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ORIGINAL PAPER

COMPREHENSIVE LONG-TERM CARE: OBSERVATIONS ON CAPACITIES, GAPS, AND INTERINSTITUTIONAL COLLABORATION

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Summary

Background. Population aging in Poland increases demand for long-term care and intensifies contacts between residents of long-term care facilities (LTCF) and emergency medical services (EMS) and emergency departments (ED). The aim of the study was to provide a concise assessment of the clinical profile and service use in a single LTCF in 2020-2024 and to identify independent predictors of adverse outcomes.

Material and methods. This retrospective observational study included all residents of an LTCF in the Masovian Voivodeship with 50 beds. Administrative and clinical data were analyzed for admissions, discharges, deaths, EMS interventions, and scheduled transports for diagnostics and consultations. Clinical variables included: age, gender, diagnoses coded with ICD-10, functional status.

Results. We included 118 residents with a mean age of 84 years. More than half had dementia diagnoses. The greatest organizational burden came from scheduled transports for diagnostics and consultations, which exceeded emergency interventions.

Conclusions. In the LTCF population, prognosis is driven mainly by advanced age and frailty severity measured by functional status. Findings support early risk stratification based on age and function as a rapid substitute for a comprehensive geriatric assessment (CGA), preference for on-site stabilization with teleconsultation when red flags are absent, and development of pathways outside the ED.

Keywords: multimorbidity, institutional care, frailty, long-term care, geriatrics

Introduction

At the system level, Poland faces rapid population aging. According to projections from the Central Statistical Office and other institutional analyses, the share of people aged ≥ 65 years will exceed 30% around 2050. Some public administration reports indicate approximately 33%. This places Poland among the fastest-changing countries in the EU [1-3].

Residents of long-term care facilities (LTCF) including nursing homes (NH), assisted living facilities (ALF), and skilled nursing facilities (SNF) form a growing group that requires care, diagnostic evaluation, contact with the health service including primary care (PC) and specialist outpatient care (SOC), and emergency medical services (EMS) interventions. This reflects population aging, multimorbidity, and increasing cognitive impairment. Given limited geriatric resources and weak integration among PC, SOC, emergency departments (ED), EMS,

and LTCF, rapid and accurate stratification of clinical and organizational risk is crucial. Frailty sits at the center of prognostic understanding in this population. It is a state of reduced physiological reserve in which even minor stressors, such as infection, dehydration, or a fall, trigger disproportionate decompensation. Frailty consistently correlates with poorer outcomes, including increased mortality. In prehospital practice, a useful indirect marker is functional dependence, which is easy to assess at the bedside within minutes. When operationalized by simple functional measures, frailty may serve both as a prognostic predictor and as a driver of care costs [4,5].

Compared with community-dwelling older adults in Poland, EMS interventions show several stable system features. The vast majority of calls occur at the place of residence (92.5%). The average on-scene time is about 20 minutes. Transport to the ED occurs in nearly 70% of cases. About one third of responses use lights and sirens. Cardiovascular conditions are most frequently diagnosed (40%). This illustrates the limits of prehospital diagnostics and the need to make decisions with incomplete information. These realities are an important reference point for LTCF, where frailty and functional dependence often exceed those of community peers. As a result, what justifies frequent ED transports in the general population requires a careful balance of benefit versus risk in LTCF. It may favor alternative pathways, such as stabilization in place or targeted transport to a ward aligned with the dominant problem [6,7].

LTCF residents, although a minority among older adults, generate a disproportionately high share of emergency responses and hospitalizations. In the UK analyses, they accounted for approximately 6.5% of ED visits and 8% of emergency admissions among those aged ≥65 years. The prevalence of dementia was very high at about 66%, and life expectancy was limited in advanced dementia [8,9].

