Transferring nursing home residents to emergency departments by emergency physician-staffed emergency medical services : missed opportunities to avoid inappropriate care?

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Abstract

Background

The decision to transfer a nursing home (NH) resident to an emergency department (ED) is multifactorial and complex but many of the emergency physician-staffed emergency medical service (EP-EMS) interventions and emergency department (ED) transfers are probably inappropriate.

Methods

We conducted a retrospective, cross-sectional study in three EP-EMS's in Belgium over a period of three years . We registered indicators that are potentially associated with inappropriate transfers: patient characteristics, availability of written do not resuscitate (DNR) orders or treatment restrictions, involvement of a general practitioner (GP) and availability of transfer notes. We also explored the association between age, the Charlson Comordity Index (CCI), polypharmacy, dementia and the availability of DNR documents.

Results

We registered 308 EP-EMS interventions in NH residents. In 98% the caller was a healthcare professional. In 75% there was no GP present and 40 % had no transfer note. Thirty two percent of the patients had dementia, 45% had more than 2 comorbidities and 68% took five medications or more. In 6% cardiopulmonary resuscitation (CPR) was performed. DNR orders were available in 25%. Eighty eight percent of the NH residents were transferred to the ED. Forty four percent had a CCI >5. In patients of ≥90 years, with a CCI >5, with dementia, with polypharmacy, DNR orders were not available in 81%, 67% and 69% respectively.

Conclusions

Adapted EMS dispatch center protocols, more involvement of GP's, more availability of DNR orders and better communication between GP's/NH's and EP-EMS could prevent inappropriate interventions, futile actions and ED transfers.

Keywords

Do-not-resuscitate (DNR), emergency department, nursing home, transfer, emergency medical services (EMS)

Introduction

The European population continues to age. By 2030 24% of all Europeans will be 65 years or older. The population in Belgium shows the same demographic trend with a predicted percentage of people of 65 years or older of 22.5% in 2030 and 25% in 2050 [1]. Geriatric patients are defined by the presence of multiple diseases in combination with age-related changes, polypharmacy, social problems and reduced emotional resilience [2,3]. Old, fragile people have a higher demand for acute medical care [4-10] and previous research has shown that the multimorbidity geriatric condition is associated with poor health outcome when consulting the emergency department (ED) [3]. Nursing home (NH) residents are a vulnerable and frail population. They are more likely than community-dwelling residents to become acutely unwell and they are at higher risk for ED transfers [8,11,12]. The most common reasons for the transfer of NH patients to an ED are the exacerbation of an existing cardiac or pulmonary condition, an acute injury or an acute infection [11,13,14].

Although there is no universal definition of appropriateness of care, many of the transfers from NH's to ED's are probably inappropriate and avoidable [15]. Inappropriate transfers to EDs may be characterised by at least one of the following conditions: the absence of somatic and psychiatric emergency conditions, palliative care known before the decision to transfer, a resident's preference for non-hospitalisation and the availability of equally safe and good care in the NH [16,17]. Additionally, one should think about the way these NH residents (if judged to be necessary) have to be transferred to an ED. When is it appropriate to call for the help of an emergency medical service (EMS) team capable to perform advanced life support techniques? In this respect, one should keep in mind that the use of a highly skilled team may have consequences for the whole EMS system, as is makes that team unavailable for other patients.

There are no official Belgian data on the characteristics of NH to ED transfers or the means of transport that are used. In this study, we studied the prevalence of emergency physician-staffed EMS (EP-EMS) transfers from a NH to an ED of patients of 65 years or older. We report clinical factors that are possible indicators for poor prognosis (and consequently also inappropriate care): comorbidities, polypharmacy and dementia. We also studied the involvement of the GP's in these

transfers, the availability of transfer notes and the availability of written do not resuscitate (DNR) orders or other treatment limitations. These factors are indicators that could help to define the boundaries of meaningful EP-EMS interventions in NH's and to tackle overtreatment and overtriage.

