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# Proposal of Preliminary Quality Indicators for Long-Term Care Institutions: a Study in Portugal

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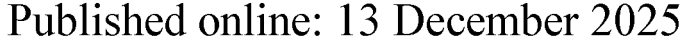
## Abstract

This study, based on the Donabedian's model (*JAMA*, *260*(12), 1743–1748, 1988), indentify professionals who spend the most time in care activities and proposes quality indicators for long-term care institutions in Portugal. The increasing complexity of long-term care in Portugal calls for an evaluation system tailored to the country's clinical, social organizational context. Existing European indicators, developed for different settings, fail to fully capture national specificities. The indicators proposed in this study, incorporating care time, professional roles, and resident profiles, enable a more accurate assessment, support continuous improvement, and guide evidence-based public policies. Indicators were validated through literature review, Delphi consensus, and analysis of residents' records using descriptive statistics and multiple linear and logistic regressions models (Stepwise and Forward). Structure, presence of an interdisciplinary team, an Individual Intervention Plan and case manager, Nursing Assistant hours and psychosocial care. Process: rate of dependency, use of anti-infective drugs, for the central nervous and cardiovascular systems, and prevalence of pressure ulcers. Outcome: rate of falls, deaths, hospitalizations, bedridden individuals, incontinence and incidence of pressure ulcers. This preliminary study based on Donabedian's model identifies structure, process and outcome indicators to evaluate long-term integrated care. The time spent caring for dependent users, especially in Long Duration and Maintenance Unit, reveals greater complexity. Despite the broad sample and interdisciplinary approach, methodological limitations require further research to validate and adapt the indicators to the portuguese context.


**Keywords** Quality indicators · Integrated care · Long-term care · Donabedian model · Health care quality assessment



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## Introduction

Aging population is a rapidly growing global phenomenon, with projections indicating that, by 2050, one in six people will be 65 years of age or older (Campos, 2018). In Europe, the proportion of older people is expected to reach 33.7% of the population (Eurostat Statistics Explained, 2020). In Portugal, this trend is even more pronounced, with an increase in average age and life expectancy (Góis, 2020), resulting in a higher prevalence of chronic diseases such as cardiovascular, respiratory, diabetes and cancer pathologies (WHO, 2020; Feng et al., 2020).

Multimorbidity, the simultaneous presence of two or more chronic diseases, is highly prevalent among the elderly population and is associated with increased levels of dependency, hospitalizations, and high mortality rates (Hajat & Stein, 2018; Nguyen et al., 2019). This condition interacts with the natural aging process, compromising autonomy and requiring long-term care, especially in cases of functional dependence (Feng et al., 2020; Slatyer et al., 2019).

This scenário represents a significant challenge for health and social protection systems, requiring a profound restructuring of services to meet the complex needs of the ageing population. Although nursing homes have historically played a central role (Helioterio et al., 2020), their capacity proved insufficient, leading to the creation, in 2006, of the National Integrated Continuing Care Network (NICCN). This intersectoral structure articulates health interventions and social support, promoting rehabilitation, autonomy and social reintegration (ACSS, 2023; Portugal.GOV.PT., 2023).

According to the World Health Organization (WHO, 2020), long-term care must be provided in a safe, effective, person-centered, timely manner, with efficient resource management and in an equitable manner. Quality in healthcare is associated with the ability of services to produce the desired results, aligning with best practices and scientific evidence (Donabedian, 1988, 2003, 2005). At European level, the European Pillar of Social Rights recognises the right to quality in long-term care. The European Commission, through the Subgroup Indicators of the Social Protection Committee, is developing a set of common indicators to monitor access, sustainability and quality of long-term care (European Commission & Social Protection Committee, 2021).

The construction of quality systems involves the definition of principles, criteria and metrics that guide the evaluation and continuous improvement of services. Member States such as Germany, Luxembourg and Portugal have adopted formal frameworks that apply these criteria in both public and private institutional settings and in residential and home-based services (Cès & Coster, 2019). Nordic countries lead in terms of access and quality, while others face more significant challenges. Many countries rely on standardized instruments such as interRAI-LTCF or the SHELTER project, adopted nationally or locally in Germany, Netherlands and Italy. The ANCIEN project identified 390 quality indicators already applied or recommended in the context of long-term care (European Commission & Social Protection Committee, 2021).

