

COMORBIDITY AND DEPENDENCE JOINTLY INDICATE THE NEED FOR PALLIATIVE CARE IN NURSING HOME RESIDENTS

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Abstract: The purpose was to investigate the association between mortality in nursing home residents (NHR) and multimorbidity, dependence and their interaction. This study was an 18-month prospective, observational study, that included a subgroup of 5527 NHR residing in 163 nursing homes located in France between May and July 2011. A Cox proportional hazard model was used to perform multivariate survival analysis. Independent variables of interest were baseline multimorbidity, baseline dependence, and the interaction between multimorbidity and dependence. NHR were very dependent at baseline and the median Charlson Index score was 2. In multivariate survival analysis, multimorbidity and dependence were both significantly associated with an increased 18-month mortality (HR=1.10; CI 95% [1.04 - 1.17] and HR=1.30; CI 95% [1.22 - 1.38], respectively). Higher multimorbidity and higher dependence were both independently associated with a higher 18-month mortality in NHR. Clinicians could use these two simple indicators to identify NHR requiring palliative care.

Key words: Nursing homes, multimorbidity, functional status.

Introduction

Nursing home residents are a vulnerable population, with a limited lifespan (1), life-limiting diseases and are at risk for potentially life-limiting acute events. Yet, one nursing home resident in four have very limited access to palliative care at the end of their life, with insufficient symptom relief and respect for privacy (2). External palliative care resources are available but under-solicited and internal resources are scarce (2). Early initiation of palliative care could improve residents' quality of life by identifying care needs and facilitating palliative care provision at early stages (3).

Identifying nursing home residents requiring palliative care is a pre-requisite to their effective access to palliative care. Existing tools to identify palliative situations are either derived from prognosis estimation (4, 5) or from multimorbidity evaluation (6) and are seldom specific to nursing home residents (7). But existing identification tools lack sensitivity and often identify nursing home residents in very advanced or terminal stages, when care planning is limited to short-term goals of care, whereas earlier identification would be required in nursing home residents often presenting terminal declines over several years (8).

Multimorbidity and dependence are routinely evaluated in nursing home residents. Their use in daily practice to identify nursing home residents requiring palliative care could be easier than the use of research-purposed identification tools, and thus ensure broader access to palliative care in nursing home residents. The aim of this study was to investigate the association between 18-month mortality in nursing home residents and multimorbidity, dependence and their interaction.

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Methods

Participants and setting

Data of the IQUARE study were used. Briefly, IQUARE was an interventional study performed in southwest France from 2011 to 2013 that included 6275 nursing home residents to improve quality of care and reduce nursing home residents' functional decline (9). Quality indicators were compared before and after an 18-month follow-up, during which two types of interventions (light or strong) were implemented in participating facilities. Nursing homes in the strong intervention group were assigned individual support by a hospital geriatrician and collective support by the regional health agency. Nursing homes in the light intervention group were only presented their performance on quality indicators before and after follow-up (10). Data from both intervention groups were pooled in this study. The ethics committee of Toulouse University Hospital and the Consultative Committee for the Treatment of Research Information on Health approved IQUARE (CNIL: 07-438).

Outcome measures

The main outcome was death. Follow-up time was calculated from the date of inclusion to the date of death for decedents, and from the date of inclusion to the date of final assessment for survivors.

Independent variables of interest were baseline multimorbidity, as indicated by the Charlson Comorbidity Index, baseline dependence as indicated by the Groupe Iso Ressource (GIR, ranging from 1: totally dependent, to 6: no

dependence) and the interaction between multimorbidity and dependence. Multimorbidity and dependence were used as continuous variables.

Covariates included age, gender, provenance before admission to NH, hospitalizations in the last year, body mass index (BMI), any weight loss in the last two months, oral nutritional supplements intake, falls in the last year, dementia, screams, depression, physical restraint, pain, and polypharmacy (number of drugs prescribed, continuous).

