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Utilization of medical healthcare among people receiving long-term care at home or in special accommodation

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Aim: To investigate the utilization of medical healthcare, hospital care and outpatient care, during a 1-year period in relation to informal care, multimorbidity, functional status and health complaints and to long-term care at home or in special accommodation among people aged 65+, with one or more hospital admissions and receiving long-term care.
Method: A total of 694 people receiving long-term care during the year 2001 were studied. Data were collected by means of the administrative registers Patient Administrative Support in Skåne and PrivaStat and through the study Good Ageing in Skåne. Those at home and those in special accommodation were compared regarding utilization of medical healthcare, informal care, multimorbidity, functional status and health complaints. Multiple logistic regression analysis was performed using at home vs. in special accommodation as the dependent variable and also two multiple linear regression analyses using the number of hospital stays and the number of contacts with the physician in outpatient care separately as dependent variables.
Findings: Those at home were significantly younger (mean age: 81 vs. 84 years) and less dependent in personal and instrumental activities of daily living (PADL/IADL) than those in special accommodation. A larger proportion of those at home was admitted to hospital three times or more (21 vs. 14%) and they had significantly more contacts with physicians in outpatient care (md: 10 vs. md: 7). Informal care was associated with care at home (OR = 0.074) and with utilization of outpatient care (B = 2.045). Dependency in PADL was associated with care in special accommodation (OR = 1.375) and with utilization of hospital care (B = −0.060) and outpatient care (B = −0.581).
Conclusion: Medical healthcare seems more accessible to those who live at home are younger, less dependent and who have access to informal caregivers.

Keywords: medical healthcare utilization, long-term care at home vs. in special accommodation, informal care, multimorbidity, functional status, health complaints.

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Introduction

Many European countries are facing problems with the financing and provision of care for a growing number of older people. Studies which illuminate factors related to high utilization of medical healthcare, hospital care and outpatient care, among older people are therefore urgently needed. Particularly in relation to whether long-term care is provided to such people at home or in special accommodation (equivalent to nursing homes – housing with access to around-the-clock care and service) (1). Those who receive long-term care have been found to utilize more hospital and outpatient care than those without (2). A study by Condelius et al. (3) (n = 4907, age 65+) showed that frequent hospital admissions (≥3 during 1 year) were more common among those who received long-term care compared to those without. However, the relationship between long-term care provided at home or in special accommodation and utilization of medical healthcare was not explored. Such knowledge may be useful since changes are taking place in the distribution of long-term care at home vs. in special accommodation; the latter is declining (4). Previous studies have mainly focused

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on healthcare utilization either among those who receive care at home (5) or among those in special accommodation (6). They have also tended to focus either on the risk of being readmitted once, shortly after discharge from hospital, or on the general pattern of medical healthcare utilization. However, from the perspective of cost for society as well as for the older person it is reasonable to consider frequent hospital admissions and frequent contacts in outpatient care as a greater problem than the occasional readmission to hospital. Thus, studies that investigate high utilization of medical healthcare in relation to care at home vs. in special accommodation are lacking although important for the development of long-term care. Such knowledge can help policy makers in planning care and competence in accordance with the health care needs of older people.

In Sweden, as in many other countries, the responsibility for providing care and services for older people is divided among various authorities. The county councils are responsible for medical healthcare – primary care, hospital care and outpatient care – and the municipalities are responsible for long-term care and services in the older person's home or in special accommodation. Long-term care includes such tasks as help with laundry, shopping, cleaning and personal care and is usually carried out by assistant nurses. Home nursing care can be provided by the municipalities in agreement with the county council and may include specialized medical care and terminal care up to the level of Registered Nurses. Physicians can only be employed by the county councils, e.g. in outpatient care or in hospitals (7). The involvement of various authorities and staff groups in the care of older people makes it important to investigate how care within one sector relates to utilization within another. Since it is a trend in Europe to enforce stricter criteria for obtaining a bed in special accommodation (12) an increased number of frail, older people are being cared for at home (4). Karlsson et al. (8) conducted a study on consumption of medical care among older people who received long-term care (n = 1958, age: 65+) and showed that a higher proportion of the group receiving care at home was admitted to hospital (35%) compared to those in special accommodation (26%). Several studies have also shown that older people discharged to their homes after a hospital stay are more likely to be readmitted than those discharged to another institution (9–11). The explanation for this could be that continuity of care is more available in special accommodation and more difficult to achieve in the older persons home. Thus, these results imply a risk of more utilization of medical healthcare among those cared for at home. However, this relation needs to be investigated further and with regard to known risk factors such as multimorbidity, functional status, health complaints and informal care.