In Portugal, despite advances, the quality of service in the NICCN remains little discussed, especially due to the predominance of the non-profit sector, less predisposed to adopt standardized quality control practices. Although exist integrated evaluation mechanisms, a standardized set of indicators applicable to all care institutions

has not yet been implemented. This absence compromises systematic monitoring, with the QIs used being inconsistent and often misaligned with international references (Qin et al., 2022).

Donabedian's model (Donabedian, 1988, 2003, 2005) is widely recognized as a reference for assessing quality in health, organizing it into three dimensions: structure, process and result. Indicators such as pressure ulcers (PU) (Ghorbani Vajargah et al., 2023), falls (Sterke et al., 2021), infections (Zhang et al., 2022), and incontinence (Tuinman et al., 2021) are frequently used in long-term care assessment.

However, Portugal lacks a unified set of quality indicators to assess NICCN services. This study, guided by the Donabedian model (1988), aims to identify the professional categories that dedicate more time to care, and to propose a standardized set of potential indicators to evaluate the quality of care in Medium Duration and Rehabilitation Units (MDRU) and Long Duration and Maintenance Units (LDMU) institutions within the NICCN, in Portugal. The region was selected as a case study due to its particular demographic, geographic and socioeconomic characteristics: marked aging population, low density, difficulties in accessing specialized care (INE, 2021; PORDATA, 2023), high multimorbidity, functional dependence and social isolation (DGS, 2022). This rural context, and the shortage of professionals (ACSS, 2023), represents an ideal scenario to assess adjusted indicators to peripheral and vulnerable territories (European Commission & Social Protection Committee, 2021). This way, standardizing QIs can provide a robust basis for improving quality, allowing comparisons at different levels, promoting transparency, facilitating evidence-based public policies and optimizing resources (European Commission & Social Protection Committee, 2021).

## Methods

The LDMU and MDRU in Trás-os-Montes, Portugal, were invited to participate in the study, with 64% of LDMU and 50% of MDRU accepting participation. The selection of responsible professionals followed inclusion criteria, higher education, at least 5 years of health experience, and work with quality indicators. A panel of 14 experts was established (9 LDMU, and 5 MDRU). A literature review was conducted from three sources, PubMed, national legislation, and a set of QIs implemented in a LDMU and MDRU. Based on these results, an electronic survey was created in Google Forms. The survey had two parts, the first part for respondents sociodemographic characterization, and the second part containing potential indicators to evaluate care quality, categorized into the dimensions structure, process, and outcome, and criteria of effectiveness, relevance, and feasibility (Bell et al., 2012). It was sent to participants and applied through the modified Delphi method in two rounds. This is an established technique for developing health quality measures (Minkman et al., 2009). Experts evaluated each indicator on a 9-point Likert scale, and criteria for retaining indicators included Kendall's coeficiente of concordance (W>0,3), coefficient of variation (80% importance indicated strong consensus). The Resource Utilization Scale, which recorded time spent in care, was applied to all residents of participating institutions, filled out by the multidisciplinary team professionals (doctor, nurse,

nursing assistant, physiotherapist, social animator, psychologist, social worker, nutritionist for LDMU, and also physiatrist for MDRU). Participants' responses were kept anonymous. Internal validation of results was conducted with data from the Gestcare CCI platform, as independent variables. The study used variables identified in the literature review as dependent variables. Statistical analysis utilized IBM SPSS Statistics 24.0, with linear and logistic regression, stepwise and forward methods, and significance tests with $p < 0.05$. Data collection occurred between May 2022 and December 2023, with ethical approval obtained from the Northern Regional Health Administration, study 20220026 of 20–04–2022, from institutions and participants or their caregivers.