Methods

Study design

A retrospective descriptive, cross-sectional study of the demographics, clinical and transfer characteristics of NH residents of 65 years or older who were attended by an EP-EMS was performed for a period of 26 months (from 1 January 2015 until 28 February 2017). We collected data from three hospital-based EP-EMS teams (Jan Yperman Ieper, Saint-Augustinus Veurne and University Hospital Antwerp), thereby covering three different EMS regions in Flanders with approximately 450,000 inhabitants.

Description of the emergency medical services system in Belgium

The Belgian EMS system is three-tiered. The first tier consists of two emergency medical technicians (ambulance). The second tier, the paramedic intervention team (PIT), is a hospital-based team of an emergency medical technician and an emergency nurse; they work with standardised prehospital treatment protocols for common medical conditions (hypoglycaemia, decreased consciousness, …). The third tier (i.e. the EP-EMS) consists of a team of an emergency medicine physician and an emergency nurse. Only ambulances and PIT's have the capability to transport a patient. Ambulances, PIT's and EP-EMS's are sent by the EMS dispatch center according to standard medical regulation protocols. Ambulances and PIT's can ask for assistance of the EP-EMS if needed [18]. The EMS dispatch center has no adapted medical regulation protocols for NH residents.

Data collection

We screened the EP-EMS charts and the medical hospital records and included 308 patients from NH's. We collected data on age, gender, and the reason for calling the EMS dispatch center (i.e. a new acute medical problem, a deterioration of an existing medical condition or trauma). Diagnostic category (cardiac, pulmonary, neurologic, vascular, gastro-intestinal, endocrine, oncologic,

nephrological, trauma), multimorbidity and number of medications were registered. We also gathered transfer data (day and time of intervention, Glasgow Coma Score (GCS), relationship of the caller with the patient, presence of the referring physician, availability of a referral document and the availability of DNR orders.

A DNR order may be limited to do not perform cardiopulmonary resuscitation (CPR) order (i.e. a DNR 1 order). DNR 2 orders contain therapeutic restrictions for ventilatory support, artificial feeding and fluids, antibiotics, dialysis, referral to hospital or other medical treatments. DNR 3 means that only supportive and palliative care is to be given. A DNR 0 order implies that medical personnel have to perform CPR in case of cardiac arrest.

Out of hours was defined as between 6 PM and 8 AM and during weekends and legal holidays. As patient outcome data we collected: deceased at intervention site, at ED or during hospitalisation, resuscitation attempted by EMS, and ED transfer. Comorbidities were grouped in major categories based on ICD10 codes. Polypharmacy was defined as a patient who is taking 5 or more chronic medications [19].

Charlson Comorbidity Index

The Charlson Comorbidity Index (CCI) was developed as a weighted index to predict risk of death within 1 year of hospitalisation for patients with specific comorbid conditions. Sixteen ICD-10 conditions are included in the index. Each condition, if present, was assigned a weight from 1 to 6 (e.g. 1 for congestive heart failure, 2 for lymphoma and 6 for metastatic cancer), based on the estimated 1-year mortality hazard ratio from a Cox proportional hazards model. These weights are summed to produce the CCI score. We used the updated score from 2014. Higher scores indicate a more severe condition and consequently, a worse prognosis [20].

Goals of the study

The primary goal of our study was to evaluate indicators potentially correlated with inappropriate transfer: absence or unavailability of DNR orders at the time of intervention, lack of GP involvement at the time of the intervention, and the lack of transfer notes. As secondary goals we explored the

relationship between DNR availability and patient characteristics: age, CCI, dementia an polypharmacy. Furthermore we looked at all cases were CPR was performed.

Statistical analysis

This quantitative study uses descriptive statistics (mean and standard deviation (SD)) . Between-groups comparisons were made using the Chi-square test for categorical data and the independent t-test for continuous data. Mosaic plots were used for 2D-visualisation of differences in combinations of two or more categorical variables with the surface of each region corresponding to the number of patients in that particular combination. A statistical significance level of $P < .05$ was set and we used R statistical software version 3.4.4 (R Foundation for Statistical Computing, Vienna, Austria) for all the analyses.

