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Original Study

Lack of Energy and Negative Health-Related Outcomes in Nursing Home Residents: Results From the INCUR Study

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A B S T R A C T

Objective: "Lack of energy" or anergia is a common complaint associated with adverse outcomes in older people. There is a lack of knowledge on this symptom in the nursing home (NH) setting. The aim of this study was to investigate whether lack of energy was associated with hospitalization and mortality in NH residents.
Design: Longitudinal observational cohort study.
Setting and Participants: A total of 575 NH residents (72% women) in 13 French NHs from the Incidence of pNeumonia and related ConseqUences in nursing home Residents (INCUR) study cohort.
Measurements: Lack of energy was measured at the baseline visit as part of the 10-item Geriatric Depression Scale. Unadjusted and adjusted Cox proportional hazard regression models were performed to test the association of lack of energy with hospitalization events and mortality over 12 months of follow-up.
Results: The mean age of the study sample was 86.3 (SD = 7.5) years. At the baseline, 250 (43.5%) residents complained about lack of energy. Overall, 192 (33.4%) individuals experienced at least 1 hospitalization event and 98 (17.0%) died during the 12-month follow-up. Lack of energy was significantly associated with a higher risk of hospitalization (HR 1.35; 95% CI 1.02–1.80; $P = .03$), even after adjustment for potential confounders (HR 1.41; 95% CI 1.04–1.91; $P = .02$). No statistically significant association was found between lack of energy and 12-month mortality.
Conclusion: Lack of energy is a predictor of hospitalization in older people living in NHs. It may be considered a relevant clinical feature for identifying individuals at risk of adverse health outcomes, thus potentially serving as a screening tool for subsequently conducting a comprehensive geriatric assessment in this highly vulnerable and complex population.

Symptoms represent common and burdening problems for older individuals, especially for those affected by multiple chronic diseases.[1,2] They indeed affect the individual's quality of life and functioning, may represent risk factors, and are responsible for increased health care utilization and associated costs.[3,4] Therefore, their identification, assessment and treatment should be considered a priority issue by geriatricians and other specialists who provide medical care to older adults.

Self-perceived lack of energy or *anergia* is one of the symptoms frequently complained about by older individuals in clinical practice. In a previous report, the prevalence of at least 1 complaint related to lack of energy has been estimated to be 66% in a multiethnic cohort of community-dwelling older adults.[5] In a recent study, almost 1 of 2 comorbid older persons reported having

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experienced lack of energy during the previous week, with consequent high levels of distress.[2]

Lack of energy has a multidimensional nature and it has been shown to be associated with multiple detrimental conditions, including reduced physical, cognitive, psychological, and social function.[5] Subjects reporting lack of energy present increased health care services utilization (eg, higher hospitalization rate and number of outpatient visits). This symptom is also predictive of mortality in older persons.[5] Studies in the field of cardiovascular syndromes confirm the association of lack of energy with multiple comorbid conditions, reduced functional capacity, quality of life, and subsequent adverse health-related events.[6,7]

The complaint of lack of energy resembles the analogous concept of fatigue, one of the core features of the frailty syndrome, and more widely studied in the literature.[8–10] It is noteworthy that measures of lack of energy, often derived from scales assessing depressive symptoms, have been used as a legitimate surrogate of fatigue in several studies.[11,12]

Despite its relevance for older patients and health care systems, the burden of anergia has been rarely investigated in nursing home (NH) settings. Typically, the vast majority of institutionalized older adults are characterized by high vulnerability and clinical complexity. Moreover, they are susceptible to experience acute diseases or a worsening of chronic conditions, leading to adverse outcomes, such as hospitalization.[13] In the present study, we hypothesized that the self-reported lack of energy symptom might serve as predictor of negative outcomes even among the most complex geriatric patients as those residing in NHs. Thus, our aim was to investigate the potential association between lack of energy and 2 clinically significant outcomes (ie, hospitalization and mortality) in NH residents.