## Findings

The panel of experts was constituted by 9 members with broad geographic representation and diverse areas of expertise. Based on the analysis of the indicators selected by the panel of experts, after two rounds, defining the consensus with 80% agreement, a total of 4 structural indicators, 8 process and 28 outcomes for LDMU, and 15, 11 and 13, respectively, for MDRU, were validated. Considering the categories of indicators evaluated, structure, process and outcome, and the dimensions, effectiveness and relevance, consensus was reached in several QIs, such as in LDMU, structure, existence of case managers, relevant (100%), process, risk of falling, efficacy (100%) and feasibility (88.9%), use of long-term catheter, relevance (100%), rate of falls with injury and without mobility changes, efficacy (88.9%), prevalence of pressure ulcers, effectiveness (88.9), percentage of pressure ulcer healing, viability (88.9%), outcome, user/caregiver satisfaction, relevance (88.9%) and viability (80%). In MDRU, indicators of structure, existence of individual intervention plans, effectiveness and feasibility (100%) and relevance (80%), number of nursing assistant hours presents 80% in the three dimensions, structure, psychosocial care with effectiveness and relevance (80%) and feasibility (100%), body mass index assessment, efficacy (80%) and relevance (100%), risk of falling efficacy and feasibility (100%) and relevance (80%), pain management efficacy and relevance (80%) and, as a result, number of users assisted, effectiveness and relevance (80%), physical performance, relevance and viability (80%), and satisfaction of users/caregivers with viability (80%). The response rate was 100%. There were no responses in the open answers. Considering internal validation crucial to guarantee the reliability and applicability of the results, verifying the integrity of the data and the robustness of the analyses, the authors chose to build a database, with information on the residents individual process, using Gestcare CCI, a platform information technology at NICCN. In total, 323 patients constituted the database. The sample considted of 58.3% women, with an average age of 74.88 years and low education (29.6% illiterate). The majority (59.9%) live with their family, 5.1% in institutions and 32.5% alone. Support in nutrition (16.7%) and hygiene (19.8%) stands out. There are high rates of incontinence (47.9% fecal and 73.4% urinary) and 33.4% have a history of falls. Functionality is low, with an average National Functionality Table (NFT) score of 127.8. Professionals spend more time in LDMU (40.6 min) than in MDRU (27.2 min). In LDMU, an average

of 3.2 professional categories interact, and in MDRU 4.1. Based on the Donabedian model, and after statistical analysis, the results emphasize the importance of the following indicators for quality care in long-term care facilities. For LDMU, structure, communication, number of nursing and nursing assistant hours, process, prevalence of pressure ulcers, falls and bedridden users, and use of medications (anti-infective, nervous and cardiovascular systems), and outcome, rate of PU, falls, urinary and fecal incontinence, death and avoidable hospitalizations. The remaining results are common in both typologies (Tables 1 and 2). For MDRU, there is no statistically significant predictor for fecal incontinence.

## Discussion

The quality of care in LDMU and MDRU is a crucial factor for the health and well-being of residents, who are essentially older adults. Quality Indicators are accepted to evaluate and promote continuous improvements, but the lack of a standardized framework makes systematic evaluations difficult. This study used the Delphi method and literature review to identify and validate QIs, applying quantitative analysis to resident data and identifying significant predictors for quality of care. Data from multiple sources identified potential significant indicators and predictors for quality of care in LDMU and MDRU. We are not aware of previous work that standardizes quality indicators for these institutions. The results show, for LDMU, age (0.631) and female gender (8.304) were significant predictors for the NFT score, similarly, in the study of López-Liria et al. (2019), younger age is correlated with greater functional capacity. Likewise, the use of a wheelchair (0.340) contributes to an increase in the number of professional categories involved and reduces the NFT score (−6.208), that is, due to an increase in the degree of dependence. In this scenario, a more diverse mix of staff and skills has a positive effect on the quality of care (Koopmans et al., 2018), when dependency increases and NFT decreases. Likewise, nursing intervention in changing diapers (32.888) and the time spent on the afternoon shift by these professionals (0.597) are positively associated with better results in resident functionality (López-Liria et al., 2019), and are associated with a reduction in unnecessary hospitalizations (−1.724) (Lyhne et al., 2022). However, advanced age appears, curiously in Turcotte's study (2019), as a protective factor for hospitalization time, and in Walker et al. (2009), adequate record keeping also prevents hospitalizations (1,767). The study of Arandelovic et al. (2018) states that older adults with medical complexities are more likely to be hospitalized, as their accessibility to hospitals and healthcare professionals. On the other hand, long-term hospitalization (−0.051) and the nursing assistant morning shift schedule (- 0.020) have an impact on medication use. Older residents and women tend to need more care, even nonpharmacological (−16,540) and for longer time (Turcotte et al., 2019). The bandage register (3.302) and nursing shift time (0.046) reduce the incidence of PU, so, according to the results of Black et al. (2011), they are largely preventable events. However, preventability depends on the care and characteristics of residents. Professional training and shift organization are also essential to prevent PU. Educating residents and caregivers helps reduce the number of bedridden patients (−1,457) who are more likely to develop PU. Similarly, the results of the study