Ethics

This study was approved by the ethics committee of the University of Antwerp (approval numbers 16/42/431, 16/42/432 and 16/35/354). We also obtained approval of the ethics committees of all three participating hospitals.

Results

The demographic and clinical characteristics of the 308 patients included in the study are shown in Table 1. Note that the percentages given do not take into account the cases with missing data.

The mean age of the NH residents was 86 years (SD=6.4) and 62% were female. The EMS were activated by a physician or a nurse in 75% of the calls. Another healthcare worker from the NH initiated 23% of the calls. In 2% of the calls the caller was a bystander or a family member. More than half of the EP-EMS interventions occurred out of hours (54%).

The most common reason for ED transfer (58%) was an acute event (pulmonary oedema, acute myocardial infarction, airway obstruction, etc.). Thirty percent was due to worsening of an existing condition (pneumonia, deterioration of mental state, etc.). A GP was present in the NH on arrival of

the EP-EMS in only 25% of the cases. There was no significant difference in GP presence between in and out-of-hours (23% versus 27%). A transfer note from the GP or the NH staff was available in less than half of the transfers (40%). During working hours 51% of the NH residents had a transfer note; after hours this dropped to 31%. The majority of the NH patients (88%) was transferred to the ED, five percent deceased during the intervention. Only five percent of the NH residents was treated on-site but not transferred. Thirty-seven percent of the NH residents were suffering from multimorbidity and 32% had dementia. One hundred and thirteen (44%) of the NH residents had a CCI of more than 5. Polypharmacy was present in 68% of the NH residents (figure 1).

The EP-EMS performed CPR in the NH in 6% of the interventions (n=13). The mean age of these patients was 84.2 years (SD 4.5), eight patients were female. Nine patients died on-site and four were transported to the ED. In 10 out of these 13 patients no DNR status was available.

Documents containing a DNR order were available in only 25% of all attended NH patients (76/308) ; 38% of the available DNR orders had no treatment restrictions (DNR 0; table 1). The EP-EMS was activated for 18 DNR 1 and 29 DNR 2/3 patients. Sixty-eight patients of 90 years or older (81%) did not have a DNR code available (table 2).

In 256 patients sufficient data were available to calculate the CCI score (table 2). In 67 % (76/113) of the patients with a CCI>5 no DNR order was present. In 68% (57/84) patients with dementia no DNR code was discussed. Sixty-nine percent (98/142) of the patients with polypharmacy had no documented DNR order. Even when DNR was discussed 4/16 patients of 90 years or older, 13/37 patients with high CCI, 8/27 patients with dementia and 19/43 patients with polypharmacy had a documented DNR 0 order.

Discussion

Using data from three EMS regions in Flanders (Belgium) we provided insight in patient characteristics, availability of DNR orders and GP involvement during 308 EP-EMS interventions in NH's. Our results strongly suggest that in a substantial percentage the use of an EP-EMS for the ED

transfer, and probably also the ED transfer itself, was inappropriate care. Moreover, an EP-EMS is the highest rank of prehospital medical care available in Belgium, implying that the employment of this resource to a NH may leave other patients with life-threatening medical problems without suitable care in the prehospital phase.

The decision to transfer an NH resident to an ED is multifactorial and complex [21]. Worldwide, quality improvement programmes are implemented to reduce the number of inappropriate ED transfers [22-24]. We should identify those patients who benefit from an EP-EMS intervention and referral to an ED. In the current situation the EMS dispatch center only has the standard regulation protocols available. These protocols do not take into consideration the residence, medical history, frailty status or DNR code. This results in frequent deployment of an EP-EMS to a NH consuming significant healthcare resources that probably may be better spent elsewhere[10,17]. As the transfer of the NH resident is requested by a GP or the NH staff (nurses or nursing aids), one might expect that the caller, as a rule, has access to DNR orders. In case of an available DNR order, the EMS dispatch center should have the authority to downscale the EMS tier deployed, and send out a PIT instead of an EP-EMS.

