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BMJ Open

Municipal acute care teams as a flexible solution for the treatment of acutely ill patients at-home: a mixed-method study of patients' and caregivers' experiences with an acute care team

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To cite: Udesen SEJ, Nielsen DS, Andersen N, *et al*. Municipal acute care teams as a flexible solution for the treatment of acutely ill patients at-home: a mixed-method study of patients' and caregivers' experiences with an acute care team. *BMJ Open* 2021;**11**:e049945. doi:10.1136/bmjopen-2021-049945

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online. (http://dx.doi.org/10.1136/bmjopen-2021-049945).

Received 08 February 2021
Accepted 22 July 2021

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ABSTRACT

Objective Development of initiatives to reduce hospitalisations is a major focus of healthcare planning. Strengthening the community with municipal acute care teams or units is a newly implemented Danish initiative aimed at preventing hospitalisations and supporting more flexible services. This study aims to describe patients treated by a municipal acute care team and to explore patients' and caregivers' experiences with at-home treatment.

Design A mixed-method study consisting of descriptive statistics of patients treated by an acute care team, and quantitative and qualitative data from follow-up telephone questionnaires with patients and caregivers.

Setting The acute care team, 'Acute Team Odense' (ATO), in the Odense Municipality, Denmark.

Participants Patients treated by ATO and their caregivers. ATO treated 3231 patients (5676 contacts) in the period of 2018–2019.

Results Average number of new contacts per day was 7.8, and the median treatment-length was 1 day. Patients were referred by various healthcare providers and most often by general practitioners, municipal staff and hospital staff. The median age of the patients was 80 years, and 20% were independent before the treatment. In total, 787/5676 contacts received at-home intravenous therapy, which corresponded to 3.6 hospital beds saved per day. The questionnaires were completed by 307/478 patients and 168/254 caregivers. Most respondents stated they would prefer at-home treatment in future similar situations as it enabled them to maintain their lives. Several respondents also experienced that ATO avoided hospitalisations or reduced hospital stays, which was described as a relief.

Conclusion ATO was frequently used, indicating the demand for community-based acute healthcare. The patients and caregivers experienced that this solution avoided hospitalisations and allowed them to maintain their lives, and this was described as less burdensome. As a result of these findings, this initiative has been continued with an ongoing focus on searching for possibilities aimed to prevent hospitalisations.

Strengths and limitations of this study

- This study increases the knowledge of patients treated by a Danish municipal acute care team, which is important due to limited evidence surrounding alternatives to hospitalisations.
- The merge of municipal and hospital data made it possible to explore what happens with patients across one municipality and one hospital.
- The mixed methods approach gave a voice to the patients and their caregivers while concurrently gathering statistics about their experiences with treatment at home.
- The interview questionnaire was conducted not through face-to-face interviews but as telephone interviews instead.
- The study was based on one municipality which may reduce the generalisability of the results, but the study can still be used as inspiration to the development of outpatient programmes and acute healthcare services in the community.

INTRODUCTION

Improving transitions in care and targeting acute healthcare services to older people is a major focus of healthcare planning.[1–4] Development of initiatives and strategies to reduce hospitalisations and readmissions is important to ensure appropriate care in the most appropriate setting[1] and to ensure coherent and high-quality healthcare services to patients and caregivers.[5–7] In this context, it is important to be aware of the caregiver burden when healthcare shifts to being provided in the community instead of in hospitals.[8] A new acute healthcare service has been implemented in the Danish community, making it possible to get hospital treatment like intravenous therapy and acute nursing with paraclinical testing at home. This new initiative consists of municipal acute care

teams or units.[9] In Denmark, the municipalities are responsible for home nursing services.[10] Acute care teams are outpatient teams that provide acute nursing in patients' own homes, whereas acute care units are organised as 'acute beds' located in care facilities. Municipalities can organise this initiative as either a unit, a team or both. The acute care teams and units are specialised in identifying acute diseases and acute deterioration of chronic diseases as well as in performing specialised treatment previously performed at hospitals.[9] The initiative offers a potential alternative to hospitalisation and supports a more flexible solution for patients and caregivers. The acute care teams and units collaborate with various healthcare professionals and adapt to the patients' needs.[11] The general practitioners (GPs) have an important role in this collaboration, as they are the primary contact point to Danish healthcare services that are free of charge.[10]

To improve and develop alternatives to hospitalisations in the community, it is necessary to increase available evidence in this field. This study describes patients treated by a municipal acute care team called 'Acute Team Odense' (ATO). To include the patient and caregiver perspective, this study explores patient and caregiver experiences with treatment at home. In this study, the term 'treatment' includes care, assessments and treatment.

The initiative

ATO was established in 2018; it is located in Odense, Denmark, which has a population of 205 106.[12] The aim of this team is to prevent unnecessary hospitalisation and to provide treatment in the homes of adult patients (≥18 years) using fast response times and the more flexible application of competencies across sectors.[13] ATO is comprised of 20 highly qualified nurses specialised in delivering acute nursing. The team possesses equipment that makes new and flexible solutions in patients' homes possible (eg, clinical nurse assessments with paraclinical samples and intravenous therapy). To ensure continuous flow in relation to ATO's capacity, only patients in need of short-term treatment are discharged to ATO. ATO collaborates with GPs and municipal staff (nurses and nursing assistants), three departments at Odense University Hospital (OUH), the out-of-hours service and the Emergency Medical Dispatch Centre. The collaborating partners at OUH include the Emergency Department (ED), the Geriatric Department and the Palliative Team. The team is based in the ED to support close collaboration across sectors.[14]

METHOD

Design

This is a mixed-method study inspired by a convergent parallel design[15] aiming to provide a broad nuanced understanding of treatment at home. The design allowed for simultaneous data extraction and analyses. The