**Table 1** Results of logistic regressions in the LDMU typology

| Variable to Explain | Predictor Group | Predictors | Coefficients | Standard Error | *p* | Constant | % Correctly Classified |
|---|---|---|---|---|---|---|---|
| Incidence PU | I | Years of Education | −0,655 | 0,315 | <0,05 | 0,971 | 59,5% |
| | II | Bandage Register | 3,032 | 0,440 | <0,05 | −1,026 | 77,5% |
| | III | Nursing time | 0,046 | 0,015 | <0,05 | −1,961 | 59,5% |
| Prevalence PU | I | Age | 0,036 | 0,017 | <0,05 | −3,414 | 65,5% |
| | II | Bandage Register | 1,970 | 0,336 | <0,05 | −1,225 | 74,8% |
| | III | Nursing time | 0,036 | 0,015 | <0,05 | −1,932 | 66,7% |
| Prevalence of Bedridden Patients | I | Age | 0,044 | 0,017 | <0,05 | −3,617 | 64,7% |
| | II | Nursing Inter-vention-Diaper Changing | 1,609 | 0,458 | <0,05 | −0,435 | 70,3% |
| | II | User and Caregiver Education-Thera-peutic regime | −1,457 | 0,389 | <0,05 | | |
| | II | Mobility Dis-positive Devices Wheelchair | −0,831 | 0,325 | <0,05 | | |
| | II | Bandage Register | 1,148 | 0,352 | <0,05 | | |
| | III | Nurse night Shift | 0,076 | 0,024 | <0,05 | −2,506 | 64,3% |
| Urinary Incontinence | I | Age | 0,027 | 0,014 | 0,052 | −0,993 | 73,1% |
| | II | Altered Communication | 0,583 | 0,289 | <0,05 | 0,620 | 77,1% |
| | II | Nursing Inter-vention-Diaper Changing | 1,351 | 0,323 | <0,05 | | |
| | II | User and Caregiver Education-Thera-peutic regime | −1,034 | 0,403 | <0,05 | | |
| | III | Nursing Assistant Morning Shift | 0,100 | 0,033 | <0,05 | −0,540 | 75,2% |
| Fecal incontinence | I | Age | 0,040 | 0,014 | <0,05 | −3,184 | 62,6% |
| | II | Altered Communication | 0,801 | 0,230 | <0,001 | 0,056 | 61,0% |
| | II | User and Caregiver Education-Thera-peutic regime | −0,726 | 0,296 | <0,05 | | |
| | III | Nursing Assistant Afternoon Shift | 0,051 | 0,015 | <0,05 | −0,493 | 58,6% |
| | III | Doctor Time | −0,043 | 0,016 | <0,05 | | |
| Use of Anti-infective Medications | II | Support in Personal Hygiene | −1,121 | 0,543 | <0,05 | −1,143 | 83,0% |
| | III | Nursing Assistant Morning Shift | 0,040 | 0,013 | <0,05 | −2,227 | 84,8% |
| | III | Doctor Time | −0,051 | 0,022 | <0,05 | | |
| | III | Nurse Morning Shift | −0,020 | 0,019 | 0,288 | 2,417 | 88,3% |
| Use of Cen-tral Nervous System Medications | III | Hospitalization time | 0,005 | 0,002 | <0,05 | 0,035 | 62,1% |
| Falls | III | Nursing Assistant Morning Shift | −0,060 | 0,027 | <0,05 | −0,558 | 86,9% |