In Belgium more than 75% of the NH residents are heavily dependent on care. More than half of them die within 24 months of NH stay [25]. Literature data show that DNR orders with written treatment restrictions often are not available, even for patients with severe life-limiting illness [26-28]. This increases the risk of futile resuscitation as discussed below [29-32]. We should make the DNR status available for every patient at EMS intervention [2]. When the NH staff pays more attention to the patient's wishes regarding medical treatment, fewer avoidable transfers occur [33,34]. Conversations about advance directives are often perceived as difficult by healthcare professionals and many GPs find it hard to identify the 'right time' to discuss directives [2]. It is, however, essential for this conversation between the patient and the GP or another treating physician to take place. During the current COVID-19 pandemic the importance of an existing DNR order has become even more evident. Twenty-five percent of the NH residents who died from COVID passed away in the hospital [35].

Many frail older adults die in NH's. In NH residents polypharmacy and multiple comorbidities are associated with severe disease and poor prognosis [36]. It is therefore of crucial importance to identify in advance the patients who may benefit from an EP-EMS intervention and an ED transfer, versus the patients for whom treatment in the NH is more appropriate [37]. Our data show that in an important percentage of NH residents a DNR code was not available, and that high age, a severe CCI, dementia and polypharmacy frequently seemed to be no motivation for discussing a DNR code.

Besides the need of a deeply debated decision on a DNR code for every NH resident, there is also the issue of the 24/7 availability of these DNR codes and the correct application of the DNR decision in case of an emergency. We found that DNR orders were available in only 25% of the EP-EMS interventions in NH's. By increasing this percentage, many inappropriate actions and unnecessary ED transfers may be avoided [34,38,39]. Furthermore, our data show that, even when treatment restrictions were available (i.e. DNR2/3), NH staff sometimes called the EMS dispatch center resulting in an EP-EMS intervention and an ED transfer. One could reflect that in many of these cases an ED transfer was not the best option for these frail patients, and that the deployment of an ambulance or a PIT would have been sufficient to provide appropriate care. In the literature several explanations are found for the high amount of transfers of patients with known therapy restrictions [15,40]. Inadequate end-of-life planning, inadequate education of NH staff, unavailability of the GP and pressure exerted on NH staff by families are common reasons for preventable transfers [41,42]. The perception about the appropriateness of ED transfers in an unselected group of NH residents differs between GP's and NH staff [21]. GP's found up to 40% of the transfers avoidable [16,42]. The estimation of inappropriateness of transfers by NH staff is substantially lower: 25% [21,42]. Therefore more GP involvement in the decision to transfer a patient to the ED is preferred.

Our results show that overall GP involvement at transfer was only 51% during working hours and dropped to 31% out of hours. The GP was present on arrival of the EP-EMS team in only one quarter of the patients. Over the last decade several studies showed low numbers of GP visits prior to ED transfer [4,21,43,44]. Timely attendance by a GP and early treatment, however, can prevent deterioration, avoid ED transfer [7,45] and reduce EMS interventions [6]. In the end, NH staff and

GP's share the responsibility to provide up to date written treatment preferences including a DNR order and decide whether a transfer should be initiated or not. With regard to the low percentage of referral letters, it is obvious that a lack of information on the frailty status, patient's wishes and the current medical problem also may lead to inappropriate care in the ED. Some frequent communication deficits between NH's and ED's are identified by Griffiths et al. [46].

EP's also have a responsibility in the prevention of inappropriate care. They should take the outcome of medical conditions (e.g. cardiac arrest) into consideration when choosing their actions [47]. Thirteen NH residents were resuscitated by the EP-EMS although the prognosis of out of hospital cardiac arrest in older adults is generally poor [30,39]. Studies show that in frail NH patients who received resuscitation, none had a good 12-month functional outcome [29,30,32]. NH staff, patients, relatives and EP's should be informed about the outcome of advanced life support interventions in these frail older residents in order to have realistic expectations and to make well-founded choices concerning treatment options, hospital transfer and-end-of life decisions [48].