Methods

Study Design and Participants

Data were obtained from the Incidence of pNeumonia and related ConseqUences in nursing home Residents (INCUR) study, a NH cohort study. The rationale and methodology of the INCUR project have been previously described in detail.[14]

Briefly, the primary aim of INCUR was to estimate the incidence, the clinical consequences, and the economic burden of pneumonia in older persons living in French NHs. In the INCUR project, 800 residents of 13 randomly selected nursing homes in the Midi-Pyrenees region of France were recruited. The main eligibility criteria were as follows:

(1) age of 60 years and older;
(2) a functional status ranging from 2 to 5 from the *Autonomie Gérontologie – Groupes Iso-Ressources* (AGGIR) scale. The AGGIR scale is an administrative tool used in France to score the functional status of the individual. A range between 2 and 5 as applied in INCUR excludes patients with total disability and those with no impairments in basic activities of daily living;
(3) a minimum of 30 days since admission to the NH.

Data were collected at baseline, and after 6 and 12 months of follow-up. Follow-up visits were designed to repeat the multidimensional evaluation already conducted at baseline, and ascertain the possible onset of major health-related events.

The Ethics Committee of the Toulouse University Hospital approved the study. All participants were informed about the conducted research activities and were free to decline their participation at any time.

The present analyses were conducted in 575 individuals, after exclusion of 225 individuals who had missing data for the main measures of interest. There were no significant differences in age, stroke prevalence, and number of chronic diseases between participants included versus those excluded from the present analyses. However, more women (81.4% vs 72.0%, $P = .007$) and patients with dementia (86.5% vs 55.2%, $P < .01$) were present in the group of participants excluded from the present study sample.

Lack of Energy Assessment

Lack of energy was defined at baseline according to the answer provided by participants to the following question included in the 10-item Geriatric Depression Scale (GDS)[15]: "Do you feel full of energy during the past week?" Patients who responded "no" to this question were classified as presenting the independent variable of interest (ie, lack of energy).

Outcome Measurement

Primary outcomes of interest for the present analyses were (1) hospitalization, and (2) death. During each assessment conducted at the 6- and 12-month visits, data on acute events as well as emergency room and hospital admissions occurred during the previous 6 months were collected. For this scope, the study staff was trained at retrieving information from patients' medical records and charts, and interviewing the NH personnel and proxies of participants. Moreover, between the clinical visits, the onset of the health-related events experienced by the INCUR participants was monitored through regular contacts between the study staff and the NH personnel. If an event had occurred during the previous semester, information was collected and recorded about its nature and probable causes. Hospitalization was defined as any overnight stay in the hospital due to an acute illness.

Other Variables

Data collected also included sociodemographic characteristics, comorbidities (ie, hypertension, cardiac disease, diabetes, respiratory disease, osteoarthritis, dementia, stroke, and cancer), and functional status evaluated using basic activities of daily living scale (ADLs).[16] Depression was assessed with the 10-item Geriatric Depression Scale (GDS),[15] but the item defining lack of energy (condition of interest for the present study) was excluded from the computation of the total score (used as potential confounder of the analyses).

Statistical Analysis

Chi-squared tests and *t* tests were used to compare baseline characteristics according to the 2 outcomes of interest. Cox proportional hazard regression models were fitted to evaluate the association between lack of energy and the 2 outcomes, hospitalization and death, adjusting for age, gender, and other potential confounders. Hazard ratios (HRs) and 95% confidence intervals (95% CIs) were reported.

For hospitalization, individuals who died were censored at time of death, those who experienced a hospital admission were censored at the time of the first hospital admission, and other persons surviving were censored at the last follow-up measurement at 12 months. For mortality, those who died were censored at time of death; the surviving participants were censored at the last follow-up measurement at 12 months.

Statistical significance was defined as $P < .05$. All analyses were performed with SPSS statistical software version 20 (IBM Corp, Armonk, NY).