Statistical analysis

A Cox proportional hazard model was used to perform multivariate survival analysis. Proportional hazards assumption was verified using Shoenfeld residuals method and the absence of multicollinearity was verified using the variance inflation factor. Analyses were performed by STATA, version 16.1. (StataCorp, College Station, Texas, USA). Statistical significance was assumed when $p < .05$.

Results

A total of 5527 residents from 163 nursing homes were included, among which 1554 died during follow-up. Nursing home residents' characteristics were presented in Table 1. The median age was 87.5 years, and most nursing home residents were women (73.8%). The median GIR was 2 and the median Charlson Index score was 2; 42.7% of nursing home residents had dementia.

Table 1

Characteristics of nursing home residents included in the survival model

Characteristics (n=5527)	N (%)	Median (IQR)
Age (y)		87.5 (9.0)
<75	497 (9.0)	
[75-85]	1395 (25.2)	
[85-90]	1728 (31.3)	
≥90	1907 (34.5)	
Female	4077 (73.8)	
Male	1450 (26.2)	
GIR*		2 (2)
1	1100 (19.9)	
2	1759 (31.8)	
3	839 (15.2)	
4	1136 (20.6)	
5	371 (6.7)	
6	322 (5.8)	
Charlson comorbidity index		2 (2)
Other comorbidities		
Dementia	2362 (42.7)	
Screams	548 (9.9)	

Table 1 (continued)

Characteristics of nursing home residents included in the survival model

Characteristics (n=5527)	N (%)	Median (IQR)
Physical restraint	1669 (30.2)	
Depression	1913 (34.6)	
Pain	1317 (23.8)	
Body mass index (n=3715, kg/m ²)		24.7 (7.3)
< 18.5	343 (9.2)	
[18.5-25.0[1620 (43.6)	
[25.0-30.0[1068 (28.7)	
≥30.0	684 (18.4)	
Provenance before nursing home		
Home	2899 (52.5)	
Acute care	1759 (31.8)	
Other nursing home	543 (9.8)	
Unknown	326 (5.9)	
Recent medical history		
Hospitalized at least once in the last year	5387 (97.5)	
Lost any weight in the last two months	1973 (35.7)	
Fell at least once in the last year	2395 (43.3)	
Is prescribed oral nutritional supplements	432 (7.8)	
Number of drugs prescribed		8 (4)

*GIR: Groupe Iso-Ressources, inversely reflecting dependency for activities of daily living

The results of the survival model were presented in Table 2. Multimorbidity and dependence were both significantly associated with an increased 18-month mortality (Hazard Ratio (HR)=1.10; CI 95% [1.04 - 1.17] and HR=1.30; CI 95% [1.22 - 1.38], respectively), whereas their interaction was not (HR=0.99; CI 95% [0.98 - 1.01]).

Female gender, BMI 25–29.9, BMI ≥30 and dementia were significantly associated with a decreased risk of 18-month mortality in nursing home residents (HR=0.62; IC [0.55-0.70], HR=0.73; IC [0.63-0.86], HR=0.69; IC [0.56-0.85] and HR=0.83; IC [0.75-0.93] respectively). Conversely, age (categorical covariate), BMI ≤18.5, oral nutritional supplements intake, physical restraint and polypharmacy were significantly associated with an increased risk of 18-months mortality in nursing home residents ($p < .001$, HR=1.31; IC [1.07-1.60], HR=1.33; IC [1.15-1.55], HR=1.34; IC [1.21-1.49], HR=1.02; IC [1.01-1.04] respectively).