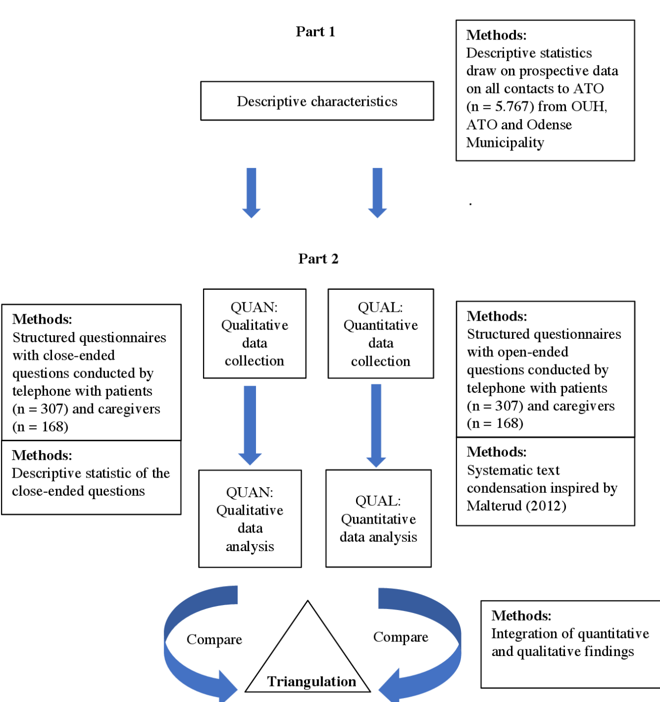

Figure 1 The study design inspired by the convergent parallel design[15]

design's philosophical assumptions build on pragmatism by using different methods and paradigms, allowing them to shift within the quantitative (QUAN) and qualitative (QUAL) phases.[15] As can be seen in figure 1, the study contained two sections. Initially, descriptive characteristics of ATO contacts were gathered; this was intended to provide an overview of the patients treated at home (QUAN). Second, the mixed-methods part consisted of telephone interviews employing questionnaires with closed-ended questions (QUAN) and elaborated qualitative interviews (QUAL).

Data collection: descriptive characteristics

The presented data were comprised of all the contacts ATO made with patients receiving treatment in the period from January 2018 to December 2019. The data contain all the acute hospital visits to OUH among these patients. Some patients had more than one instance of contact with ATO.

The data were gathered from prospective registrations of all ATO activities registered by ATO and by the Municipality Citizens' Record. The data consisted of information about the referring person, referral cause, treatment length, number of visits, number of contacts, time information (days and hours), intravenous therapy, interview participation, alive/dead status, amount and type of homecare, resident type, age and gender. Data from OUH are based on patients' electronic hospital records and are taken from the ED's logistic system, where all hospital data are registered and stored for each individual patient under their Danish civil registration number (CPR-number).[16] The data used in this study were stored and assigned pseudonyms on the logged server OPEN.[17]

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Telephone interviews and participants

The telephone interviews consisted of questionnaires with closed-ended questions as well as a portion with open-ended questions allowing for more explorative answers (online supplemental file 1). One questionnaire targeted patients' perspective while the other targeted caregivers' perspective. The development of the questionnaires was inspired by Danish recommendations to patient-reported outcome data,[18] address involvement, information, safety, understanding and consistency. Participating patients and caregivers were recruited in the period of 2018–2019 with the help of the nurses working in ATO, and they were interviewed within 3 weeks. The nurses asked the patients and their caregivers about participation. Patients who had cognitive impairments, were too ill to participate or were hospitalised, were excluded. The acute nurses made these exclusions, as they were the ones to determine whether the patients were eligible. Caregivers of excluded patients could still participate.

The telephone interviews were conducted by the first author (SEJU) and three assistants (not employed in ATO), all of whom had experience with questionnaires and interviews. During the study, SEJU was employed in Odense Municipality as an independent researcher attempting to increase knowledge about ATO.

Questionnaires (QUAN)

The patients and the caregivers answered 12–14 close-ended questions. Most of the questions used a 6-point Likert scale, and participants were asked to specify their experience. Positive statements were categorised by answering with 4–5 (high to very high) and negative statements were categorised by answering with 0–3 (very low to moderate). Both groups had the opportunity to answer 'not applicable'. The questionnaires were structured as a survey.[19]

Interviews (QUAL)

The patients and the caregivers were asked to elaborate on their answers after each question. At the end of the interviews, these participants were asked if they had anything else to add about their experiences with ATO. The interviewers entered any comments into text fields.

Analysis

Analysis of the patient contacts' descriptive characteristics (QUAN)

The characteristics of all patient contacts in the period of 2018–2019 were analysed using descriptive statistics. Data were merged based on a unique pseudonymised personal identification number assigned to each patient contact based on the Danish CPR-numbers.

Analysis of the questionnaires (QUAN)

Descriptive statistics were used to analyse the questionnaires with the purpose of separately presenting the answers to the close-ended questions.[20] The answers were dichotomised into two categories: 0–3 and 4–5. Fishers' exact tests were performed to compare differences in answers between patients with and without a present caregiver. The results were considered significant at $p<0.05$.

Analysis of the questionnaires (QUAL)

The qualitative answers to the questions were analysed and reported as qualitative thematic results derived from the data.[20] The thematic analysis was inspired by Malterud's systematic text condensation; this is an explorative analysis method that does not require a specific theoretical framework.[21,22] The strategy consisted of four steps. (1) All text fields containing elaborated answers were read several times to get an overall impression of the data and to find preliminary themes. (2) The meaning units were identified and sorted into code groups; this was done to progress from the preliminary themes to codes. (3) The code groups with meaning units were reread, and their content was reduced from codes into meaningful condensates. (4) The meaning of the condensates was summarised by generalising descriptions and concepts of the experiences with ATO.[21] Selected quotes were translated into English.

