of being lost alone with her disease if she did not maintain close contact with the physicians at the hospital.

4 | Discussion

To our knowledge, this is the first study to investigate the feasibility of SC daratumumab administered by a primary care nurse at home or at a local healthcare clinic; we found it to be safe, feasible, and preferable to most patients. Likewise, previous studies have demonstrated that home treatment of SC bortezomib is also a viable alternative to hospital administration for the majority of patients with MM [6, 17, 18]. Given the increasing number of patients requiring MM treatment and cancer treatment in general, healthcare systems are forced to rethink the organization of future treatment [5]. This might well include that the majority of patients will be managed outside the hospital. However, it is important to keep in mind that home treatment is not necessarily the best solution for all patients. Aiming to gather insights that could inform clear inclusion and exclusion criteria for future home-treatment projects, we broadly included patients in our study and thoroughly documented both included and nonincluded patients as well as those who withdrew from the study. In our quantitative analyses, we found no statistically significant differences in the demographics of included and nonincluded patients, but we saw that significantly more patients receiving daratumumab monotherapy accepted participation compared with patients receiving daratumumab in combination with other treatments. There are no obvious practical barriers preventing patients on combination therapy from receiving treatment at home, suggesting that other factors may influence their decision. In our analysis, we grouped the three different combination therapies together and compared them collectively to monotherapy to explore potential differences in participation rates. Therefore, we cannot ascertain if the addition of one specific drug to the treatment regimen causes patients to decline home-based treatment. We believe that home-based treatment holds great potential for a broader patient population, but we encourage future studies to focus on identifying-and overcoming-barriers for patients receiving combination therapy.

When broadening the aspects of identifying the right candidates for home treatment in the interviews, some tendencies became evident: In line with the findings of Touati and colleagues [18], hospital staff thought of home treatment as being most attractive to elderly and frail patients. Primary care nurses agreed on this perspective, but they also emphasized their thoughts on the need for patients to be cognitively well-functioning to receive their treatment at home. This was, however, not reflected in the inclusion of our patients.

Importantly, we found the administration of SC daratumumab at home or at a healthcare clinic to be safe. All administrations were given without unforeseen events, and no doses were given unplanned. Our findings are in line with previous reports of home administration of SC treatment for patients with MM and other hematologic cancers as being safe [6, 17–21].

Time savings have previously been described as one of the main advantages of home treatment. Indeed, Lassalle et al. have established that home treatment provides an optimal environment for patients as it reduces transportation time, allowing the patients to maintain a normal family life during treatment [17]. However, as was evident from our qualitative analysis, home treatment was not preferable to all patients, as some found staying at home waiting for the treatment to be delivered and for the primary care nurse to be bothersome. This confirms the findings of a previous study on home treatment in solid cancers describing this waiting time to be decisive for the patients' preference of treatment location [22]. As we conducted our patient interviews consecutively, the issues of long waiting times at home became evident early in the study, allowing us to adjust the logistics to alleviate these frustrations. We acknowledge that with these adjustments in the course of the study, the need for caution when



FIGURE 3 | Time spent on treatment administrations and reasons for unplanned contacts to the healthcare system after treatment. Time spent by patients (A) includes time spent on transportation to the healthcare clinic and to the hospital. Time spent by nurses (B) is the total time spent by hematological and primary care nurses. It includes both time spent on direct contact with the patients and time spent on administrative tasks. Horizontal lines indicate mean value; statistical significance is marked with *(p < 0.05), unpaired *t*-test. Reasons for unplanned contacts to the healthcare system after a treatment at the hospital (C) and after treatment at home or at a healthcare clinic (D). There was no statistically significant difference between number of unplanned contacts after a hospital administration and an administration at home or at a healthcare clinic (Fishers exact test; p values > 0.05).

interpreting our findings arises, but on the other hand, we are convinced that these adjustments were pivotal for patients' willingness to have SC daratumumab administered at home by a primary care nurse. First of all, the time slot for delivering the treatment at the patients' home was continuously discussed with the hospital pharmacy. At study initiation, treatment was delivered the day before administration, forcing the patient to wait at home for two consecutive days. The newest agreement states that treatment is delivered during a 4-h time slot in the morning on the day of administration. This seems more desirable to the patients. Moreover, when the study was initiated in March 2022, agreements on administration of SC daratumumab by a primary care nurse from the primary healthcare services were only in place with the 10 geographically closest municipalities serviced by our hospital. This meant that the patients assumed to benefit the most from reduced transportation time were excluded from participation. One year into the study, agreements also came in place with the 12 municipalities outside Funen, allowing patients with the longest distance to the hospital to participate too. Hematological nurses stated that many patients living far away expressed that this set-up was beneficial to them, but due to the timeframe of our study, only five patients living outside Funen were included. Though we did not find any statistically significant correlation between patients' preferred treatment location