Along with the increased number of older people cared for at home it has been shown that informal caregivers provide a growing amount of care for older people (13). Karlsson et al. (14) showed that 69% of those who received long-term care at home (n = 629) also received care from informal caregivers. Hellström et al. (15) (n = 1247, age: 75+) showed that those in special accommodation received less informal care than those at home. Thus, those who receive long-term care at home can be expected to receive more informal care than those in special accommodation. Cheek et al. (16) (n = 55) showed in a qualitative study that informal caregivers played a key role in older peoples' decision about when to enter the acute care system. Family members who were exhausted by their care-giving tasks were also shown to take their older relative to the emergency department. Thus, informal caregivers can be expected to have an impact on utilization of medical healthcare and act, perhaps as 'gate openers' to hospital and outpatient care.

Multimorbidity has previously been shown to contribute to greater utilization of medical healthcare among older people and those who receive long-term care has been found to suffer from a higher degree of multimorbidity than those without (3). Multimorbidity, must therefore, be taken into consideration. However, multimorbidity refers to the co-occurrence of medical conditions (17) and does not reveal how these conditions manifest themselves in the individual. To be useful in clinical work, multimorbidity needs to be supplemented with information about health complaints and functional status. Those with severe impairment in activities of daily living (ADL) have been found less likely to have hospital admissions than those with no such limitations (18). The explanation for this might be that such limitations predict institutionalization (19) and thus the availability of professionals around the clock. ADL impairment and high age can also be expected to serve as criteria for low priority in the medical healthcare system (20). Health complaints such as anxiety and depressive symptoms have previously been found to be common among older people and to be related to utilization of medical healthcare (21). Thus, understanding utilization of medical healthcare among older people receiving long-term care either at home or in special accommodation needs to take into consideration differences in multimorbidity as well as functional status, health complaints and informal care giving. Such knowledge may facilitate work targeted on preventing intensified utilization of medical healthcare in this group.

Aim

The aim of this study was to investigate utilization of medical healthcare, hospital care and outpatient care, during a 1-year period in relation to informal care, multimorbidity, functional status, health complaints and to long-term care at home or in special accommodation

among people aged 65+, with one or more hospital admissions and receiving long-term care.

Method

Swedish context

Approximately 18% of the Swedish population is aged 65 years or older and of these 15% are aged 85 years or older (22). The policy in Sweden, as in many other countries, is that older people are to be supported to remain in their homes for as long as possible. Accordingly, in year 2007 approximately 94% of people aged 65 years or older lived at home and of those 10% received long-term care (23). This study was conducted in the region of Skåne which constitutes one of 21 Swedish county councils. Approximately 13% of the Swedish population lives in this region and the municipalities included represent both rural and urban areas. During the year 2001, 107 136 individuals were admitted to hospital in this region and 41% of these were aged 65 years or older (2).

Sample

The sample consists of 694 people, who had one or more hospital admission during the year 2001, was aged 65 years or older and received long-term care and services from the municipality. The sample was identified and data collected from the register of Patient Administrative Support in Skåne (PASiS) and PrivaStat and from the care and services part of the study Good Ageing in Skåne (GAS) (24). Based on individual civil registration numbers, data from the GAS study were merged with the PASiS and the PrivaStat data.