All analyses were conducted by the first author (SEJU). All statistical analyses were performed using the statistical software program STATA V.15 (StataCorp LLC). The author group reviewed and discussed the findings to ensure quality. The Strengthening the Reporting of Observational Studies in Epidemiology and Consolidated criteria for Reporting Qualitative research checklists were used to guarantee transparency and that important information was reported.[23,24]

Integrating QUAN and QUAL

The quantitative and qualitative data were compared which give a nuanced description of the results and to look for consistencies, inconsistencies and complexities.[15,20]

Patient and public involvement

No patient involved.

Ethics

The descriptive data collection, storage and analysis were conducted in accordance with the guidelines of the Association of Internet Researchers[25] and the Danish data protection legislation[26]. The Danish Protection Agency in the Region of Southern Denmark granted study permission. All participants gave informed consent to participate. Verbal and written information about the study were given before the interviews were conducted. The patients and caregivers had time to consider their participation and had the opportunity to decline or stop the interview at any time. All data were stored in SurveyXact and OPEN.[17,19]

RESULTS

Descriptive characteristics of patient contact

From 2018 to 2019, ATO made 5767 contacts with 3231 individual patients (table 1). The average number of

Table 1 Characteristics of all patient contacts to Acute Team Odense (ATO)

Variable	Total* 5767 (100%)
Age†, median, min–max (IQR)	80, 12–105 (70–87)
Gender, n (%)	
Female	3013 (52.3)
Male	2754 (47.7)
Referral source, n (%)	
GP	2429 (42.2)
Municipal staff	1507 (26.0)
Odense University Hospital‡	819 (14.2)
Out-of-hours GP	594 (10.3)
Emergency Medial Dispatch Centre	303 (5.2)
Other	115 (2.0)
Treatment length by ATO (reported in days)	
Median, min–max (IQR)	1, 1–29 (1–1)
Number of visits by ATO	
Median, min–max (IQR)	1, 1–45 (1–2)
Number of contacts to ATO in 2018–2019,	
Median, min–max (IQR)	2, 1–56 (1–4)
Independent 30 days before contact with ATO, n (%)	
Independent	1164 (20.2)
Dependent	4603 (79.8)
Services patients accessed after ATO treatment, n (%)	
Hospital	886 (15.4)
None	890 (15.4)
Municipal elderly care	3974 (68.9)
Dead	17 (0.3)
Day of the week for new contacts to ATO, n (%)	
Monday–Friday	4716 (81.8)
Saturday–Sunday	1051 (18.2)
Intravenous therapy, n (%)	
No intravenous therapy	4978 (86.3)
Intravenous antibiotic	467 (8.1)
Intravenous fluid	276 (4.8)
Intravenous fluid and antibiotic	44 (0.8)
Time of day for new contacts to ATO, n (%)	
08:00–15:59	4076 (70.7)
16:00–07:59	1691 (29.3)
Acute hospital contact in relation to contact to ATO, n (%)	
No contact	3933 (68.2)
Hospitalisation	1141 (19.8)
Acute hospital contact	693 (12.0)
Dead within 30 days after contact with ATO, n (%)	
Alive	5108 (88.6)
Dead§	659 (11.4)
Agreed to participate in telephone interview, n (%)	
No participation¶	5190 (90.0)
Patient participation	323 (5.6)
Caregiver participation	99 (1.7)
Both patient and caregiver participation	155 (2.7)

*5767 contacts comprising 3231 individual patients.
†One missing for age due to foreign citizenship.
‡Odense University Hospital: Emergency Department, Geriatric Department, Palliative Team—and exceptionally—other departments.
§On a contact level did 659 died following treatment by ATO. The 659 contacts consisted of 510 individuals.
¶Patients who either declined to participate, were not asked to participate, were hospitalised or who had cognitive impairment.
GP, general practitioner.

new patient contacts per day was 7.8. The median for treatment length was 1 day (ranging from 1 to 29 days); the median number of visits was one visit per contact (ranging from 1 to 45 visits). The median age of the patients was 80 years, and only 20% of the patients were independent 30 days before the at-home treatment. In total, 467 patient contacts received intravenous antibiotic therapy, 276 patient contacts received intravenous fluid therapy and 44 patient contacts received both types of intravenous therapies. The mean length for intravenous therapy was 3.3 days; the most common referral for intravenous therapy came from OUH. Before the ATO was established, this treatment would have required hospitalisation. Based on the total amount of intravenous therapy (n=787) and the mean treatment length (3.3 days), 2603.7 days of hospital beds were saved; this corresponds to 3.6 hospital beds saved per day.

Most patients were referred by GPs (42.2%), municipal staff (26.0%) or hospital staff (14.2%) (table 1). The remaining patients were referred from the GP out-of-hours service, the Emergency Medical Dispatch Centre and others (eg, patients themselves, caregivers, etc). Frequent causes of referral were clinical assessments (34.2%) and suspected infection (22.9%), but these percentages varied among the referrers. Patients referred by GPs and municipal staff were generally older and less independent than patients referred by OUH (see online supplemental appendix table 1).

The questionnaires

In total, 478 patients and 254 caregivers agreed to participate. When they were called, 59 patients and 14 caregivers declined to participate, and 112 patients and 72 caregivers did not answer the phone (figure 2). The most common reasons for declining were patients feeling ill, suffering from poor memory or regretting their participation. The final sample consisted of 307 (64.2%) patients and 168 (66.1%) caregivers. In the final sample, most patients were referred to ATO by OUH (53.1%) and GPs (35.2%), and most caregivers were referred to ATO by GPs (44.4%) and OUH (33.7%). The telephone interviews lasted for up to 15 min.