We also found that the EP-EMS, not familiar with the patient, transported almost all patients (88%) to an ED. That is in contrast with the fact that in many cases, care in the NH would be safe, less disruptive and cheaper, and is therefore preferred over referral to an ED [16]. NH residents who were admitted to the hospital show an increased risk for delirium, falls, hospital-acquired infections, iatrogenic complications and functional decline [4,49,50]. Therefore NH staff, GP's and EP's should collaborate to improve the transfer policy in NH residents. We need to explore if the implementation of clinical prognostication tools such as CriSTAL that can indicate residents with short life expectations and who are potentially at risk for inappropriate transfer, can contribute to more appropriate care [51]. Fassmer found that both GPs and NH staff agree on three measures to prevent transfers: more NH staff, better communication between NH staff and GPs, and higher qualification of nurses [21]. Better communication between the NH/GP and the EMS is necessary to provide appropriate care. The availability of transfer notes is crucial in this process.

For most of the above-mentioned problems, trained geriatric nurse specialists in the NH's may be one of the solutions [22]. A geriatric nurse specialist could provide organisational support and complement

the heavy workload and general shortage of GP's [52]. Nurse specialists trained in advance directives may be a valuable alternative to physicians discussing end-of-life preferences [53].

Limitations

First of all, our results should be read with caution as our study was based on the review of data from medical records and prehospital EMS files which were frequently incomplete. Second, our data are retrospective and therefore causality cannot be inferred. Third, we included only three different EMS regions in Flanders and therefore our data may not be representative for the whole of Flanders. Fourth, we could not differentiate the different stages of dementia and we did not measure the severity of a disease.

Conclusion

In the vast majority of EP-EMS interventions in NH's, no GP was present, no DNR document was available and there was no transfer note. Almost all patients were transferred to an ED. More involvement of GP's and more availability of DNR documents may provide opportunities for improved emergency care for NH residents. The EP-EMS should take prognosis into consideration during their interventions. The EMS dispatch center should have adapted medical regulation protocols in case of an available DNR. We also suggest the implementation of trained geriatric nurse specialists to facilitate end-of-life discussions and to reduce avoidable transfers to emergency departments.

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References

1. Eurostat. Ageing Europe-2019 edition 2019,Oct,18. Available from: https://ec.europa.eu/eurostat/cache/digpub/ageing/
2. Knight T, Malyon A, Fritz Z, et al. Advance care planning in patients referred to hospital for acute medical care: Results of a national day of care survey. EClinicalMedicine. 2020 Feb;19:100235.
3. Tanderup A, Lassen AT, Rosholm JU, et al. Disability and morbidity among older patients in the emergency department: a Danish population-based cohort study. BMJ Open. 2018 Dec 14;8(12):e023803.
4. Briggs R, Coughlan T, Collins R, et al. Nursing home residents attending the emergency department: clinical characteristics and outcomes. QJM. 2013 Sep;106(9):803-8.
5. Arendts G, Dickson C, Howard K, et al. Transfer from residential aged care to emergency departments: an analysis of patient outcomes. Internal Medicine Journal. 2012;42(1):75-82.
6. Carron P, Dami F, Yersin B, et al. Increasing prehospital emergency medical service interventions for nursing home residents. Swiss Medical Weekly. 2015.
7. Lee SW, Goh C, Chan YH. Emergency department usage by community step-down facilities--patterns and recommendations. Ann Acad Med Singapore. 2003 Sep;32(5):697-702.
8. Carron PN, Mabire C, Yersin B, et al. Nursing home residents at the Emergency Department: a 6-year retrospective analysis in a Swiss academic hospital. Intern Emerg Med. 2017 Mar;12(2):229-237.
9. Fan CW, Keating T, Brazil E, et al. Impact of season, weekends and bank holidays on emergency department transfers of nursing home residents. Ir J Med Sci. 2016 Aug;185(3):655-661.
10. Dwyer R, Gabbe B, Stoelwinder JU, et al. A systematic review of outcomes following emergency transfer to hospital for residents of aged care facilities. Age Ageing. 2014 Nov;43(6):759-66.
11. Wang HE, Shah MN, Allman RM, et al. Emergency department visits by nursing home residents in the United States. J Am Geriatr Soc. 2011 Oct;59(10):1864-72.
12. Hoffmann F, Strautmann A, Allers K. Hospitalization at the end of life among nursing home residents with dementia: a systematic review. BMC Palliative Care. 2019;18(1).
13. Hallgren J, Ernsth Bravell M, Molstad S, et al. Factors associated with increased hospitalisation risk among nursing home residents in Sweden: a prospective study with a three-year follow-up. Int J Older People Nurs. 2016 Jun;11(2):130-9.
14. Kirsebom M, Hedstrom M, Wadensten B, et al. The frequency of and reasons for acute hospital transfers of older nursing home residents. Arch Gerontol Geriatr. 2014 Jan-Feb;58(1):115-20.
15. Lemoyne SE, Herbots HH, De Blick D, et al. Appropriateness of transferring nursing home residents to emergency departments: a systematic review. BMC Geriatrics. 2019;19(1).
16. Saliba D, Kington R, Buchanan J, et al. Appropriateness of the decision to transfer nursing facility residents to the hospital. J Am Geriatr Soc. 2000 Feb;48(2):154-63.
17. Perrin A, Tavassoli N, Mathieu C, et al. Factors predisposing nursing home resident to inappropriate transfer to emergency department. The FINE study protocol. Contemporary Clinical Trials Communications. 2017;7:217-223.
18. FPS Public Health. MUG 2021, October. Available from: https://www.health.belgium.be/en/node/28762
19. Masnoon N, Shakib S, Kalisch-Ellett L, et al. What is polypharmacy? A systematic review of definitions. BMC Geriatrics. 2017;17(1).
20. Frenkel WJ, Jongerius EJ, Mandjes-van Uitert MJ, et al. Validation of the Charlson Comorbidity Index in acutely hospitalized elderly adults: a prospective cohort study. J Am Geriatr Soc. 2014 Feb;62(2):342-6.