Medical healthcare

Patient Administrative Support in Skåne is a system for registering medical healthcare provided by the Skåne County Council (3) while PrivaStat is a register for outpatient care provided by private agencies in this region. In PASiS, information is registered on an individual basis concerning age, gender, length of hospital stay (LOS), date and time of admission and discharge, discharge destination and diagnoses treated during the hospital stay in accordance with The International Statistical Classification of Diseases and Health Problems, 10th version (ICD-10) (25). Information about date of contact and profession concerned is registered for outpatient care similarly in PASiS and in PrivaStat.

The number of hospital stays, the number of emergency and planned admissions, of days spent in hospital and the number of contacts in outpatient care were counted for each participant. Contacts with professions other than physician, e.g. nurse, physiotherapist or occupational therapist are presented as contacts with other staff groups. The number of unique ICD-10 codes registered was counted for each participant. To measure multimorbidity the number of diagnosis groups represented by these codes, according to the chapters in the ICD-10 system was calculated. Diagnosis groups that are not related to diseases or not relevant for the age group were excluded from this calculation (chapters XV, XVI, XX and XXI). Thus 17 of the original 21 chapters/diagnosis groups were included in the calculation.

Long-term care and services

Good Ageing in Skåne (GAS) is a sub-study of the national study the Swedish National study of Ageing and Care (SNAC) (26). The inclusion criteria for the care and services part of SNAC and GAS are being 65 years or older, receiving long-term care from the municipality or living in special accommodation and/or receiving at least four visits per month from home nursing care and/or rehabilitation, excluding those receiving only meals on wheels, transport services or who had an alarm. GAS is being carried out in five municipalities in Skåne, of which four were included in the present study. Data were collected by means of a form completed by Registered Nurses, assistant officers, physiotherapists or occupational therapists. The form comprises questions concerning demographic data, functional status, health complaints, adaptation and standard of housing and formal and informal care. It was developed by an expert group and has been tested in a pilot study (27).

Measurements

The ADL staircase (28) and the Berger scale (29) were included in the form. The ADL staircase is an expansion of the Index of Activities of Daily Living (Index of ADL) (30) and includes performance in personal activities of daily living (PADL), i.e. bathing, dressing, going to the toilet, transferring, continence and feeding, as well as performance in instrumental activities of daily living (IADL); cooking, transportation, cleaning and shopping. Performance is graded as independent, partly dependent or dependent. In this study the summarized performance in each section of the staircase, IADL-sum and PADL-sum, was calculated for each individual. PADL-sum ranges from 0 – independent in all activities to 4 – dependent in all activities. The IADL-sum ranges from 0 to 6. The Berger scale is a six-stage classification of the severity of mental disorder. The classifications are I ''can function in any surrounding, but forgetfulness is often disruptive of daily activities', II 'can function without direction only in familiar surroundings', III 'needs direction to function even in familiar surroundings but can respond appropriately to instructions', IV 'needs assistance to function, cannot respond to direction alone', V 'remains ambulatory, needs assistance to

function, but cannot communicate verbally in a meaningful fashion' and VI 'bedridden or confined to a chair and responds only to tactile stimuli' (29). 'No impairment' was added in the form as a response alternative.

Health complaints were covered by single-item questions about dizziness, urinary and faeces incontinence, anxiety, depressed mood, pain and ulcers. The questions have yes/no response alternatives or alternatives indicating their severity; periodic/some and slight – periodic severe and severe – constantly severe and unable to control faeces or urine. The questions about informal care in PADL or IADL have yes/no response alternatives.

Data analyses

Comparisons were made between those receiving long-term care at home and those receiving such care in special accommodation using the chi-square test, the Mann–Whitney *U*-test and Student's *t*-test. Multiple logistic regression analysis (backward, Likehood Ratio) was performed using long-term care at home and special accommodation as the dependent variable (dichotomized as: home = 0 and special accommodation = 1) controlling for age and sex. The goodness-of-fit of the regression model was carried out using the Hosmer and Lemeshow goodness-of-fit test (31) and Nagelkerke R^2. Two multiple, linear regression analyses (backward) (32) were also performed using the total number of hospital stays and the total number of contacts with the physician in outpatient care as dependent variables controlling for age and sex. Number of diagnosis groups, number of contacts with other staff groups in outpatient care, IADL sum, PADL sum, Berger scale, informal care in IADL/PADL, anxiety, depressed mood, pain and ulcer were entered as independent variables in all three analyses. In the analysis of care at home vs. in special accommodation the number of hospital stays and number of contacts with the physician in outpatient care were also entered. In the analysis of total number of hospital stays, receiving care at home vs. in special accommodation and the number of contacts with the physician in outpatient care were added as independent variables. Dummy variables were constructed for ordinal scale type data and no cognitive impairment and no complaints were used as references. All data were analysed using SPSS 11.5 for Windows.