Despite this, decisions to transfer LTCF residents to the ED remain heterogeneous. A systematic review shows that 4-55% of transports may be inappropriate or potentially avoidable. The most common indications include falls, altered mental status, and infections. Nonclinical factors also matter, such as family expectations, perceived benefits of ED attendance, and local organizational patterns. Excess or unnecessary ED transfers expose frail patients to iatrogenic harm, delirium, and functional decline. A synthesis of transfer-related risks notes that, in addition to a high proportion of potentially inappropriate transfers (4-55%), some patients die during transport or in the ED (1-2%). Many experience in-hospital complications, including delirium, infections, and iatrogenic injuries. In-hospital mortality after admission reaches 6-25%. Together, these data argue for caution against mechanical escalation

of care. Transfer decisions are influenced not only by clinical status but also by "power dynamics" and legal anxieties among staff. Qualitative syntheses show that families often act as dominant decision-makers. When rapid community services are unavailable, clinicians more often choose ED transfer as the safest procedural option. Such choices are more frequent outside regular hours, with limited access to a PC physician and thinner nursing coverage. These factors have been directly identified as drivers of unnecessary transfers [10].

In light of international findings, recommendations to reduce unnecessary transfers include system-wide care plans, better access to family physicians and community teams outside regular hours, strengthening nursing staffing and competencies in facilities, developing telemedicine, and creating coherent intersectoral communication pathways. Qualitative reviews also indicate that effective interventions must address the central role of the family in decision-making and reduce legal anxiety among staff. Otherwise, the default pressure toward the ED will persist regardless of objective clinical status [11-13].

Against this background, several gaps limit comprehensive care in LTCF:

- limited bedside and on-site diagnostics, with no X-ray, ultrasound (US), Holter monitoring, and sometimes no electrocardiography (ECG),
- need for external transport for elective and urgent tests,
- no constant, immediately available physician consultation at night and on holidays,
- limited access to intensive rehabilitation and continuous occupational therapy,
- lack of family-integrated contingency plans for acute deterioration,
- limited access to telemedicine,
- insufficient collaboration pathways with PC, SOC, ED, and EMS.

In practice, an LTCF provides nursing care, medical oversight to varying degrees, prescribing, and access to a physiotherapist. Yet, for imaging such as X-ray or for specialist consultations, the patient often needs ambulance transport. In acute deterioration, EMS intervenes, and the ED decision is often made with incomplete information and under organizational pressure [14,15].

Aim of the work

The aim of this study is to provide a concise assessment of the care profile and its dynamics within an LTCF. We conducted a five-year retrospective analysis (2020-2024)

covering patient flow (admissions, discharges) and events beyond facility capacity, including EMS interventions and scheduled ambulance transports, among them imaging diagnostics.

Material and methods

Study design

We conducted a five-year retrospective analysis of resident stays in an LTCF. The study period was from Jan 01, 2020, to Dec 31, 2024. It covered "patient flow", i.e. admissions and discharges, in a facility with a capacity of 50 beds. Data were obtained from internal records of an LTCF in the Masovian Voivodeship, Poland. The provider operates under a nursing-care profile.

Variables extracted from the records included: year of admission, age and gender, length of stay in months, main indication for care (index disease), coexisting deficits, level of physical and mental functioning, signaling of basic needs, discharge mode, and procedures beyond facility capacity. These procedures comprised EMS interventions and scheduled ambulance transports for procedures, specialist consultations, and tests, including imaging. Medical diagnoses were coded using ICD-10 [16].

Statistical analysis

Results are presented as mean and standard deviation (SD) for continuous variables and as absolute numbers and percentages for categorical variables. The Kolmogorov–-Smirnov test assessed distribution normality. Because several continuous variables departed from normality, group comparisons were performed in parallel with one-way ANOVA and the nonparametric Kruskal-Wallis test. Correlations between continuous or ordinal measures were quantified using Spearman's rank correlation. Qualitative variables were compared with the chi-squared test. For 2×2 tables, odds ratios (ORs) with 95% confidence intervals (CIs) were calculated, and Fisher's exact test was applied when expected cell counts were small. Regression results are reported as ORs with 95% CIs and two-sided *p*-values. Missingness was inspected. Variables entering the multivariable model had near-complete data, and analyses used a complete-case approach. A p-value <0.05 was considered statistically significant. All analyses were performed in Statistica 13.0 (StatSoft, Tulsa, OK, USA).