21. Fassmer AM, Pulst A, Spreckelsen O, et al. Perspectives of general practitioners and nursing staff on acute hospital transfers of nursing home residents in Germany: results of two cross-sectional studies. BMC Family Practice. 2020;21(1).
22. ElBestawi MR, Kohm C. Decreasing preventable emergency department transfers for long-term care residents using PREVIEW-ED(c). Healthc Manage Forum. 2018 Jul;31(4):137-141.
23. Stadler DS, Oliver BJ, Raymond JG, et al. Reducing Avoidable Facility Transfers (RAFT): Outcomes of a Team Model to Minimize Unwarranted Emergency Care at Skilled Nursing Facilities. J Am Med Dir Assoc. 2019 Aug;20(8):929-934.
24. Zuniga F, De Geest S, Guerbaai RA, et al. Strengthening Geriatric Expertise in Swiss Nursing Homes: INTERCARE Implementation Study Protocol. J Am Geriatr Soc. 2019 Oct;67(10):2145-2150.
25. Voorzorg D. Persbericht Profiel bewoner woonzorgcentrum 2020, June. Available from: https://corporate.devoorzorg-bondmoyson.be/wp-content/uploads/2020/06/Persbericht-Profiel-bewoner-woonzorgcentrum-24.06.2020.pdf
26. Sharp T, Moran E, Kuhn I, et al. Do the elderly have a voice? Advance care planning discussions with frail and older individuals: a systematic literature review and narrative synthesis. British Journal of General Practice. 2013;63(615):e657-e668.
27. Butler J, Binney Z, Kalogeropoulos A, et al. Advance Directives Among Hospitalized Patients With Heart Failure. JACC: Heart Failure. 2015;3(2):112-121.
28. Malyon AC, Forman JR, Fuld JP, et al. Discussion and documentation of future care: a before-and-after study examining the impact of an alternative approach to recording treatment decisions on advance care planning in an acute hospital. BMJ Support Palliat Care. 2017 Sep 1.
29. Andrew E, Mercier E, Nehme Z, et al. Long-term functional recovery and health-related quality of life of elderly out-of-hospital cardiac arrest survivors. Resuscitation. 2018 May;126:118-124.
30. Druwe P, Benoit DD, Monsieurs KG, et al. Cardiopulmonary Resuscitation in Adults Over 80: Outcome and the Perception of Appropriateness by Clinicians. J Am Geriatr Soc. 2020 Jan;68(1):39-45.
31. Fan KL, Leung LP. Outcomes of Cardiac Arrest in Residential Care Homes for the Elderly in Hong Kong. Prehosp Emerg Care. 2017 Nov-Dec;21(6):709-714.
32. Pape M, Rajan S, Hansen SM, et al. Survival after out-of-hospital cardiac arrest in nursing homes – A nationwide study. Resuscitation. 2018;125:90-98.
33. Evans G. Factors influencing emergency hospital admissions from nursing and residential homes: positive results from a practice-based audit. J Eval Clin Pract. 2011 Dec;17(6):1045-9.
34. Nakashima T, Young Y, Hsu WH. Are Hospital/ED Transfers Less Likely Among Nursing Home Residents With Do-Not-Hospitalize Orders? J Am Med Dir Assoc. 2017 May 1;18(5):438-441.
35. Sciensano. COVID-19 epidemiologische situatie 2020 [cited 2020 21 Apr]. Available from: https://covid-19.sciensano.be/nl/covid-19-epidemiologische-situatie
36. Reber KC, Lindlbauer I, Schulz C, et al. Impact of morbidity on care need increase and mortality in nursing homes: a retrospective longitudinal study using administrative claims data [Research Support, Non-U.S. Gov't]. BMC Geriatrics. 2020 10 31;20(1):439.
37. Curtis JR, Kross EK, Stapleton RD. The Importance of Addressing Advance Care Planning and Decisions About Do-Not-Resuscitate Orders During Novel Coronavirus 2019 (COVID-19). JAMA. 2020.
38. Temkin-Greener H, Zheng NT, Xing J, et al. Site of Death Among Nursing Home Residents in the United States: Changing Patterns, 2003–2007. Journal of the American Medical Directors Association. 2013;14(10):741-748.
39. Sulzgruber P, Sterz F, Poppe M, et al. Age-specific prognostication after out-of-hospital cardiac arrest - The ethical dilemma between 'life-sustaining treatment' and 'the right to die' in the elderly. Eur Heart J Acute Cardiovasc Care. 2017 Mar;6(2):112-120.