FIGURE 4 | Evaluation of treatment at home/at healthcare clinics. The majority of patients were satisfied receiving treatment at home or at healthcare clinics, and 84% would like to continue this after the study.

and distance to the hospital, our qualitative data points in the direction of home treatment being most attractive to patients spending > 30 min on transport to the hospital. One possible explanation for the lack of statistical significance is the limited sample size, which may have reduced our ability to detect a meaningful correlation. Additionally, factors beyond travel time—such as personal preferences, caregiving responsibilities, or perceptions of hospital-based versus home-based care—may also influence treatment location choices. Future studies with larger sample sizes and a more detailed assessment of patient preferences could help clarify these relationships.

From the health sector perspective, the objective of treatment relocation and home hospitalization is to relieve the healthcare system as a whole, and therefore it should not cause an increase in the total use of healthcare services [23]. In our study, we investigated direct and indirect healthcare use by time spent and unplanned contacts. Our findings showed no statistically significant difference in the time spent by nurses administering treatment at home compared with treatment at the hospital, suggesting that no additional resources are required to manage a large cohort of patients remotely. Furthermore, we anticipate that as healthcare staff become more familiar with this setup, the process may become even more efficient over time. However, information on the current use of healthcare services for patients on SC cancer treatment is sparse, making comparison difficult. Existing studies on early discharge to hospital-at-home for patients with cancer and other complex medical conditions demonstrate a marginal but insignificant increase in readmissions compared with routine hospital care [24]. Another systematic review on integrated care models reports inconsistency in the effect of care outside the hospital on the use of healthcare services [25]. In the previously mentioned study by Lassalle and colleagues, 2% of patients reported visiting their general practitioner more frequently when receiving SC bortezomib at home compared to when receiving it at the hospital [17]. In our study, we assessed the number of unplanned contacts after treatment.

We found no significant difference in the number of contacts after hospital administration and administration at home or at a local healthcare clinic. Our focus on unplanned contacts alone differs from previous studies but was chosen to leave out any preplanned controls for a known condition, thus only assessing the number of contacts expected to be a direct result of the treatment.

4.1 | Strengths and Limitations

Though our results are consistent with the findings of others, the methods applied to examine patient preference and satisfaction hold both strengths and limitations worth mentioning: Limitations are related to our quantitative analysis based on data collected using a custom-made questionnaire, chosen as no validated questionnaire exists for this purpose. In the questionnaire, treatment administered at home and treatment administered at a healthcare clinic were combined and compared with treatment at the hospital. However, as emerged from the patient interviews, some patients had differing perspectives on home treatment and treatment administered at a healthcare clinic. Therefore, asking the patients to evaluate the three treatment locations separately would most likely have added more nuanced information on preference and satisfaction. In addition, relying on patient-reported data for time spent and unplanned healthcare contacts may raise concerns about accuracy. However, this approach was chosen as we had no access to healthcare contacts outside the hospital system, making patients' own registrations more comprehensive. To enhance reliability, we reviewed patient charts to capture hospital-related contacts-with no instances of unreported visits-and ensured patients recorded time aspects difficult for research staff to track, such as waiting times and parking. Research staff thoroughly introduced patients to these tasks and followed up during clinic visits. The major strength of our evaluation lies in the mixed method design, combining quantitative and qualitative data, bringing synergy to our results [13].

5 | Conclusion

The administration of SC daratumumab by a primary care nurse in the homes of patients with MM or at a local healthcare clinic was safe and feasible. It saved patients from spending a lot of time on transportation, but focus on the logistics of home delivery is important to reduce waiting time at home. Importantly, treatment relocation did not just redirect the total use of healthcare services to other sectors. Nurses spent an equal amount of time on treatment at the hospital and outside the hospital; when treatment was administered at home or at a local healthcare clinic, primary care nurses and hematological nurses shared the time spent. As healthcare systems seek sustainable models, primary care-led MM treatment represents a viable, patientcentred approach. However, emphasis on logistical efficiency remains crucial to optimize patient experiences and maximize healthcare resource allocation.