Results

Cohort characteristics

We included 118 residents: 86 women (72.9%) and 32 men (27.1%). The mean age was 84.1±8.0 years, and the mean length of stay was 11.0±10.5 months. The years 2023-2024 dominated the dataset (51.7%). Persons aged ≥85 years comprised 55.1%, and 53.4% stayed ≤9 months. Marked functional dependence (wheelchair or bedbound) was common at 48.3%. A total of 54.2% signaled their basic physiological needs. At database lock, 35 residents (29.7%) remained in the LTCF, and 83 (70.3%) had left. Among discharge modes, death was most frequent (34.7%), followed by discharge home (28.0%). Dementia syndromes dominated the diagnostic profile (Alzheimer's disease plus other dementias together 57.0%), followed by post-trauma/fracture states (15.3%) and stroke (7.6%) (Table 1). Events beyond facility capacity, defined as at least one event per person, were as follows: EMS intervention in 12 residents (10.2% of the cohort) and scheduled ambulance transport for tests, consultations, or procedures in 27 residents (22.9%).

Table 1. General characteristics of the study group

Variable	Category	n	%
Year	**2024**	30	25.4
	2023	31	26.3
	2022	22	18.6
	2021	23	19.5
	2020	12	10.2
Gender	**Female**	86	72.9
	Male	32	27.1
Age	**≥90**	38	32.2
	85-89	27	22.9
	75-84	36	30.5
	<75	17	14.4
Length of stay in the facility (months, categories)	**≤4**	32	27.1
	4-9	31	26.3
	9-12	26	22
	>12	29	24.6
Physical functioning	**Dependent/marked**	57	48.3
	Independent/good	28	23.7
Signals basic physiological needs	**Yes**	64	54.2
	No	36	30.5

	Mixed	18	15.3
Currently in the facility (1 = yes, 0 = no)	**No**	83	70.3
	Yes	35	29.7
Discharge reason (clinical)	**Death**	41	34.7
	Discharge home/independent	33	28
	Transfer (hospital/SNF/other)	7	5.9
	Missing data	37	31.4
Transfer to hospital/SNF	**Yes**	11	9.3
Index diagnosis	**Alzheimer's disease**	34	28.8
	Dementia	33	28
	Post-trauma/fracture	18	15.3
	Post-stroke	9	7.6
	Heart failure	6	5.1
	Mental disorders	4	3.4
	Obesity	3	2.5
	Malignancy	3	2.5
	Osteoarthritis	3	2.5
	Hearing loss/blindness	2	1.7
	Parkinson's disease	2	1.7
	Respiratory failure	1	0.8
Comorbid diagnoses	**Hearing loss/blindness/speech disorders**	7	5.9
	Diabetes	4	3.4
	Post-trauma/fracture	4	3.4
	Heart failure	4	3.4
	Lung disease	4	3.4
	Dementia	4	3.4
	COVID-19	4	3.4
	Mental disorders	4	3.4
	Memory disorders	3	2.5
	Osteoarthritis	3	2.5
	Wheelchair user	3	2.5
	Heart failure	1	0.8
	Other	91	77.1
Transport – destination	**Specialist outpatient clinic**	21	17.8
	Hospital ward	6	5.1

Year-by-year analysis

Length of stay differed by year (ANOVA $p<0.001$): shortest in 2023 (mean 6.42±3.10 months; n=31) and longest in 2020 (28.75±18.01 months; n=12). Age did not differ across years ($p=0.166$). There were no differences in the rate of discharges home ($p=0.823$) or transfers to

hospital/SNF (p=0.952). Annual event rates per 100 residents for EMS were: 8.3 (2020), 21.7 (2021), 9.1 (2022), 9.7 (2023), 3.3 (2024). This pattern indicates that logistical load arose mainly from scheduled transports rather than urgent EMS responses.