**Table 1** (continued)

| Variable to Explain | Predictor Group | Predictors | Coefficients | Standard Error | *p* | Constant | % Correctly Classified |
|---|---|---|---|---|---|---|---|
| Death | I | Age | 0,088 | −9,053 | < 0,05 | −9,053 | 87,9% |
| | II | Physical Medicine and Rehabilitation | 0,189 | 0,071 | < 0,05 | 1,472 | 84,7% |
| | II | User/and Caregiver Education-Thera-peutic regime | −0,804 | 0,413 | 0,058 | | |
| | II | Mobility Dis-positive Devices Wheelchair | −1,381 | 0,518 | < 0,05 | | |
| | III | Nurse Night Shift | 0,089 | 0,028 | < 0,05 | −3,403 | 72,6% |
| | III | Occupational Therapist Time | −0,028 | 0,014 | < 0,05 | | |
| | III | Hospitalization time | 0,005 | 0,002 | < 0,05 | | |
| Hospitaliza-tions and/or Potentially Avoidable | II | Bandage Register | 1,767 | 0,880 | < 0,05 | −4,388 | 97,3% |

Vahakangas et al. (2008), show that rehabilitation care practices focused on activities of daily living can encourage residents to get out of bed and participate in social activities. Nurses expertise is crucial in preventing PU through the development of innovative protocols and practices (Black et al., 2011). Age (0.027; 0.040) and altered communication (0.583; 0.801) are associated with increased incontinence. On the other hand, personal hygiene (1.351) and morning care (0.100), together with adapted communication strategies and the collaboration of physiotherapists, can reduce the incidence of incontinence, according to the study of Sterke et al. (2021). Personal hygiene (−1.121) also has a positive effect, as does morning shift nursing assistant hours (0.040), as they reduce the use of anti-infective medication. It is also crucial in preventing skin infections and PU, however they present a significant health and cost challenge (Cavalcante et al., 2016). Nursing assistant morning shift hours (−0.060) can reduce falls (−0.060). Mobility is crucial for the health of residents, the presence of healthcare professionals, specifically nurses, according to Lahmann et al. (2014), maintains and improves mobility and prevents falls. Advanced age (0.088), hospitalization (0.005), rehabilitation (0.189), PU value and night nurse (0.089) are predictors of mortality in institutionalized older adults (Cavalcante et al., 2016). Another study finds that early interventions and rehabilitation improve survival and reduce mortality in high-risk cases (Bravo et al., 2002). At MDRU we have the following QIs, altered communication (12.106) and advanced age (−0.420) significantly impact the number of professional categories involved in care, as Forsgren and Saldert, (2022) states, effective strategies team-wide communication skills are necessary to improve care, as communication difficulties may reflect residents more complex needs. Nighttime support from nursing assistants (0.120) is essential in the administration of antimicrobials to prevent infections, highlighting the importance of continuous support (Beganovic & Laplante, 2018). Maintaining bandage registers (3.301), nursing hours on the morn-