Results

Overall, among the 575 residents (mean age: 86.3 [SD 7.5] years; women 72.0% [n = 414]), 250 (43.5%) reported lack of energy at the

Table 1
Baseline Characteristics of the Study Sample (n = 575) According to Presence of "Lack of Energy"

Variable	Lack of Energy				
	No		Yes		P*
	n	% or Mean (SD)	n	% or Mean (SD)	
Age, y	325	85.6 (7.6)	250	87.2 (7.1)	.01
Women	227	69.8	187	74.8	.19
Education, y	266	8.4 (3.0)	210	8.4 (3.4)	.78
Hypertension	201	62.2	154	61.6	.88
Cardiac disease	128	40.3	113	45.6	.21
Diabetes	47	14.5	41	16.5	.52
Respiratory disease	30	9.3	35	14.2	.07
Osteoarthritis	79	24.4	64	25.8	.70
Dementia	189	59.4	122	49.8	.02
Stroke	43	13.3	27	11.1	.43
Cancer	47	14.7	39	15.8	.72
ADL score, 0–6	320	3.0 (1.7)	249	2.4 (1.7)	<.001
9-item GDS score†	325	1.8 (1.9)	250	3.4 (2.2)	<.001

The total n may vary in baseline characteristics due to missing values (age, gender, and 9-item GDS score have no missing values).
*Based on χ^2 test and *t* test.
†Nine-item GDS score was computed excluding the "lack of energy" item.

baseline. Main characteristics of the study sample according to the presence or absence of lack of energy are presented in Table 1. NH residents reporting lack of energy were older (mean age: 87.2 [SD 7.1] vs 85.6 [SD 7.6], $P = .01$), more disabled (mean ADL score: 2.4 [SD 1.7] vs 3.0 [SD 1.7], $P < .001$), and presented more depressive symptoms (mean 9-item GDS score: 3.4 [SD 2.2] vs 1.8 [SD 1.9], $P < .001$) and a lower prevalence of dementia (49.8% [n = 122] vs 59.4% [n = 189], $P = .02$) compared with those without the symptom of interest.

Table 2 shows the baseline characteristics of NH residents according to the study outcomes. A total of 192 (33.4%) older adults experienced at least 1 hospital admission during the follow-up period. Baseline prevalence of lack of energy was higher in residents who experienced hospitalization events (49% [n = 94] vs 40.7% [n = 156], $P = .06$). Among comorbidity, only respiratory disease was significantly associated with hospitalization (15.9% [n = 30] vs 9.3% [n = 35], $P = .02$). A total of 98 (17%) older adults died during the 12-month follow-up. There was no significant difference in prevalence of lack of energy (43.9% [n = 43] vs 43.4% [n = 207], $P = .93$) according to vital status at the end of the study. Those who died were older than survivors (mean age 88.7 [SD 7.1] vs 85.8 [SD 7.4], $P < .01$), less likely to be women (58.2% [n = 57] vs 74.8% [n = 357]; $P < .01$), and were more functionally impaired (mean ADL score 2.4 [SD 2.0] vs 2.8 [SD 1.8]; $P = .03$).

Lack of energy was significantly associated with a higher risk of hospitalization during follow-up (HR 1.35, 95% CI 1.02–1.80; $P = .03$). This association remained significant even after adjustment for age and gender (Model 1: HR 1.36, 95% CI 1.02–1.82; $P = .03$) and additionally baseline GDS score (Model 2: HR 1.41, 95% CI 1.04–1.91; $P = .02$). Differently, no statistically significant association was reported between lack of energy and 12-month mortality (Table 3). The inclusion of comorbidities (hypertension, cardiac disease, diabetes, respiratory disease, osteoarthritis, dementia, stroke, and cancer) and ADL score as additional covariates did not substantially modify the study findings for both outcomes (results available on request).

Discussion

In the present longitudinal study, lack of energy was highly prevalent (43.5%) in NH residents. Moreover, it was shown to be an independent predictor of hospitalization in this population.