Discussion

Higher multimorbidity and higher dependence were both independently associated with a higher 18-month mortality in nursing home residents. Yet, the size effect of dependence on mortality was not affected by multimorbidity, and the size

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Table 2

Cox model: 5527 observations, 163 nursing homes, 1554 deaths, time at risk 88,984.1 months, p value <.001

		Hazard Ratio	p-value	95% CI	
Charlson comorbidity index		1.10	0.001	1.04	1.17
GIR*		1.30	<.001	1.22	1.38
Interaction Charlson-GIR		0.99	0.505	0.98	1.01
Age (y)	<75	1.00			
	75-85	1.75	<.001	1.36	2.25
	85-90	2.42	<.001	1.87	3.13
	≥90	3.08	<.001	2.39	3.98
Female gender		0.62	<.001	0.55	0.70
Other comorbidities	Dementia	0.83	0.001	0.75	0.93
	Screams	1.10	0.162	0.96	1.27
	Physical restraint	1.34	<.001	1.21	1.49
	Depression	0.94	0.246	0.85	1.04
	Pain	1.11	0.108	0.98	1.25
Body Mass Index (kg/m ²)	< 18.5	1.31	0.010	1.07	1.60
	[18.5-25.0[1.00			
	[25.0-30.0[0.73	<.001	0.63	0.86
	≥30.0		8 (4)	0.56	0.85
Provenance before nursing home	Home	1.00			
	Acute care	0.98	0.764	0.86	1.11
	Other nursing home	0.86	0.091	0.73	1.02
	Unknown	0.91	0.360	0.73	1.12
Hospitalized at least once in the last year		1.46	0.117	0.91	2.36
Lost any weight in the last two months		1.08	0.121	0.98	1.20
Is prescribed oral nutritional supplements		1.33	<.001	1.15	1.55
Fell at least once in the last year		1.03	0.656	0.92	1.15
Per additional drug prescribed (polypharmacy)	1.02	0.005	1.01	1.04	

*:GIR: Groupe Iso-Ressources, inversely reflecting dependency for activities of daily living. This variable was inverted to directly reflect dependency (e.g. GIR 6 was transformed into 1, GIR 5 into 2, etc.); Note: Age and body mass index were significantly associated with the risk of death (p-value <.001) whereas provenance before nursing home was not (p-value 0.31).

effect of multimorbidity on mortality was not affected by dependence, as informed by a non-significant association of the interaction term with mortality.

This study provided clinicians with two simple indicators, i.e. higher multimorbidity and higher dependence, which could be used in routine by primary care providers to identify nursing home residents requiring palliative care. Beyond their identification, prioritizing these nursing home residents for advance care planning would more effectively give them actual access to palliative care through individually tailored goals of care.

In France, primary care physicians and nursing home medical directors are respectively responsible for individual and collective care decisions, including palliative care

provision. In some situations, medical directors could implement strong facility-wide palliative care policies that will remain inaccessible to nursing home residents in a palliative situation until their primary care physician identifies the situation as such. Joint evaluation through consensual measurable indicators like multimorbidity and dependence could help solve these situations and give more nursing home residents access to palliative care.

Further research could include interventional studies to evaluate prospectively this simple identification strategy on patient-reported outcomes.

The literature on palliative care for nursing home residents and particularly on the identification of nursing home residents requiring palliative care is very scarce despite the growing

prevalence of these situations. To our knowledge, this study is the first on this issue that was performed on a French population.

The large number of participants in this multicenter study and their characteristics suggest the participants were a representative sample the French population living in nursing homes. nursing home residents were similar in terms of age (median of 87.5 years in our sample and in nursing home residents in France in 2015), proportion of female gender (73.8 vs 73.6% respectively) and level of dependence (51.7% of were GIR 1 or 2 vs 54% in nursing home residents in France in 2015) (11).

Results on covariates in the multivariate survival model concur with known risk factors for mortality in nursing home residents, including age (8, 12), gender (8, 13), BMI \leq 18.5 (14), BMI \geq 25 (14), dementia (15) and polypharmacy (13).

A confounding bias could have been introduced in the interpretation of results due to the exclusion of some variables from the survival model, despite a rationale in the literature for including them. These variables, like recent transfer to an emergency department or pressure ulcers, were excluded after they were found to violate proportional hazards assumption.

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