

## Original Article

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# Hospitalisation and use of medication of Danish nursing home residents at the end of life

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**ABSTRACT**

**INTRODUCTION.** The end-of-life period remains sparsely investigated in Danish nursing home residents. This study aimed to estimate medication use, drug reimbursement for terminal illness and hospital admissions and to compare these estimates between two groups of nursing home residents.

**METHODS.** This small-scale observational study was based on residents who died while residing in a nursing home in 2019. Medication use was estimated three months before the residents' death. Estimates for residents registered with a GP designated to the nursing home were compared with estimates for residents who maintained their usual GP.

**RESULTS.** We included 67 residents (mean age: 88 years, 78% female). On average, residents with a designated GP (n = 21) received ten different medications, and residents who maintained their usual GP (n = 46) received seven. In all, 90% of residents were prescribed on average three "often inadequate" medications in their final three months of life. Furthermore, 39 (58%) residents received drug reimbursement for terminal illness; most were residents who maintained their usual GP (65% versus 43%). Among residents who had a designated GP, five (24%) died at the hospital compared with eight (17%) of the residents who maintained their usual GP.

**CONCLUSIONS.** The residents received many drugs, including "often inadequate" medication, in the three months leading up to their death. No significant differences were found between the two groups. A stronger focus should be placed on optimising end-of-life care for nursing home residents.

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Elderly residents living in nursing homes represent a frail population, and many are burdened by multimorbidity and polypharmacy [1]. The disease pattern is complex, and age-related physiological changes may influence both the pharmacodynamics and the pharmacokinetics of drugs, which may result in adverse or reduced effects of medications [1, 2]. The average age of residents entering a nursing home is 84 years, and the average length of stay is approximately 30 months. Almost a third will die within the first year after moving in [3].

Since 2016, many nursing homes in Denmark have affiliated a specific GP to the nursing home [4]. These nursing home GPs (here referred to as "designated GP") consult the residents on a regular basis, e.g. once a month, and

provide healthcare advice to nursing home staff. This model is intended to improve treatment quality, optimise medication and reduce preventable hospitalisations, including readmissions [4]. The designated GP model implies that a single or a few GPs from the local area are assigned to the nursing homes while still maintaining their private practice. When admitted to a nursing home, residents are offered to select the designated GP, but they can also keep their usual GP [5].

A Danish study found an association between the designated GP model and a reduced number of preventable hospital admissions and readmissions [5]. Moreover, further implementation of the model yielded a stronger collaboration and improved communication between the designated GPs and the nursing home staff [5].

We aimed to estimate medication use, drug reimbursement for terminal illness (DRTI) and hospital admissions at the end of life in residents with a designated GP compared with residents who had maintained their usual GP.

## METHODS

### Design and study cohort

We conducted a small-scale explorative, observational retrospective study based on data from two Danish nursing homes (referred to as “NH1” and “NH2”). All the included residents died during the study period from 1 January to 31 December 2019.

The nursing homes were located in the same municipality and had the same nursing home manager. Thus, we considered them to be comparable in terms of organisation and economy.

NH1 had four designated GPs affiliated simultaneously throughout the study period, whereas NH2 had one designated GP as from mid-August 2019. Since most residents ( $n = 17$ ) at NH2 had died before the designated GP was affiliated and the shift to a designated GP is expected to be a process occurring in the course of months, we registered all residents from NH2 ( $n = 27$ ) in the group maintaining their usual GP.

The residents were categorised into two groups: residents registered with a designated GP and residents registered with their usual GP.

### Data collection and analysis

The data were collected for the three months leading up to the death of each of the residents. Medications (prescriptions and over-the-counter drugs) were categorised according to level 4 of the Anatomical Therapeutic Chemical (ATC) system and grouped into clinically meaningful groups ([https://ugeskriftet.dk/files/a08210647\\_-\\_supplementary.pdf/S1](https://ugeskriftet.dk/files/a08210647_-_supplementary.pdf/S1)).