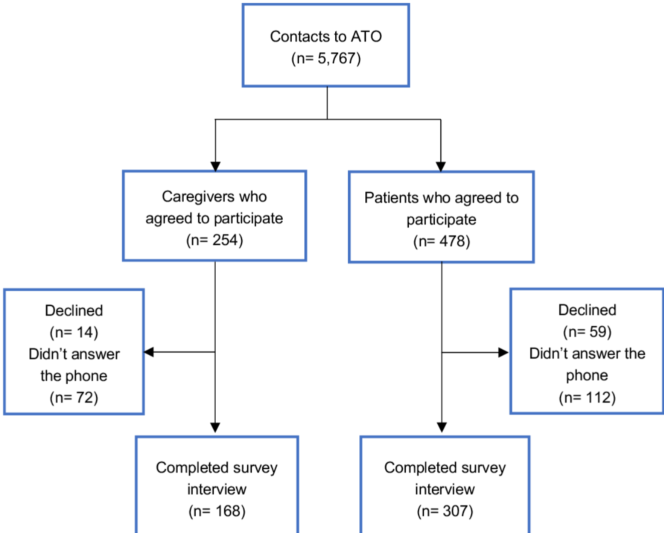

Figure 2 Flow chart of the study population

Quantitative results of the questionnaires

The majority of the patients (94.8%) and caregivers (96.4%) had positive experiences with ATO, and most of them (89.2%–94.0%) stated that they would prefer this same mode of treatment in similar future situations (table 2). Almost two-thirds of the patients had a caregiver by their side when they received treatment at home. Half of these patients stated that the caregiver's presence did not matter in terms of ensuring the treatment at home was safe. Almost all the patients (93.1%) without caregivers stated that the presence of caregivers would not have made them feel any safer. Significant differences between patients with and without caregiver presence were found for five of the questions by using the Fishers' exact test. The presence of caregivers might have importance for some aspects, such as the possibility of asking questions, feeling informed and the overall experience with treatment at home (see online supplemental appendix table 1).

Generally, the patients and their caregivers indicated a positive attitude toward ATO (table 3). Most of the patients experienced a feeling of safety when receiving the treatment (92.5%–95.2%); many felt highly involved (79.8%–85.8%) and informed (88.3%–92.3%) about their treatment. Most of the caregivers (85.7%) also experienced that ATO provided an extra level of safety regarding patient condition. Finally, most of the patients (72.8%–84%) experienced consistency.

Qualitative results

The analysis revealed and identified three themes being central to the experiences of patients and their caregivers: (1) comfortable and safe treatment at home, (2) being able to receive treatment as a part of daily life and caregiver presence and (3) cross-sectorial solutions with high competencies (table 4).

Comfortable and safe treatment at home

Despite the fact that the patients had received different types of treatment at home, patients and their caregivers shared many of the same experiences. Both groups had different prerequisites based on the type of treatment; some experiences were based on several days of treatment, whereas other experiences were based on a single visit from ATO.

Most of the patients and caregivers expressed that treatment at home was more comfortable compared with hospitalisation or visiting a GP, and this was because of the familiar surroundings of their own homes. Many of the patients expressed that they often felt like they were a burden when they had to visit their GPs or the hospital, both to their caregivers and to healthcare professionals. They highlighted that ATO reduced this feeling of being a burden because the patients did not have to unnecessarily bother caregivers or multiple healthcare professionals. One patient expressed the following: 'I was so happy with the treatment at home, and I would much rather be at home than at the hospital. I do not like to be a burden. In this way I feel that I am less burdensome'. Hospitalisation or visiting a GP seemed to be demanding for many of the patients and their caregivers due to transfer and waiting time at the hospital or at the GP's office.

The home setting made it possible for the nurses to have undisturbed dialogues with patients and caregivers based on individual needs. Many of the caregivers highlighted that the nurses spoke to them and the patients with dignity. One relative stated: 'The way that she spoke to my father was really good. Some people do not have patience to talk with him'. The surroundings also made it possible to ask the nurses questions without feeling rushed, with only one patient mentioning that ATO left too quickly.

The response time was an important factor in generating a sense of safety. Many of the patients and the caregivers expressed that it seemed reassuring when ATO arrived quickly. A caregiver said: 'I thought they were competent. They provided us with safety when we needed urgent help. They came in a moment'. The option to call ATO at any time while undergoing treatment was expressed as being important in order to feel safe. One patient stated: 'I felt very safe because they said that there were no stupid questions, and we could call them if we were in doubt about anything'. This view is supported by caregivers who were not aware of this possibility and experienced feeling unsafe in the periods between the visits from ATO.

Being able to receive treatment as a part of daily life and caregiver presence

The patients described treatment at home as being less stressful than hospitalisation because of the possibilities of maintaining their daily lives while undergoing treatment. Maintaining daily life included both practical commitments and socialising. Caregivers did not have to spend hours at the hospital, which could be stressful