40. Kirsebom M, Hedstrom M, Poder U, et al. Transfer of nursing home residents to emergency departments: organizational differences between nursing homes with high vs. low transfer rates. Nurs Open. 2017 Jan;4(1):41-48.
41. Arendts G, Reibel T, Codde J, et al. Can transfers from residential aged care facilities to the Emergency Department be avoided through improved primary care services? Data from qualitative interviews. Australasian Journal on Ageing. 2010;29(2):61-65.
42. Trahan LM, Spiers JA, Cummings GG. Decisions to Transfer Nursing Home Residents to Emergency Departments: A Scoping Review of Contributing Factors and Staff Perspectives. J Am Med Dir Assoc. 2016 Nov 1;17(11):994-1005.
43. Morphet J, Innes K, Griffiths DL, et al. Resident transfers from aged care facilities to emergency departments: Can they be avoided? Emergency Medicine Australasia. 2015;27(5):412-418.
44. O'Connell B, Hawkins M, Considine J, et al. Referrals to hospital emergency departments from residential aged care facilities: stuck in a time warp. Contemp Nurse. 2013 Oct;45(2):228-33.
45. Gruneir A, Bell CM, Bronskill SE, et al. Frequency and pattern of emergency department visits by long-term care residents--a population-based study. J Am Geriatr Soc. 2010 Mar;58(3):510-7.
46. Griffiths D, Morphet J, Innes K, et al. Communication between residential aged care facilities and the emergency department: A review of the literature. International Journal of Nursing Studies. 2014;51(11):1517-1523.
47. Zanders R, Druwé P, Van Den Noortgate N, et al. The outcome of in- and out-hospital cardiopulmonary arrest in the older population: a scoping review. European Geriatric Medicine. 2021;12(4):695-723.
48. MacKenzie MA, Smith-Howell E, Bomba PA, et al. Respecting Choices and Related Models of Advance Care Planning: A Systematic Review of Published Evidence. Am J Hosp Palliat Care. 2018 Jun;35(6):897-907.
49. Hutt E, Ecord M, Eilertsen TB, et al. Precipitants of emergency room visits and acute hospitalization in short-stay medicare nursing home residents. J Am Geriatr Soc. 2002 Feb;50(2):223-9.
50. Arendts G, Popescu A, Howting D, et al. 'They never talked to me about…': Perspectives on aged care resident transfer to emergency departments. Australasian Journal on Ageing. 2015;34(2):95-102.
51. Cardona M, Lewis ET, Kristensen MR, et al. Predictive validity of the CriSTAL tool for short-term mortality in older people presenting at Emergency Departments: a prospective study. European Geriatric Medicine. 2018;9(6):891-901.
52. Bodenheimer T, Bauer L. Rethinking the Primary Care Workforce - An Expanded Role for Nurses. N Engl J Med. 2016 Sep 15;375(11):1015-7.
53. Miller H, Tan J, Clayton JM, et al. Patient experiences of nurse-facilitated advance care planning in a general practice setting: a qualitative study. BMC Palliat Care. 2019 Mar 6;18(1):25.