Comparisons across discharge modes

Age differed by discharge mode (ANOVA F=6.339; p=0.0028; Kruskal-Wallis H=10.706; p=0.0047). Decedents were oldest (87.0±6.4 years; n=41) versus those discharged home (81.0±9.0; n=33) and those transferred (80.9±8.2; n=7). Length of stay also differed (F=3.610; p=0.0317). This was longest among transfers (14.9±14.5 months), shorter among decedents (11.5±11.2), and shortest among those discharged home (6.5±4.7), consistent with rising needs and care complexity over time.

Correlations

The association between age and length of stay was positive but not significant (r=0.156; p=0.092). Length of stay showed no significant link with physical functioning on either ordinal or dichotomized scales.

Univariate analyses

Functional dependence (wheelchair or bedbound) was associated with an almost fourfold increase in odds of death versus other functioning categories (OR=4.099; 95% CI 1.83-9.18; p<0.001). Lack of signaling of basic needs suggested higher risk (OR=2.143; 95% CI 0.963-4.766; p=0.092). Male gender did not affect risk (OR=0.822; 95% CI 0.35-1.93; p=0.670).

Multivariable model

In a model including age (years), gender (male), length of stay (months), functional dependence (wheelchair or bedbound), and lack of signaling of basic needs (1 = yes), two independent predictors of death remained:

Age: OR=1.081 (95% CI 1.018-1.148; p=0.011), i.e. an 8.1% increase in odds per additional year; and functional dependence: OR=4.014 (95% CI 1.705-9.448; p=0.001).

Other variables were not significant (lack of signaling of basic needs: OR=2.033; 95% CI 0.839-4.927; *p*=0.116; male gender: OR=0.880; 95% CI 0.332-2.332; *p*=0.797; length of stay: OR=0.990; 95% CI 0.952-1.030; *p*=0.619) (Table 2).

Table 2. Multivariable logistic regression for death in the LTCF cohort

Variable	β coefficient	OR	95% CI (lower)	95% CI (upper)	*p*
Intercept	-8.096	<0.001	<0.001	0.056	0.002
Age (years)	0.078	1.081	1.018	1.148	0.011
Gender: male	-0.128	0.88	0.332	2.332	0.797
Length of stay (months)	-0.01	0.99	0.952	1.03	0.619
Functional dependence (wheelchair/bedbound)	1.39	4.014	1.705	9.448	0.001
No signaling of basic needs	0.71	2.033	0.839	4.927	0.116

Discussion

Our findings must be viewed in the context of structural deficits in elder care in Poland. Many reports point to the absence of a functional geriatric system amid rapid demographic aging, with outpatient and community gaps. In this setting, simple, early-available clinical markers such as age and functional dependence gain value as surrogates for a comprehensive geriatric assessment (CGA) at care touchpoints [17,18].

Across many studies, frailty is an independent determinant of death, while gender and length of stay add little prognostic information after adjustment. This profile aligns with the established role of frailty as a carrier of adverse risk in older adults and with reports that simple functional measures summarize physiological reserve well in prehospital settings [19-21]. Our results therefore support a front-line “age plus function” assessment for on-scene triage and destination decisions.

A defining feature of long-term care residents is multimorbidity with numerous nursing needs across physical, mental, and social domains. Holistic organization of care can yield therapeutic benefit. Interpreting our results in a broader context, a large share of transfers from an LTCF to the ED may be inappropriate or avoidable, and hospitalization carries material risks of adverse events and death. Family pressure for system-level care under limited access to PC drives many ED transfers [22]. Our data reflect similar practice. Even with well-organized institutional long-term care, transfers to the ED or for specialist tests remain unavoidable.

Other studies show that transfer decisions result from interactions among facility staff, family, and outside professionals, and that nonclinical factors, such as legal anxiety, lack of community services, family preferences, often drive choices. This helps explain real-world variability and argues for standardized communication and early goal-setting [23]. In our material, especially the loss of an independent effect of "lack of signaling needs" after adjustment, inconsistent definitions and documentation likely add to this variability.