Author Contributions

Tine Rosenberg: acquisition, analysis and interpretation of data, drafting the work, and the final approval of the version to be published and agreement to be accountable for all aspects of the work. Jannie Kirkegaard: design of the work, acquisition, analysis, and interpretation of data, drafting the work, and the final approval of the version to be published and agreement to be accountable for all aspects of the work. Michael Tveden Gundesen: analysis and interpretation of data and critically revising the work, and the final approval of the version to be published and agreement to be accountable for all aspects of the work. Maja Kjær Rasmussen: analysis and interpretation of data and critically revising the work, and the final approval of the version to be published and agreement to be accountable for all aspects of the work. Karin Brochstedt Dieperink: design of the work and interpretation of data and critically revising the work, and the final approval of the version to be published and agreement to be accountable for all aspects of the work. Thomas Lund: design of the work, analysis and interpretation of data and critically revising the work, and the final approval of the version to be published and agreement to be accountable for all aspects of the work.

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Ethics Statement

According to the Danish National Research Ethics Committee, the study did not require approval. The study was registered at the Danish Data Protection Agency with no. 21/39486.

Consent

Informed consent was obtained from all participants included in the study.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request; please contact the corresponding author at tine.rosenberg@rsyd.dk.

References

1. World Health Organization, "Ageing and Health," https://www.who. int/news-room/fact-sheets/detail/ageing-and-health2022.

2. J. M. Challinor, M. R. Alqudimat, T. O. A. Teixeira, and W. H. Oldenmenger, "Oncology Nursing Workforce: Challenges, Solutions, and Future Strategies," *Lancet Oncology* 21, no. 12 (2020): e564–e574.

3. L. Cool, J. Missiaen, P. Debruyne, et al., "Oncologic Home-Hospitalization Delivers a High-Quality and Patient-Centered Alternative to Standard Ambulatory Care: Results of a Randomized-Controlled Equivalence Trial," *JCO Global Oncology* 7 (2021): 1564–1571.

4. L. Cool, J. Missiaen, D. Vandijck, et al., "An Observational Pilot Study to Evaluate the Feasibility and Quality of Oncological Home-Hospitalization," *European Journal of Oncology Nursing* 40 (2019): 44–52.

5. L. Cool, D. Vandijck, P. Debruyne, et al., "Organization, Quality and Cost of Oncological Home-Hospitalization: A Systematic Review," *Critical Reviews in Oncology/Hematology* 126 (2018): 145–153.

6. J. Kirkegaard, B. W. Lundholm, T. Rosenberg, T. Lund, M. T. Gundesen, and K. B. Dieperink, "Home Is Best. Self-Administration of Subcutaneous Bortezomib at Home in Patients With Multiple Myeloma—A Mixed Method Study," *European Journal of Oncology Nursing* 60 (2022): 102199.

7. S. Turale, C. Meechamnan, and W. Kunaviktikul, "Challenging Times: Ethics, Nursing and the COVID-19 Pandemic," *International Nursing Review* 67, no. 2 (2020): 164–167.

8. M. A. Dimopoulos, A. Oriol, H. Nahi, et al., "Daratumumab, Lenalidomide, and Dexamethasone for Multiple Myeloma," *New England Journal of Medicine* 375, no. 14 (2016): 1319–1331.

9. K. Malterud, "Systematic Text Condensation: A Strategy for Qualitative Analysis," *Scandinavian Journal of Public Health* 40, no. 8 (2012): 795–805.

10. E. von Elm, D. G. Altman, M. Egger, S. J. Pocock, P. C. Gøtzsche, and J. P. Vandenbroucke, "The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for Reporting Observational Studies," *Lancet* 370, no. 9596 (2007): 1453–1457.

11. A. Tong, P. Sainsbury, and J. Craig, "Consolidated Criteria for Reporting Qualitative Research (COREQ): A 32-Item Checklist for Interviews and Focus Groups," *International Journal for Quality in Health Care* 19, no. 6 (2007): 349–357.

12. A. C. Klassen, J. Creswell, V. L. Plano Clark, K. C. Smith, and H. I. Meissner, "Best Practices in Mixed Methods for Quality of Life Research," *Quality of Life Research* 21, no. 3 (2012): 377–380.

13. L. Chiang-Hanisko, D. Newman, S. Dyess, D. Piyakong, and P. Liehr, "Guidance for Using Mixed Methods Design in Nursing Practice Research," *Applied Nursing Research* 31 (2016): 1–5.