The study was approved by the Ethics Committee of the Medical Faculty, Lund University (LU 650-00 and 744-00).

Results

Comparisons of those receiving care at home and those in special accommodation

Sixty-one percent of the total sample received long-term care at home; and the mean age was 82.5 years with a range of 65–104 and 67% were women. Those living at home were significantly younger than those in special accommodation, more often living with someone (30 vs. 5%) and less dependent in IADL or PADL (Table 1). Eight percent of those at home were classified as belonging to severity classes III–IV of the Berger scale, compared to 24% among those in special accommodation and 30% of those at home received informal care in PADL and 74% received such care in IADL. No significant gender differences were found (Table 1).

A significantly smaller proportion of those at home was classified as having either some difficulties, severe difficulties or being unable to control urine or faeces compared to those in special accommodation (urine 44 vs. 65%) (faeces 13 vs. 36%) (Table 2). Furthermore, a significantly smaller proportion of those at home had some degree of depressed mood (45 vs. 61%) and pressure ulcers (3 vs. 7%) than those living in special accommodation. Slow-healing wounds were the only health complaint that were more common among those at home (10%) than among those in special accommodation (5%). There were no significant differences regarding dizziness, anxiety or pain between the two groups (Table 2).

Those who received long-term care at home accounted for 65% of the total number of hospital admissions and 21% of those had three or more hospital stays compared to 14% of those in special accommodation (Table 3). Eighty percent was emergency admissions in both groups. Those receiving care at home spent significantly more days in hospital during the entire year, had a longer median LOS and more contacts with the physician and other staff groups in outpatient care than those in special accommodation. There were no significant differences between the two groups regarding number of registered ICD-10 codes or number of diagnosis groups.

Variables associated with long-term care at home vs. in special accommodation

Higher age (OR = 1.076), dependency in IADL (OR = 3.112) or in PADL (OR = 1.375) were associated with care in special accommodation and informal care in IADL (OR = 0.074) or in PADL (OR = 0.039) was associated with receiving care at home (Table 4). Neither number of hospital stays nor number of contacts in outpatient care was significantly associated with care at home vs. in special accommodation.

Variables associated with utilization of medical healthcare

The number of diagnosis groups, the number of contacts with the physician in outpatient care and periodic anxiety were positively associated with the number of hospital stays while PADL sum had a negative relation to such care (Table 5). Number of diagnosis groups, number of contacts

Table 1 Comparisons of functional status and informal care between those receiving care at home and those in special accommodation

	At home n = 425	*Special accommodation n = 269*	*p value*
Sex (%)			0.140[2]
Female	64.5	69.9	
Male	35.5	30.1	
Age			
Mean (SD)	81.5 (7.1)	84.3 (6.6)	<0.001[1]
Living status (%)[a]			<0.001[2]
With someone	29.8	4.9	
Alone	70.2	95.1	
Dependent in IADL (%)			
Cleaning[a]	86.5	95.9	<0.001[2]
Shopping[a]	78.8	89.9	<0.001[2]
Transportation[b]	81.2	98.1	<0.001[2]
Cooking[a]	64.0	97.8	<0.001[2]
IADL-sum			
Mean (SD)	3.0 (1.2)	3.9 (0.4)	<0.001[1]
Dependent in PADL (%)			
Bathing[a]	57.4	85.0	<0.001[2]
Dressing[a]	25.1	65.9	<0.001[2]
Toileting[a]	21.1	65.9	<0.001[2]
Transfer[a]	18.2	56.4	<0.001[2]
Continence[c]	39.3	63.7	<0.001[2]
Feeding[a]	1.4	9.4	<0.001[2]
PADL-sum			
Mean (SD)	1.5 (1.7)	3.4 (1.9)	<0.001[1]
Cognitive ability (%)[b]			<0.001[3]
No impairment	70.1	31.1	
Severity class I	9.1	14.7	
Severity class II	6.6	10.4	
Severity class III	6.6	19.5	
Severity class IV	4.3	12.7	
Severity class V	2.8	7.2	
Severity class VI	0.5	4.4	
Informal care in			
PADL (%)[a]	30.4	1.9	<0.001[2]
IADL (%)[a]	73.6	14.6	<0.001[2]