We used Morin’s criteria to classify medications based on consensus through a Delphi survey among 40 experts from ten different countries [6] ([https://ugeskriftet.dk/files/a08210647\\_-\\_supplementary.pdf/S2](https://ugeskriftet.dk/files/a08210647_-_supplementary.pdf/S2)). The three groups of medication were “often adequate” (treatment and management of symptoms), “questionable” (treatment of comorbidities and secondary prevention of cardiovascular diseases) and “often inadequate” (long-term prevention of chronic disease). We excluded antibiotics as they are often used for short-term treatment, and because we had no information about the indication for the prescribed antibiotics. We also excluded dermatologicals, local oral treatments and eye drops as these are typically temporary medications.

We used descriptive statistics to characterise the residents and the use of medicine. Numbers and percentages were used for discrete variables, whereas mean and interquartile ranges (IQR) were used for continuous variables. In the comparisons between the two groups (residents with designated GP and residents maintaining their usual GP), we used t-tests for continuous variables and  $\chi^2$ -tests for categorical variables. Statistical analyses

were performed with SAS version 9.4 (SAS Institute, Cary, NC).

*Trial registration:* not relevant

## RESULTS

We included 67 residents with a mean age of 88 years (IQR: 85-94 years), and 78% (n = 47) were female (Table 1). In total, 31% of the included residents (n = 21) were affiliated with a designated GP.

**TABLE 1** Characteristics of the 67 included residents.

	Residents with designated GP (n = 21 (31%))	Residents who maintained their usual GP (n = 46 (69%))	Total (N = 67 (100%))
Age, yrs, mean (IQR)	85 (85-94)	89 (86-94)	88 (85-92)
Age ≥ 80 yrs, n (%)	16 (76.2)	40 (87.0)	56 (83.6)
DRTI at ≥ 1 days before death, n (%)	9 (42.9)	30 (65.2)	39 (58.2)
Hospitalised at time of death, n (%)	5 (23.8)	8 (17.4)	13 (19.4)
Medications at 3 mos. before death: ATC level 4, n, mean (IQR)	10.0 (7-12)	7.3 (5-10)	8.1 (5-11)

ATC = Anatomical Therapeutic Chemical; DRTI = drug reimbursement for terminal illness; IQR = interquartile range.

Residents with a designated GP received an average of ten medications, and residents maintaining their usual GP received an average of seven medications. A total of 39 (58%) residents received DRTI ranging from one to eleven days before death (median: three days). Nine (43%) residents who were affiliated with a designated GP received DRTI compared with 30 (65%) residents maintaining their usual GP. Five (24%) residents with a designated GP were hospitalised compared with eight (17%) residents with a usual GP. We found no statistically significant differences between the two groups for medications, DRTI and hospitalisation (Table 1).

The most frequently prescribed medication groups were vitamins and minerals (70%), anticoagulants (54%) and paracetamol (51%). Residents with a designated GP were prescribed subcutaneous medicine less frequently (33%) than residents with a usual GP (65%), but the two groups did not differ significantly (Table 2).

**TABLE 2** Medications at three months before death and at the time of death. The values are n (%).

	Residents with designated GP (n = 21 (31%))	Residents who maintained their usual GP (n = 46 (69%))	Total (N = 67 (100%))
<i>Most frequent medication groups at 3 mos. before death</i>			
Vitamins and minerals	19 (90.5)	27 (58.7)	46 (69)
Anticoagulants	15 (71.4)	20 (43.5)	35 (53)
Paracetamol	13 (61.9)	20 (43.5)	33 (49)
Proton pump inhibitors	12 (57.1)	19 (41.4)	31 (46)
Laxatives	12 (57.1)	19 (41.4)	31 (46)
Antidepressants	10 (47.6)	17 (37.0)	27 (40)
Antihypertensives	8 (38.1)	16 (34.8)	24 (36)
Potassium supplements	8 (38.1)	16 (34.8)	24 (36)
Diuretics	7 (33.3)	16 (34.8)	23 (34)
Opioids	9 (42.9)	12 (26.1)	21 (31)
<i>At the time of death</i>			
Subcutaneous medications <sup>a</sup>	7 (33.3)	30 (65.2)	37 (55)

a) Include: morphine (n = 35), midazolam (n = 35), haloperidol (n = 25), furosemid (n = 22) and hyoscinbutylbromid (n = 19).