14. T. C. Guetterman, M. D. Fetters, and J. W. Creswell, "Integrating Quantitative and Qualitative Results in Health Science Mixed Methods Research Through Joint Displays," *Annals of Family Medicine* 13, no. 6 (2015): 554–561.

15. A. Moser and I. Korstjens, "Series: Practical Guidance to Qualitative Research. Part 3: Sampling, Data Collection and Analysis," *European Journal of General Practice* 24, no. 1 (2018): 9–18.

16. J. J. Francis, M. Johnston, C. Robertson, et al., "What Is an Adequate Sample Size? Operationalising Data Saturation for Theory-Based Interview Studies," *Psychology and Health* 25, no. 10 (2010): 1229–1245.

17. A. Lassalle, P. Thomaré, C. Fronteau, et al., "Home Administration of Bortezomib in Multiple Myeloma Is Cost-Effective and Is Preferred by Patients Compared With Hospital Administration: Results of a Prospective Single-Center Study," *Annals of Oncology* 27, no. 2 (2016): 314–318.

18. M. Touati, L. Lamarsalle, S. Moreau, et al., "Cost Savings of Home Bortezomib Injection in Patients With Multiple Myeloma Treated by a Combination Care in Outpatient Hospital and Hospital Care at Home," *Supportive Care in Cancer* 24, no. 12 (2016): 5007–5014.

19. T. Meenaghan, M. O'Dwyer, P. Hayden, A. Hayat, M. Murray, and M. Dowling, "Home Administration of Bortezomib: Making a Difference to Myeloma Patients' Lives," *European Journal of Oncology Nursing* 14, no. 2 (2010): 134–136.

20. D. S. Wallace, C. S. Zent, A. M. Baran, et al., "Acalabrutinib and High-Frequency Low-Dose Subcutaneous Rituximab for Initial Therapy of Chronic Lymphocytic Leukemia," *Blood Advances* 7, no. 11 (2023): 2496–2503.

21. I. Innocenti, A. Tomasso, G. Benintende, et al., "Subcutaneous Immunoglobulins in Chronic Lymphocytic Leukemia With Secondary Antibody Deficiency. A Monocentric Experience During Covid-19 Pandemics," *Hematological Oncology* 40, no. 3 (2022): 469–474.

22. M. T. King, J. Hall, S. Caleo, H. P. Gurney, and P. R. Harnett, "Home or Hospital? An Evaluation of the Costs, Preferences, and Outcomes of Domiciliary Chemotherapy," *International Journal of Health Services* 30, no. 3 (2000): 557–579.

23. S. G. Kanagala, V. Gupta, S. Kumawat, F. Anamika, B. McGillen, and R. Jain, "Hospital at Home: Emergence of a High-Value Model of Care Delivery," *Egyptian Journal of Internal Medicine* 35, no. 1 (2023): 21.

24. L. Lin, M. Cheng, Y. Guo, et al., "Early Discharge Hospital at Home as Alternative to Routine Hospital Care for Older People: A Systematic Review and Meta-Analysis," *BMC Medicine* 22, no. 1 (2024): 250.

25. S. Baxter, M. Johnson, D. Chambers, A. Sutton, E. Goyder, and A. Booth, "The Effects of Integrated Care: A Systematic Review of UK and International Evidence," *BMC Health Services Research* 18, no. 1 (2018): 350.

Appendix 1

Custom-Built Questionnaire for Evaluating Treatment at Home/at a Local Healthcare Clinic

Full List of Questions

In general, treatment at home/at a healthcare clinic helped me to better maintain my normal everyday activities.

In general, treatment at home/at a healthcare clinic was less complicated for me.

In general, treatment at home/at a healthcare clinic was less complicated for my relatives.

In general, treatment at home/at a healthcare clinic was less demanding.

In general, I felt more confident with treatment at home/at a healthcare clinic.

In general, my relatives felt more confident with treatment at home/at a healthcare clinic.

In general, treatment at home/at a healthcare clinic gave me more control over my course of treatment. In general, treatment at home/at a healthcare clinic gave me a higher degree of co-determination over my treatment course.

In general, treatment at home/at a healthcare clinic helped increase the quality of my treatment course.

In general, treatment at home/at a healthcare clinic improved the communication between me and the healthcare professionals (physicians, nurses) at the hospital.

I was very satisfied with receiving treatment at home/at a healthcare clinic.

I would like to continue receiving treatment at home/at a healthcare clinic.

I would recommend home treatment/treatment at a healthcare clinic to other patients.