[1]Student's *t*-test; [2]Chi-square test; [3]Mann–Whitney *U*-test.
Missing/not known: [a]0.4–5%; [b]6–10%; [c]10.1–15%.

Table 2 Comparisons of health complaints for those receiving care at home and those in special accommodation

	At home n = 425	*Special accommodation n = 269*	*p value*
Dizziness (%)[c]			0.165[1]
Periodic dizziness	41.9	36.4	
Periodic severe dizziness	8.9	3.3	
Constant severe dizziness	1.5	5.9	
Urinary incontinence (%)[b]			<0.001[1]
Some difficulties	26.7	36.2	
Severe difficulties	5.0	11.3	
Unable to control urine	12.5	17.9	
Faeces incontinence (%)[b]			<0.001[1]
Some difficulties	7.9	20.0	
Severe difficulties	1.4	7.5	
Unable to control faeces	3.3	8.2	
Anxiety (%)[a]			0.113[1]
Periodic anxiety	35.7	38.4	
Periodic severe anxiety	11.5	12.5	
Constant severe anxiety	1.6	3.5	
Depressed mood (%)[a]			<0.001[1]
Periodic depressed	32.6	48.6	
Periodic severe depression	10.3	10.8	
Constant severe depression	1.6	1.6	
Pain (%)[b]			0.222[1]
Slight pain	41.3	46.8	
Periodic severe pain	16.8	15.3	
Constant severe pain	2.9	4.8	
Ulcer (%)			
Slow-healing wounds[b]	10.1	5.4	0.038[2]
Pressure ulcer[a]	2.9	7.0	0.016[2]

[1]Mann–Whitney *U*-test; [2] Chi-square test.
Missing/unknown: [a]6–10%; [b]10.1–15%; [c]16–19%.

with other staff groups in outpatient care, informal care in IADL, periodic and constant severe pain, slow-healing wounds and pressure ulcer were positively associated with the number of contacts with the physician in outpatient care while age and PADL sum were negatively associated with such care (Table 5).

Discussion

This study shows that those receiving long-term care at home were younger, had a better physical and cognitive status and suffered from less health complaints than those receiving care in special accommodation. This group also received informal care in IADL and PADL to a higher extent than those in special accommodation. Accordingly the logistic regression analysis showed informal care in PADL and IADL to be significantly associated with receiving care at home. Despite better physical and cognitive status, those at home utilized more medical healthcare compared to those in special accommodation. No significant associations were found between utilization of hospital care or outpatient care and care at home vs. in special accommodation neither in the logistic regression analysis nor in the linear regression analyses. Multimorbidity and dependency in PADL were associated with utilization of hospital care and outpatient care. Anxiety was the only health complaint associated with utilization of hospital care.