Table 2 Patients' and caregivers' answers to the close-ended questions

	Answer n (%)	Answer n (%)	Answer n (%)	Total n (%)
Patients				
Q11. Did you have a caregiver in your home while you received treatment/care from ATO?	Yes 197 (64.2)	No 102 (33.2)	Not applicable 8 (2.6)	307 (100)
Q11a. Did your caregiver's presence make you feel safer about your treatment/care?*	Yes 102 (51.8)	No 87 (44.2)	Not pplicable 8 (4.0)	197 (100)
Q11b. Would the presence of a caregiver make you feel safer about your treatment/care?†	Yes 3 (2.9)	No 95 (93.1)	Not applicable 4 (4.0)	102 (100)
Q12a. Now that you've been treated in your own home, if you need similar treatment in the future, where would you prefer to receive it?‡	At-home with ATO 150 (92.6)	Hospitalisation 3 (1.9)	Not applicable 9 (5.6)	162 (100)
Q12b. Now that you've received treatment in your own home, if you need similar treatment in the future, what type of treatment would you prefer?§	At-home with ATO 94 (94.0)	Other –	Not applicable 6 (6.0)	100 (100)
Q13. What was your overall experience with ATO?	Positive 291 (94.8)	Negative 3 (1.0)	Not applicable 13 (4.2)	307 (100)
Caregivers				
Q1. What is your relationship to the relative who was treated/cared for by ATO?	Partner 114 (67.9)	Daughter/son 24 (14.3)	Parent/other 30 (17.8)	168 (100)
Q2. Do you live with the relative who was treated/cared for by ATO?	Yes 112 (66.7)	No 56 (33.3)	Not applicable –	168 (100)
Q3. Did you speak with ATO about your relative's treatment/care?	Yes 156 (92.9)	No 10 (5.9)	Not applicable 2 (1.2)	168 (100)
Q10. Did you as a relative wish that you had become more involved in the planning of your relative's treatment/care by ATO?	Yes 11 (6.6)	No 147 (87.5)	Not applicable 10 (5.9)	168 (100)
Q11a. Now that your relative has been treated at home, if your relative needed similar treatment again, what method would you prefer?‡	At-home with ATO 50 (90.9)	Hospitalisation 1 (1.8)	Not applicable 4 (7.3)	55 (100)
Q11b. Now that your relative has received care at home, if your relative needed similar care again, what would you prefer?§	At-home with ATO 80 (90.9)	Other 1 (1.1)	Not applicable 7 (8.0)	88 (100)
Q12. What was your overall experience with ATO?¶	Positive 135 (96.4)	Negative –	Not applicable 5 (3.6)	140 (100)

*Only asked of patients who answered 'yes' to Q11.
†Only asked of patients who answered 'no' to Q11.
‡Only asked of patients/caregivers who were referred by the hospital.
§Only asked of patients/caregivers who were referred by general practitioners, municipal nurses and nursing assistants, the out-of-hours service, the Medical Dispatch Centre or others. These patients can both receive assessments, care and treatment at home by Acute Team Odense (ATO). They do not necessarily have the choice between hospitalisation and at-home treatment like the patients referred from the hospital.
¶The question was added later in the interviews (September 2018).

when balancing this with a busy everyday life of work, kids and other daily chores. One caregiver said: 'It's easier for me at home. I do not like the hospital, so it was nice to have him at home. It would be difficult for me to get out to the hospital by bus'.

Several of the patients expressed that being treated at home enabled them to maintain their routines and be with their families. Some patients also reported that they could take care of and socialise with their children, which they described as being significant and important. However, the importance of caregivers' presence varied from one patient to the next and did not necessarily affect the feeling of safety when receiving treatment at home; many of the patients expressed that their caregivers' presence was always nice. Again, it was not necessary for them to feel safe, as they perceived their treatment was well coordinated. Several of the patients who stated that caregivers made them feel safer mentioned that it was always a source of confidence to have another person by their side, as caregivers could talk and ask about additional information. One patient stated: 'I can express myself well enough, but I think the acute care team was happy with the presence of my wife and the nursing assistant because they could help with additional information. They know me well and could explain my medical story'. Few patients expressed that caregiver presence was necessary to complete treatment at home. One patient said: 'I probably would not have chosen to be home if he was not here because I was too ill to take care of myself'. Very few caregivers felt insecure in managing treatment and care at home. A caregiver explained: 'He was very ill, and it would have been safer for him to be at the hospital'. In this context, patients without caregivers should be able to manage self-care, which is pointed out by several patients.

Many of the patients treated at home felt less ill because they could maintain certain behaviours and were not

Table 3 Patients' and caregivers' answers to the Likert scale-based questions

	0–3 n (%)	4/5 n (%)	N/A* n (%)	Total n (%)
Patients				
Q1. To what extent did the nurses from ATO try to listen to what was important to you?	12 (3.9)	282 (91.9)	13 (4.3)	307 (100)
Q2. To what extent were you involved in decisions about your treatment/care by ATO?	20 (6.5)	245 (79.8)	42 (13.7)	307 (100)
Q3. To what extent did you feel like you could ask questions about your treatment/care?	7 (2.3)	280 (91.2)	20 (6.5)	307 (100)
Q4. To what extent did you feel the nurses from ATO had enough knowledge about your illness or condition?	20 (6.5)	265 (86.3)	22 (7.1)	307 (100)
Q5. How much did you care about different people coming into your home in connection with your treatment/acute care at home?	21 (6.8)	260 (84.7)	26 (8.5)	307 (100)
Q6. How safe was your treatment/care by ATO?	11 (3.6)	284 (92.5)	12 (3.9)	307 (100)
Q7. How informed were you about your treatment/care?	9 (2.9)	271 (88.3)	27 (8.8)	307 (100)
Q8. To what extent did the acute nurses use language and terms that you understood?	7 (2.3)	288 (93.8)	12 (3.9)	307 (100)
Q9. To what extent did you experience consistency in your treatment/care by the acute nurses?†	6 (2.6)	169 (72.8)	50 (21.6)	232 (100)
Q10. To what extent did you experience consistency in what the acute nurses, hospital physicians and hospital nurses did in your treatment/care?‡	6 (3.7)	136 (84.0)	20 (12.3)	162 (100)
Caregivers				
Q4. Did you experience the possibility of asking questions about the treatment/care?§	1 (0.6)	153 (98.1)	2 (1.3)	156 (100)
Q5. Did you get answers to your questions about the treatment/care?§	3 (1.9)	150 (96.2)	3 (1.9)	156 (100)
Q6. Did you experience being involved in decisions about the treatment/care by ATO?	16 (9.5)	144 (85.7)	8 (4.8)	168 (100)
Q7. Did you experience being informed about the treatment/care?	8 (4.7)	155 (92.3)	5 (3.0)	168 (100)
Q8. Did you experience feeling safe about the treatment/care by ATO?	4 (2.4)	160 (95.2)	4 (2.4)	168 (100)
Q9. What did you feel ATO could do to increase the safety of your relative's health condition?	5 (3.0)	144 (85.7)	19 (11.3)	168 (100)