The mean number of “often adequate” medication was 3.9 in the group of residents with a designated GP and 2.2 in the group of residents maintaining their usual GP. The number of “questionable” medications and the number of “often inadequate” medications were similar in the two groups (Table 3). In total, 90% of the residents received “often adequate” medications, 67% of the residents received “questionable” medications and 90% of the residents received “often inadequate” medications.

**TABLE 3** Classification of drugs assessed as “often adequate”, “questionable” and “often inadequate” at three months before death. The values are mean number (interquartile range).

	Residents with designated GP (n = 21 (31%))	Residents who maintained their usual GP (n = 46 (69%))	Total (N = 67 (100%))
Often adequate	3.9 (0-5)	2.2 (0-3)	2.8 (0-4)
Questionable	2.8 (0-5)	2.3 (0-4)	2.5 (0-4)
Often inadequate	2.8 (0-4)	2.8 (0-4)	2.8 (0-4)

The three most frequently prescribed drugs in the group of “often inadequate” drugs were lipid-modifying agents, anti-dementia drugs and vitamins. We found no statistically significant differences between the two groups regarding “often adequate”, “questionable” and “often inadequate” medications.

## DISCUSSION

### Main findings

In this small-scale explorative qualitative study, we found that nursing home residents received an average of eight different medications at three months before their death. The residents who received DRTI were registered with it shortly before death and almost 20% of residents were hospitalised at the time of death. Residents in both groups were prescribed an average of almost three “often inadequate” medications within three months before death.

### Comparison with existing literature

Our finding that the residents received a large number of medications is similar to the findings of previous studies as an average of eight different medications has previously been reported [7]. Studies have identified barriers to deprescribing in older adults; they believe strongly in the need for their medications and harbour concerns about the effects of discontinuing their medical treatment [1, 8, 9]. Deprescribing medications may make the patients feel that the GP has given up on them, and the GPs may fear that discussing deprescribing may give the patients the impression that they are receiving inferior medical care [1]. Moreover, some GPs find it challenging ethically and timewise to engage in “end-of-life” discussions [10].

The most commonly prescribed medications at three months before death were vitamins and minerals, anticoagulants and paracetamol; this is consistent with the finding by Lundby et al. [7]. The trend that residents with a designated GP were more often prescribed “adequate” drugs than residents maintaining their usual GP might be explained by an attempt to optimise treatment and improve the quality of life. Prescribing “often adequate” drugs is in line with the international goals for palliative care and may be essential near the end of life [6]. However, vitamins and minerals were given to a much greater extent by the designated GPs than by the usual GPs. These supplements are often inappropriate for older patients with a limited life expectancy as they have no short-term advantages [6, 10].

Among the “questionable” medications, anticoagulants were most frequently prescribed. Still, anticoagulants may be appropriate to prevent a serious complication, e.g. a stroke [7]. Hence, this finding may indicate a high quality of the provided treatment. Lipid-modifying agents were the most frequently prescribed “often inadequate” medications. Evidence supports that discontinuation of statins in individuals with a life expectancy of < 1 year is safe and improves their quality of life [11]. Hence, medication revision is necessary in individuals with a limited life expectancy who are generally not expected to benefit from preventive medication [7, 10].