The sample comprises those who received long-term care and had one or more hospital admissions during 2001. The result is therefore valid only for those older people who receive long-term care and utilize hospital care. However, Karlsson et al. (8) included those with no

Table 3 Comparisons regarding utilization of medical healthcare and diagnosis between those receiving care at home and in special accommodation

	At home n = 425	*Special accommodation n = 269*	*p value*
Number of admissions	795	418	
Percentage acute	80	80	
Percentage of total number of admissions	65	35	
Number of hospital stays (%)			0.006[a]
1	53.6	65.4	
2	25.2	20.8	
≥3	21.2	13.8	
Days spent in hospital			0.001[c]
Median (range)	11 (1–115)	8 (1–162)	
LOS			0.027[c]
Mean (SD)	9.7 (10.8)	9.4 (12.1)	
Median (q_1–q_3)	7.0 (3–12)	5.5 (2–10)	
Number of contacts in outpatient care			
Median (q_1–q_3)			
Physician	10 (6–16)	7 (5–12)	<0.001[c]
Other staff groups	3 (1–10)	2 (0–4)	<0.001[c]
Number of registered ICD-10 codes			
Mean (SD)	3.9 (2.9)	3.5 (2.6)	0.065[b]
Number of diagnosis groups			
Mean (SD)	2.6 (1.5)	2.5 (1.5)	0.617[b]
Occurrence of diagnosis groups (%)			
Neoplasm's	15.8	10.0	0.032[a]
Endocrine, nutritional and metabolic diseases	24.7	15.6	0.004[a]
Mental and behavioural disorders	9.6	15.6	0.018[a]
Diseases of the circulatory system	56.9	56.1	0.834[a]
Diseases of the respiratory system	24.7	25.7	0.780[a]

[a]Chi-square test.
[b]Student's *t*-test.
[c]Mann–Whitney *U*-test.

Table 4 Variables associated with receiving care at home or in special accommodation (n = 505)

Final model	*OR*	*Nagelkerke R^2*	*95% CI for OR*	*p value*
		0.700		
Age	1.076		1.030–1.125	0.001
Sex	1.106		0.598–2.046	0.747
IADL sum	3.112		1.789–5.414	<0.001
PADL sum	1.375		1.150–1.643	<0.001
Informal care in IADL	0.074		0.040–0.136	<0.001
Informal care in PADL	0.039		0.009–0.181	<0.001

Dependent variable dichotomized as: Care at home = 0, Care in special accommodation = 1
Hosmer and Lemenshow goodness-of-fit test: (χ^2 = 11.579, DF = 8) p = 0.171.
Variables entered into the regression analysis: age, sex, number of hospital admissions, number of contacts in outpatient care with physicians/other staff groups, number of diagnosis groups, IADL sum, PADL sum, Berger scale, dizziness, anxiety, depressed mood, pain, slow-healing wounds, pressure ulcer, informal care in PADL/IADL.

hospital admissions in their study on utilization of medical healthcare among people who receives long-term care and found similar relations between higher age, dependency in PADL, informal care and utilization of medical healthcare. Data for this study were partly collected through the PASiS register and the appropriateness of using administrative registers for scientific purposes has been questioned. The main advantage in doing so is the amount of data that can be gathered within a reasonable amount of time and at a reasonable cost (33). The PASiS register is a well-established, administrative register that forms the basis for budgeting and financial reimbursement in the region of Skåne and is also used for the day to day accounting for occupied/unoccupied beds in each hospital. The register can, therefore, be regarded as reliable and suitable for the purposes of this study. However, there is a risk of underestimating the number of contacts with other staff groups in outpatient care, since paramedical staff may be employed by the municipalities and only contacts with those employed by the county council are registered in PASiS. Thus, the lower mean number of contacts with other staff groups among those in special accommodation may be explained by a higher number of contacts with staff employed by the municipality. This result should therefore be interpreted with caution.

The data and sample were also collected through the GAS study (26) in which there is an unknown number of dropouts. Thus, there may be people who received long-term care and were admitted to hospital during 2001 who were not included in this study. Data in GAS were collected by staff, which means that the number of people addressed and the information reported depends on the level of knowledge among the staff. The analysis of dropouts in the GAS study (27) showed an over-representation of people living in special accommodation. This can partly be explained by the staff having more knowledge about those in special accommodation and thus asking them to participate to a greater extent than they asked those who receive care at home. This indicates that people cared for at home may have been missed and thus the figures related to them may be an under-representation rather than over-representation.