A recent Swiss chart review by Zúñiga et al. distinguishes between inadequate visits (6%) and potentially avoidable visits for ambulatory care sensitive conditions (ACSC, 29%), with different resource and contextual patterns. This operational split is useful for designing fast-track pathways for common problems such as urinary tract infection (UTI) and exacerbations of heart or respiratory failure that can be managed outside the ED if monitoring and timely in-facility interventions are in place. Our finding that functional dependence flags high-risk patients fits this approach [24].

Polish EMS data confirm a high rate of transports to the ED (69%) and substantial prehospital pharmacotherapy (44%). This suggests that both ED load and the option to stabilize on scene are salient in our system. It supports a dual strategy: strengthening EMS and NH tools and skills for on-site management and developing alternatives to the "default ED" through targeted transport to wards aligned with the dominant clinical problem [8]. Another Polish analysis addresses pharmacotherapy in older adults with neurodegenerative disease [25].

Sullivan et al. note that age-related physiological change complicates trauma care in older adults. These changes affect nearly all organ systems, increase vulnerability to injury, and challenge teams seeking optimal care [26]. Our results are concordant. Physical functioning and the ability to signal basic needs were important observed variables.

According to Beaudart et al., frailty correlates with poor outcomes and higher health care use in geriatrics. Its prevalence is a challenge across settings, whether family-based or institutional. As a core component of chronic geriatric syndromes in an aging world, frailty has drawn broad research attention [27-29]. Frailty is also visible in our cohort.

Liu et al. highlight that in geriatric patients, the burden of frailty, driven by complex neural and muscular mechanisms, leads to progressive functional decline. Physical activity is widely recognized as an effective intervention in older adults. Institutional care offers access to allied professionals, including physiotherapists, who tailor activity programs to clinical status [30]. Our observation is consistent. Patients received care from rehabilitation specialists and physiotherapists.

Another study emphasized nutrition in geriatrics. Malnutrition or deficiency increases the likelihood of chronic disease exacerbation, while better nutrition is protective and helps preserve cognition [31]. Although nutrition was not an exposure in our study, and we did not analyze it as a variable, long-term institutional care enables professionally planned, balanced diets. Nutrition should be integrated into comprehensive long-term care.

Limitations

This was an observational, retrospective study. Causal inference is not possible, and unmeasured confounding may persist. Data came from a single LTCF with an NH profile, which limits generalizability. Some variables had low resolution or subjective elements, especially functional dependence and signaling of needs.

We did not capture pharmacologic treatments or downstream clinical courses after EMS transfer. Records from subsequent hospital care were unavailable. The authors also lacked data on patients' chronic home medications.

Our results do not include variables related to the COVID-19 pandemic. Our observation period began during the pandemic-prone period (2020), which may have influenced differences in length of stay.

Conclusions

Prognosis in LTCF residents is driven mainly by age and functional dependence. Incorporating frailty should underpin early risk stratification. System load stems chiefly from scheduled transports for diagnostics and consultations rather than EMS emergencies, which exposes gaps in outpatient access. In practice, an age-and-function screen is recommended as a rapid substitute for CGA, with preference for on-site stabilization and teleconsultation when red flags are absent. For frequent indications such as UTI, exacerbation of heart failure or chronic obstructive pulmonary disease (COPD), and falls without head injury, fast-track pathways outside the ED should be developed. At the organizational level, constant access to telemedicine, point-of-care (POC) diagnostics, and reserved appointments in SOC is needed, together with transfer decisions grounded in advance care planning (ACP) and a documented benefit – risk balance.

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Approval from the director of the long-term nursing-care unit was obtained in June 2023. All personal data of thepatients, facility staff, and collaborating personnel (EMS and ambulance transport) were anonymized and not used for analysis. The study was conducted in accordance with the Declaration of Helsinki. Therefore, no application was submitted to the local bioethics committee for opinion or approval.

Artificial intelligence (AI) was not used in the creation of the manuscript.

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