To our knowledge, lack of energy has never been specifically investigated in NHs. Consistent with a previous study performed in community-dwelling older persons,[5] this symptom was found to be associated with advanced age and poor functional status. However, different from the general population, no specific clinical condition was more frequently associated with the lack of energy. Such finding could be explained by the high prevalence of comorbidities in the NH population. This may lead to a clinical complexity generated by the weakening of the traditional definitions of "disease" in favor of intricate interactions and overlapping of multiple unclear nosologic entities. Concerning the lower rate of dementia among residents with lack of energy, it is likely that the inability to answer questions might have introduced a selection bias in our sample by excluding residents with (more advanced stages of) cognitive impairment. Looking at the higher number of depressive symptoms among residents reporting lack of energy, it should not be underestimated that the variable of interest was operationalized using an item coming from the GDS scale. Nevertheless, the association between lack of energy and negative outcomes was not modified after additional adjustment for the remaining GDS items. Moreover, a hypothetical vicious cycle existing

Table 2
Baseline Characteristics of the Study Sample (n = 575) According to Hospitalization and Death Events

Variable	Hospitalization					Death				
	No		Yes		P*	No		Yes		P*
	n	% or M (SD)	n	% or M (SD)		n	% or M (SD)	n	% or M (SD)	
Age, y	383	86.1 (7.8)	192	86.8 (6.6)	.26	477	85.8 (7.4)	98	88.7 (7.1)	<.01
Women	283	73.9	131	68.2	.15	357	74.8	57	58.2	<.01
Education, y	316	8.4 (3.3)	160	8.5 (3.2)	.64	398	8.5 (3.3)	78	7.9 (3.1)	.11
Hypertension	234	61.3	121	63.4	.63	293	61.7	62	63.3	.77
Cardiac disease	152	40.3	89	47.1	.12	194	41.5	47	48.0	.24
Diabetes	57	14.9	31	16.2	.68	72	15.2	16	16.3	.77
Respiratory disease	35	9.3	30	15.9	.02	52	11.0	13	13.5	.48
Osteoarthritis	98	25.7	45	23.7	.61	123	25.9	20	20.4	.25
Dementia	204	54.4	107	56.9	.57	268	57.5	43	44.3	.02
Stroke	49	13.0	21	11.1	.52	57	12.2	13	13.4	.73
Cancer	64	16.9	22	11.6	.10	73	15.5	13	13.4	.59
ADL score (0–6)	380	2.8 (1.8)	189	2.7 (1.8)	.60	472	2.8 (1.8)	97	2.4 (2.0)	.03
9-item GDS score†	383	2.5 (2.3)	192	2.5 (2.1)	.74	477	2.5 (2.2)	98	2.5 (2.4)	.28
Lack of energy	156	40.7	94	49.0	.06	207	43.4	43	43.9	.93

The total n may vary in baseline characteristics due to missing values (age, gender, and 9-item GDS score have no missing values).
Values are presented as percentages or means (SD).
*Based on χ^2 test and *t* test.
†Nine-item GDS score was computed excluding the "lack of energy" item.

Table 3
Association of Lack of Energy With Hospitalization and Mortality Over 12-Month Follow-up

	Unadjusted HR (95% CI)	*P*	Model 1 HR (95% CI)	*P*	Model 2 HR (95% CI)	*P*
Hospitalization						
n events/total n = 192/575	1.35 (1.02–1.80)	.03	1.36 (1.02–1.82)	.03	1.41 (1.04–1.91)	.02
Mortality						
n events/total n = 98/575	1.03 (0.69–1.54)	.87	0.96 (0.64–1.43)	.84	0.96 (0.62–1.47)	.83

Model 1: Adjusted for age and gender.
Model 2: Adjusted for age, gender, and baseline GDS score (9 items, excluding the "lack of energy" item).

among fatigue, depression, and pain has been evoked in the literature.[17]

Our findings extend available evidence for the association existing between lack of energy and increased health care utilization described in community-dwelling older individuals. Cheng et al[5] indeed showed that the number of emergency room visits and hospitalizations were almost doubled in individuals with anergia.