The results in this study show that those in special accommodation have the greatest care needs. However, the results also demonstrate a remarkably high share of health complaints and diagnoses among those cared for at

Table 5 Variables associated with number of hospital stays and number of contacts with the physician in outpatient care

Dependent variable	*Final model*	*B*	*Adjusted R^2 for model*	*95% CI for regression coefficient*	*p value*
			0.358		
Total number of hospital stays	Age	−0.002		−0.013–0.009	0.696
n = 648	Sex	0.055		−0.109–0.218	0.511
	Number of diagnosis groups	0.358		0.307–0.409	<0.001
	Number of contacts with physicians in outpatient care	0.032		0.024–0.039	<0.001
	Periodic anxiety	0.196		0.029–0.363	0.021
	PADL sum	−0.060		−0.097–−0.022	0.002
			0.188		
Number of contacts with the physician in outpatient care	Age	−0.121		−0.240–0.001	0.048
	Sex	0.998		−0.753–−2.749	0.263
	Number of diagnosis groups	1.386		0.852–1.920	<0.001
n = 559	Number of contacts with other staff groups in outpatient care	0.082		0.040–0.123	<0.001
	Informal care in IADL	2.045		0.319–3.771	0.020
	Periodic severe pain	3.399		0.897–5.900	0.008
	Constant severe pain	9.761		5.338–14.183	<0.001
	Slow- healing wounds	4.554		1.524–7.584	0.003
	Pressure ulcer	4.465		0.474–8.456	0.028
	PADL sum	−0.581		−0.998–−0.164	0.006

Variables entered into the regression analyses: age, sex, care at home/in special accommodation, number of contacts in outpatient care with other staff groups, number of diagnosis groups, IADL sum, PADL sum, Berger scale, dizziness, anxiety, depressed mood, pain, slow-healing wounds, pressure ulcer, informal care in PADL/IADL. The number of contacts with the physician in outpatient care was also entered in the analysis for number of hospital stays.

home and there were no significant differences found regarding degree of multimorbidity between those at home and those in special accommodation. Previous research has shown that those who are granted long-term care from the municipalities tend to be more physically and cognitively impaired than in previous decades (4). Thus, there may be people with complicated medical conditions cared for at home. Kristensson et al. (34) demonstrated the 5 months before a decision about municipal care and services to be marked by increased utilization of medical healthcare among older people, suggesting that their health is very instable. The results from the present study also shows that those at home utilized more hospital care, both regarding days spent in hospital and number of hospital stays, than those in special accommodation. This is in line with studies showing that people living at home are at greater risk of being readmitted to hospital compared to those in special accommodation (9–11). They also had more contacts in outpatient care than those in special accommodation. Utilization of outpatient care was significantly associated with utilization of hospital care, a relation that previously been demonstrated by Byrne et al. (35), Condelius et al. (3) and Hansagi et al. (36). The increase in the number of frail and older people cared for at home is a challenge to home care to manage varying and complex medical conditions in the older person's home. However, in Sweden as in other countries, medical competence seems to be low, in terms of lack of physicians and few geriatric nurses, closely involved in their care. Kihlgren et al. (37) reported that lack of competence among co-workers and distance to consultant physician contributed to the making of hasty decisions by community nurses about referral to hospital. It may well be that an increased availability of medically competent staff for those in need of proactive medical attention in the municipality might counteract utilization of medical healthcare.

The intensified utilization of both in and outpatient care among those cared for at home was not explained by the care being provided at home *per se*. The linear and the logistic regression analyses showed no association between utilization of hospital care and utilization of outpatient care and the variable 'living at home or in special accommodation'. The greater utilization among those cared for at home seems rather to be explained by their having a better health status since in the comparisons they were shown to be younger, less cognitively impaired, less dependent in ADL and suffering from fewer health complaints than those in special accommodation. This was supported by the linear regression analysis where increased dependency in PADL was associated with fewer hospital stays, a

relationship that has been demonstrated earlier by Landi et al. (18). The linear regression analysis also showed that increased age and dependency in PADL is associated with fewer contacts with the physician in outpatient care. Older people in special accommodation have been found to experience low self-determination, participation and control (38). The lower utilization of medical healthcare in this group might therefore be an expression of reduced self-determination, where staff acts as 'gatekeepers' for hospital and outpatient care. The availability and continuity of care in special accommodation may also act as a buffer against the need for medical healthcare while those at home are left to a greater extent to make their own or their relative's judgments. More research is needed to reveal whether variations in utilization of medical healthcare between those at home and those in special accommodation are due to differences in availability and continuity of care or to differences in self-determination.