*Not applicable.
†The question was added later in the interviews (September 2018).
‡The question was only asked of patients who were referred by the hospital.
§The question was only asked of caregivers who answered 'yes' to Q3.
ATO, Acute Team Odense.

surrounded by other patients. One patient explained: 'It is more comfortable to be at home and I feel less ill. I can decide for myself how things should be. I get well faster at home'. Some of the caregivers to the older patients also explained that ATO reduced confusion; patients could stay in their own homes, rather than being hospitalised which can be confusing and stressful. Several patients and caregivers talked about previous negative experiences with being hospitalised, which involved confusion and waiting for hours. In this context, they reported that ATO avoided hospitalisations, and this was especially reported by caregivers to older patients and patients with chronic conditions. A caregiver said: 'We have often visited the hospital for some hours. At the hospital, they do the same as the acute care team can do at home. We would rather have them to come so we can avoid the trips to the hospital'. Both caregivers and patients expressed that it would be relieving for them if they could call ATO in future urgent situations.

Cross-sectorial solution with high competencies

The patients and caregivers found the acute nurses to have high competencies and to act in a very professional manner. Most of the patients and caregivers explained that ATO was highly effective because the nurses managed to see their patients faster than GPs could and ATO does not have the same waiting procedures as the hospitals. One caregiver expressed: 'It does not work well at the hospital. There was a lot of noise, waiting time, and no contact person. Nothing happened. It was good to come home to a follow up by the acute care team'. Several patients who were referred by their GPs said they were very satisfied with this new initiative. Caregivers to some of the older patients said that at-home treatment made acute situations more convenient due to cross-sectorial collaboration.

Several of the patients and caregivers stated that ATO collaborated closely with the hospital and the GPs. Both groups said this created a sense of safety, as they knew that the acute nurses were in direct contact with hospital physicians or GPs. One patient said: 'They had time to listen and made sure that we got answers to questions from the hospital physicians'. They cited sufficient information as being important for treatment at home. A few patients mentioned that they had missed information about what was going to happen after they finished the treatment; this was caused by the transition from the hospital or their GPs to ATO. Several of the patients and caregivers stated that ATO's base at the ED heightened their sense of safety because they had met the acute nurses at the ED before being discharged. One patient expressed this: 'The nurse who told me about the treatment at home and who discharged me from the hospital was also one of those who came to my home. I was very happy to see a familiar face'.

Table 4 Thematic analysis of patient and caregiver interviews

Theme	Subtheme	Representative quotes patients	Representative quotes caregivers
Comfortable and safe treatment at home	Treatment at home	‘It was very positive. I was very ill, so either I had to be hospitalised, or else the Acute Team had to come. ‘[This was the] most positive experience with the healthcare system that I have had for many years’	‘I found them to be very professional and empathetic. My mother is older, and they approached her directly. There was no talking over her head. She was completely calm as the nurse was leaving’.
	Familiar, quiet and comfortable surroundings	‘It is some of the most effective [care] I have experienced. It’s nice to be home. At the hospital, there are many procedures’	‘You feel more comfortable in your own surroundings. It’s nice to be home. It provides safety’ ‘There was a need for clarification about my mother’s condition, and we got it. It took place in a safe environment in her own home, which was most optimal for her condition’
	Safeness	‘Before they started up, I was a little apprehensive. When the treatment started, I was completely comfortable with it’ ‘They told me what treatment I should have and listened to what I had to say’ ‘I felt very safe because they said that there were no stupid questions, and we could call them if we were in doubt about anything‘ It was very helpful. It creates safety when someone comes when you cannot get out of the door’	‘I thought they were competent. They provided us with safety when we needed urgent help. They came in a moment’ ‘I could hardly be more involved in it. It was amazing. They had plenty of time for us. My husband was so terribly ill, but they helped us well through it’ ‘She told [us] about it all and what we should be aware of throughout the treatment’ ‘[It was] nice to be able to talk directly with the acute team. As a relative, I felt very calm about that’ ‘It is safe to be together, especially when you have children and can be at home in familiar surroundings’
	A less feeling of being a burden	‘I was so happy with the treatment at home and I would much rather be at home than at the hospital. I do not like to be a burden. In this way I feel that I am less burdensome’	‘It’s not that confusing. It provides peace for both my husband and I’ ‘He was hospitalised and then came home. It was hard to have him at home the first few days’ ‘If I can handle him at home, I’ll definitely prefer that’ ‘I felt very safe… She was in the best hands… We were in the Lord’s hands until the acute team arrived’