Table 1. Characteristics of 308 NH patients aged 65 years or older with activation of an emergency physician-staffed EMS vehicle

Age (years)	86 (6.4)
Gender	
Female	191/308 (62%)
Male	117/308 (38%)
Working hours	
Out	167/308 (54%)
In	141/308 (46%)
EMS activation	
GP/nurse	212/283 (75%)
Healthcare worker	64/283 (23%)
Family/bystander	7/283 (2%)
Unknown	25/308 (8%)
GP present	
No	162/217 (75%)
Yes	55/217 (25%)
Unknown	91/308 (30%)
Referral letter	
No	69/115 (60%)
Yes	46/115 (40%)
Unknown	193/308 (63%)
Reason EMS activation	
Deterioration	92/307 (30%)
Acute condition	177/307 (58%)
Trauma	38/307 (12%)
Unknown	1/308 (0.3%)
Transfer	
Treated on-site	16/302 (5%)
Deceased on-site	15/302 (5%)
Transferred to ED	271/302 (90%)
Unknown	6/308 (2%)
Outcome	
Deceased prehospital	15/308 (5%)
Deceased at ED	1/308 (0%)
Deceased during hospitalisation	16/308 (5%)
Medical condition	
Internal medicine	95/251 (38%)
Cardiology	61/251 (24%)
Neurology	43/251 (17%)
Trauma	22/251 (9%)
Other	30/251 (12%)
Unknown	57/308 (18%)
GCS on EMS arrival	
< 13	99/282 (35%)
≥ 13	183/282 (65%)
Unknown	26/308 (8%)
CPR performed	
No	204/217 (94%)
Yes	13/217 (6%)

Unknown	91/308 (30%)
DNR order available	
No	232/308 75%)
Yes	76/308 (25%)
DNR code	
code 0	29/76 (38%)
code 1	18/76 (24%)
code 2	26/76 (34%)
code 3	3/76 (4%)
Comorbidity	
Stroke	82/258 (33%)
Cardiology	137/258 (53%)
Pneumology	44/258 (17%)
Oncology	21/258 (8%)
Dementia	84/259 (32%)
Diabetes	55/258 (21%)
Unknown	49/308 (15%)
Morbidity >2 (except dementia)	
No	162/256 (63%)
Yes	94/256 (37%)
Unknown	56/308 (17%)
Polypharmacy	
No	66/208 (32%)
Yes	142/208 (68%)
Unknown	100/308 (32%)

EMS, emergency medical services; GP, general practitioner; GCS, Glasgow coma score; CPR, cardiopulmonaryresuscitation; DNR, do not resuscitate; ED, emergency department

Figure1. (Dementia) DNR documents in NH residents with and without dementia; (Age) Availability of DNR documents in NH residents for different age groups; (Charlson Comorbidity Index) DNR availability for low and high CCI