Informal care proved to be significant in the utilization of medical healthcare. However, the linear regression analyses showed that informal care is associated only with contacts with the physician in outpatient care and not with hospital admissions. The explanation might be that decisions about admission to hospital are made by the attending physician at the emergency department and not by the patient or relative. Van Houtven and Norton (39) demonstrated that informal care reduced the use of home healthcare, delayed nursing-home entry and even reduced the length of hospital stays. Thus, informal caregivers are of great importance in reducing healthcare expenditure by acting, perhaps, as substitutes for long-term care. Frequent contacts in outpatient care and readmissions to hospital might also be an expression of exhausted caregivers looking for alternatives and relief, as Cheek et al. (16) demonstrated in their study. Thus, if informal caregivers are to be able to cope and continue their care-giving tasks it is essential that professional caregivers are made more aware of their situation and needs and perhaps provide them with the knowledge and support required.

A remarkably large proportion of the sample suffered from health complaints, with as many as 65% of those in special accommodation and 44% of those living at home suffered from some degree of urinary incontinence. Corresponding figures for depressed mood were 61% among those in special accommodation and 45% among those at home. No significant differences were found between the groups regarding the proportion suffering from dizziness, anxiety, pain or slow healing wounds. Both pain and wounds were associated with the number of contacts with the physician in outpatient care. This may indicate that patients suffering from pain or wounds are followed-up in outpatient care. It may, however, also be that these patients are not monitored closely enough or treated sufficiently in their home settings giving rise to the need for repeated contacts with physicians in outpatient care. Anxiety was the only health complaint associated with hospital admissions. Kvaal and Laake (40) demonstrated that the degree of anxiety increased rather than decreased after discharge from hospital among older patients, and that this was related to not feeling secure. This was interpreted as a sign that the patients did not feel secure in terms of sufficient care being available when needed. Thus, it seems essential with an increased availability of medically and geriatric competent staff within the municipalities to facilitate care and treatment of those with multiple conditions and those suffering from various health complaints and to prevent intensified utilization of medical healthcare.

Conclusions

Despite better physical and cognitive status, those who received long-term care at home utilized hospital care and outpatient care to a higher extent than those in special accommodation. Thus medical healthcare seems more accessible to those who live at home, are younger, less dependent and who have access to informal caregivers which may put those who are most vulnerable and live in special accommodation in risk of being marginalized. However, the high prevalence of diagnoses and health complaints among those cared for at home might be difficult to handle within homecare causing the need for frequent hospital admissions and frequent contacts in outpatient care. It may well be that access to more geriatric trained staff and close and regular attention in the older person's home may prevent intensified utilization of medical health care in this group. Informal caregivers may play a significant role in preserving care of older people at home as well as for utilization of medical healthcare. Thus, if older people are to be cared for at home policymakers as well as healthcare professionals need to provide informal caregivers with the information and support required to maintain their care-giving activities. More research is needed to reveal whether the lower utilization of medical healthcare among those in special accommodation is a consequence of better supervision of medical conditions or an expression of reduced self-determination where staff act as 'gatekeepers' for hospital care and outpatient care.

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Author contributions

Anna Condelius has been involved in developing the research questions, data collection, analysis and has drafted the manuscript. Ulf Jakobsson has been involved in

developing the research questions, data collection and has contributed with statistical expertise in the analysis process and revised the manuscript. Ingalill Rahm Hallberg has been involved in the design of the study, developing the research questions and supervised the realization of the study and revised the manuscript critically for research questions and important intellectual content. Anna-Karin Edberg has been involved in developing the research questions and has revised the manuscript critically.

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