Continued

Table 4 Continued

Theme	Subtheme	Representative quotes patients	Representative quotes caregivers
Being able to receive treatment as a part of daily life and caregiver presence	Maintain daily life and socialising	'It was worth gold to be able to maintain hygiene, food, change of clothes, etc.' 'I think you get better when you are at home. You become more positively challenged. You have more opportunities to maintain a daily life'	'It's easier for me at home. I do not like the hospital, so it was nice to have him at home. It would also be difficult for me to get to the hospital by bus and because of my dogs'
	Feeling less stressful and less ill	'It is more comfortable to be at home and I feel less ill. I can decide for myself how things should be. I get well faster at home' 'If the doctors think it's safe, I'd rather be home…' 'It depends on how ill you are. If I'm not ill, I prefer to be at home'	'It has been good for both us and her. It was uncomplicated. We did not have to go to the hospital' 'He was very ill, and it would have been safer for him to be at the hospital'
	Caregiver presence	'I probably would not have chosen to be home if he was not here because I was too ill to take care of myself' 'I can express myself well enough, but I think the acute care team was happy with the presence of my wife and the nursing assistant because they could help with additional information. They know me well and could explain my medical story' 'It was nice to have someone because I was feeling very ill' 'It was just antibiotic treatment, so there was not much to be involved in' 'It's always nice when she's there, but that was not what made me feel safe'	'I followed what was going on. They were good at telling me that too' 'She told [us] about it all and what we should be aware of throughout the treatment'
	Avoiding hospitalisations	'Not in my situation. I was just supposed to have antibiotics' 'I understood everything that was going on, so it did not matter' 'They made a big difference for me because I could not even get to the doctor'	'It's great that they can come [to our] home and test different things' 'We have often visited the hospital for some few hours. At the hospital they do the same as the acute care team can do at home. We would rather have them to come so we can avoid the trips to the hospital'
Cross-sectorial solution with high competencies	Competencies	They were very competent, and there was time to talk and ask questions' 'They just took some tests' 'They were competent and had incredibly great background knowledge'	'I thought they were competent. They provided us with safety when we needed urgent help. They came in a moment' 'I experienced them as truly competent, and they were not in doubt about what to do'
	Dialogues and speaking an understandable language	'[They] used professional language for each other but explained it to me afterwards' 'They spoke the language of us ordinary people' 'There was no foreign language. It was understandable, and there were no misunderstandings'	'We could ask them about anything. We asked about what we were in doubt about' 'Personally, I did not talk much with the Acute Team because my husband talked to them and then told me' 'When I asked, I got a good professional explanation'
	Cross-sectorial collaboration and transitions in patientcare	'It is my impression that they talk together and work fine together. I was sent to the hospital by my GP due to [an] infection. Then [I was sent] home with the acute team. It has been a good process all the way' 'They had time to listen and made sure that we got answers on questions from the hospital physicians' 'I was informed about the treatment from the hospital, so the acute team did not provide information' 'There was a nice connection from the hospital to the Acute Team' 'The nurse who told me about the treatment at home and who discharged me from the hospital, was also one of those who came to my home. I was very happy to see a familiar face'	'The acute nurse who visited my mother, I met her 14 days later in the emergency department. My mother was admitted. She came to me and asked about my mother. It creates some closeness' 'It does not work well at the hospital. There were a lot of noise, waiting time, and no contact person. Nothing happened. It was good to come home to a follow up by the acute care team' 'We waited a long time at the hospital. We were told that the acute team would come, but then they did not arrive at the agreed [upon] time'

GP, general practitioner.

Integration of quantitative and qualitative data

The quantitative and qualitative data expanded the understanding of experiences with ATO. The close-ended questions revealed that many patients felt the presence of caregivers did not affect their feeling of safety while receiving treatment at home; in the elaborated open-ended answers, the patients further explained that they did not need caregivers to feel safe when they perceived their treatment as coordinated. Majority of both groups stated that they felt safe, and the elaborated interviews expanded their meanings of safety, specifically healthcare professionals arriving quickly and ATO having direct contact with GPs and hospital physicians. Most of the patients and their caregivers stated that they preferred treatment at home in similar situations; the interviews helped to illuminate the reasoning behind this as being able to maintain daily routines and socialise with their families. Based on the quantitative findings, the caregivers appeared to have an insignificant level of importance in patient experiences with treatment at home. However, the qualitative findings illustrated that the presence of caregivers were necessary for patients who felt very ill or could not manage self-care.

DISCUSSION

This study revealed descriptive information of patients who were handled in the community by a municipal acute care team, and it also elaborated on patient and caregiver experiences with at-home treatment. The initiative is an example of an outpatient programme which aims to prevent hospitalisations, and it appeared to create more flexible solutions for patients and caregivers both when urgent help was needed and when patients received hospital treatment at home. This study shows that ATO saved days of hospitalisation and that treatment at home was relieving, making it easier to maintain daily chores, socialise with family and reduce the feeling of being a burden. None of the caregivers expressed feeling burdened by at-home treatment, and only two caregivers preferred hospitalisation or similar methods in future situations. However, it is important to be aware of the caregiver burden when offering hospital treatment at home as caregivers may be burdened by helping patients with self-care and things that they do not have to worry about when the patients are hospitalised.[27] In this study, the caregivers had an important role because they were the daily witnesses to the nurses who only visited the patients at scheduled times. These aspects make it necessary to learn more about the consequences of patients being treated at home. Studies have found that treatment at home is associated with higher caregiver burden,[28 29] but the caregiver burden seemed to be reduced in this study. The caregiver burden may differ depending on the diagnosis and whether the patients' conditions are temporary or chronic.[8] How treatment at home affects the caregivers who support the patients is limited[30] which is why it is necessary to focus on the potential caregiver burden as well as other effects of outpatient programmes when new care solutions are developed.