In this study, approximately half of the included residents received DRTI before they died. The median of three days is significantly shorter than proposed by the Danish Health Authority as their guidelines state that a physician must have assessed that the patient is dying and expected to live for a short time only (few weeks to a few months) [12]. The GPs seemed remarkably reluctant to register nursing home residents with DRTI. This highlights how difficult it can be to identify patients who are in the terminal phase, which is consistent with existing knowledge that physicians tend to overestimate the remaining lifetime in terminally ill patients [6, 13]. We found that 20% of the nursing home residents were hospitalised at the time of death. This highly exceeds the number of people wishing to be hospitalised at the time of death. In prior studies, only 3% of the Danish population reported a wish to die in hospital, and 60% wished to die in their own home or a nursing home [14]. The high hospitalisation rate may be explained by limited recognition that the resident is entering the terminal phase and a lack of discussion of the resident’s preferences regarding place of death [15].

In contrast to another Danish study [5], we found that the designated GPs tended to hospitalise residents more often in the end-of-life period. A possible explanation for this may be the extensive knowledge that the usual GP

has of the listed patients. We expect that the designated GPs will obtain a similar mutual confidentiality with the residents over time. Advance care planning to discuss preferences and levels for future care has been shown to reduce inappropriate hospital admissions [15], and advance care planning is highly relevant for nursing home residents.

## **Strengths and limitations**

To our knowledge, this study is the first to explore the impact of designated GPs on the end-of-life care among nursing home residents. A significant strength was the use of valid data from the nursing homes' care registration system to explore patterns in medications and hospitalisation. An additional strength was the use of Morin's division of drugs into three categories, which is based on a European consensus [6]. However, the expert panel did not agree on the classification of proton pump inhibitors, for example, which we decided to categorise as "questionable" based on clinical experiences. A significant limitation was the low number of included residents, especially in the group of residents with a designated GP. Consequently, the strength of our estimates was low, and the results might represent random findings. Furthermore, we lacked knowledge about the residents' multimorbidity. Thus, we were unable to determine whether the two groups of residents were clinically comparable. Hence, our findings may be considered generalisable to other nursing homes in similar healthcare systems, but no conclusions can be made regarding the effect of the designated GPs.

## **Clinical implications**

Our findings may have important implications for clinical care as both groups of GPs were found to prescribe "often inadequate" medications. Hence, a stronger focus should be directed towards deprescribing. Clinical guidelines, additional resources and heightened attention are needed to optimise the medication prescribed at the end of life [10]. Guidance tools like Morins' classification of drugs [6] and the Danish deprescribing list [16] may be useful to evaluate medicine use in clinical practice.

This study highlighted the importance of prioritising end-of-life discussions and advance care planning as DRTI was registered close to death and hospitalisation was frequent. A previous systematic review confirmed that GPs have an important role in advance care planning to ensure that patients are allowed to die in their preferred place [17]. The fact that subcutaneous medication was prescribed and DRTI was registered for more than half of the participants indicates that the resident's terminal condition was recognised and that appropriate symptom relief was ensured. However, more residents may benefit from end-of-life care and avoid unnecessary medication and hospitalisation if clinical focus is directed towards early recognition of the terminal phase [17]. Discussions of individual wishes may be facilitated by shared decision-making each time one experiences a decline in the patient's health status.

Although in this small study we found no significant difference between the two groups, we still believe that several advantages may be achieved by employing a designated GP. Important issues determining quality care for elderly in nursing homes are good care planning routines and a fruitful collaboration between nurses and GPs [18]. The interprofessional collaboration between the designated GP and the nursing home staff may contribute to a clear and precise communication, mutual trust and acknowledgement of each other. This may produce more positive health-related outcomes and fewer hospitalisations [19, 20].

## **CONCLUSIONS**

Nursing home residents received a large number of drugs at three months before their death, and 90% of the residents received "often inadequate" medications. DRTI was received shortly before death. Residents with a usual GP tended to be registered with DRTI more often, and fewer of these residents were hospitalised at the

time of death than were residents with a designated GP. These findings suggest that a stronger focus should be placed on optimising end-of-life care for nursing home residents.

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