A better established association has been documented between hospitalization and fatigue in the literature.[18] Fatigue is the fifth main cause for visiting an emergency department among older adults.[19] Unfortunately, little research has been performed on this issue in NH settings and available studies specifically focused on fatigue all adopted cross-sectional designs.[20,21] In a retrospective study exploring symptoms associated with hospitalization occurring among NH residents, fatigue, lethargy, tiredness, or weakness were the most frequently reported symptomatology, documented by 23% of the residents who had experienced the event.[22] Moreover, a longitudinal study showed that residents with dementia from assisted living facilities with fatigue had a higher risk of hospitalization.[23]

In contrast to the evidence from the community-dwelling population,[5] in our study, lack of energy was not associated with mortality among NH residents. Our findings may suggest that in this setting lack of energy may not be sufficiently discriminatory of the mechanisms leading to fatal events. It is plausible that the perception of lack of energy may not capture all mortality-related factors due to a "floor effect" (ie, persons at risk of dying are not able to report the lack of energy due to their unhealthy conditions). At the same time, it cannot be excluded that the lack of energy symptoms may represent the clinical expression of an acute or subacute underlying process that could carry to the unstable condition requiring the hospitalization (but not necessarily the death) of the resident.

Our findings highlight the need of a better consideration of the perception of lack of energy in older people living in NHs. The recognition and alleviation of relevant symptoms are essential aspects of clinical care in multimorbid patients to improve their quality of life. The current health care system, still focused on specific diseases approach, is not suitable for older people with highly complex profiles. Moreover, an "ageist" perspective of physicians could often lead to an underestimation of some symptoms (eg, fatigue, anergia, pain) and limit access to possible interventions.[24,25]

To date, no symptomatic treatment exists for the lack of energy (and it is still not sufficiently investigated). Therefore, the only possibility of alleviating or resolving this symptom is by the detection and targeting the underlying causes. In this context, health care professionals taking care of older residents should consider the patient's perception of lack of energy as a warning sign, an "alert" for negative events requiring the adoption of a careful multidimensional evaluation. Difficulties in detecting early manifestation of pathological conditions complicate and delay the diagnostic process and the adoption of adequate interventions in older adults, which often have altered presentations of illness. Lack of energy may be a potentially easily identifiable and thus suitable parameter, especially in those clinical settings with scarcity of resources and difficult access to instrumental examinations, as NHs are. In other words, the lack of energy symptom may indeed play a role for the screening of appropriate patients requiring a comprehensive geriatric assessment.[26,27]

Nonetheless, the lack of energy symptom remains a difficult challenge and research focusing on it is still too scarce. Several issues related to its pathophysiological mechanisms, its definition, and its measurement need to be addressed. The recognition of which measure could be more appropriate and clinically relevant for capturing the subjective perception of "scarcity of energy" among the heterogeneous older population (including cognitively impaired individuals) should be addressed. This step may help researchers to test novel pharmacological or nonpharmacological interventions against this condition.

The main strengths of our results are the analyses of a large sample size and the longitudinal evaluation. Our study also presents major limitations. The operationalization of lack of energy adopted in this report is derived from a well-validated depressive symptoms scale (ie, GDS); however, the robustness of such definition might be arguable. For example, our definition may better capture the mental component of lack of energy, neglecting the physical one also constituting this complex symptom. Therefore, our findings should be considered as preliminary and require further confirmation by studies adopting more accurate definitions of anergia. As mentioned, residents unable to answer to the GDS questionnaire (and excluded from the analyses) might have presented an overall poorer health status compared with those included in our sample. This bias might have underestimated the strength of the association between lack of energy and hospitalization. Finally, factors not considered in the present analyses (eg, drugs, severity of clinical conditions, characteristics of the specific NHs, specific pathophysiological modifications such as inflammation) might explain our findings differently.

Conclusion

The present study shows that lack of energy is a highly prevalent symptom that significantly affects NH residents' risk profile. The perception of lack of energy has a great relevance predicting a clinically relevant outcome such as hospitalization, also in such a particularly complex population. The evaluation of the perception of lack of energy may allow physicians to recognize older individuals at risk of adverse health outcomes, improving their clinical evaluation and management. An accurate assessment of this symptom should be added in the routine clinical practice. Our findings support the possible role of the anergia symptom as a screening criterion for addressing the older individual to a comprehensive geriatric assessment, even in the NH setting. Future research is required to develop novel strategies specifically targeting this symptom.

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