Other important aspects of at-home treatment were seen in the way the interviewed patients and caregivers felt that the treatment was safe, had reduced confusion, avoided hospital visits and reduced total days of hospitalisation. The quantitative results of this study show that at-home intravenous therapy is associated with saved hospital beds. Other studies found that at-home intravenous therapy was associated with reductions in hospitalisation lengths and high patient and caregiver satisfaction.[28 31 32] However, knowledge of alternatives to hospitalisation is limited. An evaluation of another Danish municipal acute care team found that patients and caregivers were satisfied with treatment at home, but it did not find conclusive results regarding other effects (hospitalisations or costs).[33] This acute care team might not be comparable with ATO due to differences in the proportion of referrals. The majority of the referrals to ATO came from GPs and municipal staff, whereas most of the referrals to the evaluated acute care team came from the hospital.[33] In general, the use of ATO shows that this type of healthcare service might be in high demand in the community. This also exemplifies the need for evidence on outpatient programmes as well as potential effects (eg, patient safety, effectiveness and costs).

Linking data from the municipality and the hospital in the descriptive patient characteristics is a strength, as few studies merge data across sectors. Generally, multiple sources of data provide more evidence than a single method,[15] and the combination of data in this study expanded the understanding of treatment at home by describing patients treated by ATO and exploring experiences with the treatment. One of the challenges in mixed-methods research is that of telling different stories behind the multiple data sources in a meaningful way, as well as to assess whether the quantitative results and qualitative results are more congruent than incongruent.[15] In this study, the quantitative and qualitative data are designed to address the same concepts due to the fact that the qualitative open-ended questions are an add-on to the quantitative close-ended questions. The results seemed to be more congruent than incongruent, and the mix of researchers strengthened the reflections and interpretations contained herein.

The convergent parallel design of this study made it possible to use the traditional techniques associated with each type of data.[15] Another strength of using a mixed-methods design is that the study gave a voice to the patients and caregivers while concurrently gathering statistics.[20] Most of the interviewed participants were referred by their GPs or OUH. It may have been more logical for the acute nurses to ask the patients referred from OUH if they wanted to participate due to their treatment lasting for several days. It is important to be aware of this potential selection bias. It also might have been more obvious for the nurses to ask patients or caregivers to participate if they perceived them to be satisfied.

However, the results must also represent the opinions of patients and caregivers who were less satisfied with ATO.

The strength of the questionnaires compared with other types of electronic surveys is that they are less likely to be self-selective and have a higher completion rate and quality; this is because the interviewers can guide the respondents if they do not understand a question. That being said, the weakness of telephone questionnaires is the inherent time limit and the fact that interviewers can influence respondents' answers, leading to bias.[34] To minimise these weaknesses, the present study attempted to make the questions simple and clear. Using qualitative data in the questionnaires made it possible to examine the close-ended questions in-depth.[20 34] However, disadvantages were also related to the qualitative data format used here, as it was not possible to observe behaviour or body language or to use visual aids.[35] Moreover, the mixed-method appraisal tool was used to ensure quality.[22] The study attempted to be transparent about the different processes it used and how it was conducted, which is a clarity that is important for the study's internal validity.[15] The study was based on one municipality which may reduce the generalisability. Thus, the results can be used as inspiration to other outpatient programmes.

Implications for health policy and future research

This study can be used as inspiration to stakeholders or to inform future studies about initiatives aiming to prevent hospitalisation, develop community settings and create more flexible solutions for patients and caregivers. Attempting to reduce the number of hospital beds is ongoing,[36 37] which is why it is important to develop new solutions. This study showed that ATO released hospital beds by offering high-level evaluation at home as well as the possibility for intravenous therapy at home. Overall, acute care teams can be used to release hospital beds. Most of the interviewed patients and caregivers preferred treatment at home, experiencing it as a safe option. This could be relevant for future studies attempting to explore other potential effects of at-home treatment, such as preventing delirium and hospital acquired infections as well as the caregiver burden related to treatment at home. Future research should also merge data from the municipalities and hospitals with other registries (eg, sociodemographic data), as this could expand researchers' knowledge in this area.

CONCLUSION

This study confirmed that acutely ill patients can be handled in the community by a municipal acute care team. GPs and municipal staff rely heavily on the acute care team which indicates that community-based acute healthcare service may be in high demand. Majority of the patients and caregivers had positive experiences with treatment at home, and most of them preferred the same treatment in similar future situations. They described the treatment as relieving and less burdensome for both patients and caregivers. The new flexible solution made it possible for them to maintain their daily lives and to avoid days of hospitalisation. Intravenous therapy at home saved 3.6 hospital beds per day, which shows that initiatives in the community can be used as a solution to release or reduce hospital bed usage. As a result of this study, the municipal acute care team has been continued and possesses an ongoing focus on searching for further possibilities that prevent hospitalisations.

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Acknowledgements The authors would like to thank the patients and caregivers for their participation in the study; they are also grateful to the Danish Health Authority for its financial support. We would also like to thank Niels Ibsgaard Agerbek (Odense University Hospital) for professional help with data management and the acute nurses (Acute Team Odense) for recruiting interview participants.

Contributors SEJU, DSN and ATL participated in the design of the study. SEJU carried out the data collection. All authors participated in the analysis of data and contributed to drafting the manuscript. All authors read and approved the final manuscript version and agreed to be accountable for all aspects of the work.

Funding The work was supported by funds from the Danish Health Authority (Award number: 4-1214-388/62). The Danish Health Authority had no role in the design of the study; the data collection, analysis or interpretation; in writing the manuscript; or publication.

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval Danish Protection Agency in the Region of Southern Denmark granted permission of this study permission (permission number: 19/19484).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data may be obtained from a third party and are not publicly available. Due to the Danish Law on personal data, we are not allowed to share data in a public dataset. All data relevant to the study are included in the article or uploaded as supplementary information. Due to the Danish Law on personal data, we are not allowed to share data in a public dataset. All data relevant to the study are included in the article or uploaded as supplementary information.

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