**Table 2** Results of logistic regressions in the MDRU typology

| Variable to Explain | Predictor Group | Predictors | Coefficients | Standard Error | *p* | Constant | % Correctly Classified |
|---|---|---|---|---|---|---|---|
| Incidence PU | II | Bandage register | 3,301 | 1,133 | <0,05 | −1,692 | 84,4% |
| | III | Nursing Assistant Morning Shift | 0,081 | 0,038 | <0,05 | −3,123 | 89,3% |
| | III | Nursing Assistant Afternoon Shift | −0,190 | 0,083 | <0,05 | | |
| | III | Nurse Afternoon Shift | 0,102 | 0,047 | <0,05 | | |
| Prevalence PU | II | Altered Communication | 1,490 | 0,622 | <0,05 | −2,501 | 86,5% |
| | III | Nursing Assistant Morning Shift | 0,048 | 0,020 | <0,05 | −3,284 | 85,7% |
| Prevalence of Bedridden Patients | II | Mobility Devices Wheelchair | −2,909 | 1,073 | <0,05 | −1,099 | 88,5% |
| | III | Nurse Night Shift | 0,119 | 0,600 | <0,05 | −4,483 | 91,1% |
| | III | Physiatrist Time | 0,109 | 0,070 | <0,05 | | |
| Urinary Incontinence | III | Nursing Assistant Night Shift | 0,203 | 0,071 | <0,05 | 0,165 | 75,0% |
| | III | Psychologist Time | −0,059 | 0,023 | <0,05 | | |
| | III | Social Animator Time | 0,011 | 0,004 | <0,05 | | |
| | III | Doctor Time | −0,074 | 0,038 | <0,05 | | |
| Use of Anti-infective Medications | III | Nursing Assistant Night Shift | 0,120 | 0,056 | <0,05 | −3,820 | 89,3% |
| Use of Central Nervous System Medications | I | Years of Education | −33,775 | 4535,275 | <0,001 | 118,650 | 100,0% |
| | II | Mobility Devices Wheelchair | −19,165 | 5933,938 | <0,05 | 19,858 | 93,8% |
| | II | Psychologist Time | 2,351 | 0,948 | <0,05 | | |
| | III | Nurse Night Shift | −0,022 | 0,019 | 0,309 | 3,279 | 94,8% |
| Use of Cardiovascular System Medications | I | Years of Education | −1,016 | 0,516 | <0,05 | 3,068 | 77,4% |
| | II | Psychologist Time | 0,986 | 0,511 | 0,054 | 0,095 | 69,8% |
| | III | Hospitalization Time | 0,012 | 0,772 | 0,197 | −2,576 | 85,7% |
| Death | II | Bandage register | 2,879 | 1,487 | 0,053 | −4,489 | 97,9% |
| | III | Hospitalization Time | 0,013 | 0,011 | 0,238 | −4,946 | 98,2% |
| Hospitalizations and/or Potentially Avoidable | I | Years of Education | −1,453 | 0,749 | 0,052 | −1,453 | 84,9% |
| | II | Nursing Intervention-Diaper Changing | −1,724 | 0,686 | <0,05 | 0,788 | 88,5% |

ing shift (0.102) and nursing assistant time on the morning shift (0.081) are significant predictors for the incidence of PU, with the professional teaching being crucial in prevention (Black et al., 2011; Davis & Caseby, 2001; Tsaras et al., 2016). Previous

studies indicate that nursing is essential in prevention and treatment (Edsberg et al., 2022; Gillespie et al., 2014), leading to protocol innovations (Black et al., 2011). However, prolonged bed rest (Schoonhoven et al., 2006), advanced age (Tsaras et al., 2016), length of stay increases the risk of PU. Prevention of PU requires a multidisciplinary team (Zaidi & Sharma, 2024). Incidence of PU varies widely, and most patients with PU die, highlighting the need to consider multiple clinical and management data (Borghardt et al., 2016). The teachings are predictors for reducing the use of medication for the nervous (−33,775) and cardiovascular (−1,016) systems, in integrated care, where polymedicated chronic patients predominate and generally lack autonomy in managing their medication (Kosari et al., 2018; Rodrigues et al., 2022). On the other hand, according to Pekkarinen et al., (2008), time pressure on nurses can lead to the use of hypnotics and the prevalence of PU, limiting advanced care practices. The prescription of antimicrobials is common in LTC (Beganovic & Laplante, 2018). Night-time support from nursing assistants (0.120) is vital in the administration of antimicrobials to prevent infections, as is the collaboration of pharmacists in multidisciplinary teams to improve the safety of pharmacotherapy in older adults (Ruiz-Millo et al., 2017). There is a significant relationship between antibiotic use and infection rates, patient functionality and costs, indicating the need for effective medication management (Mylotte & Keagle, 2005). Staff shortages make it difficult to optimize prescription and improve care (Pekkarinen et al., 2008). Interaction with psychologists (−0.059) and doctors (−0.074) reduces urinary incontinence, indicating the value of stress management and optimizing treatments. However, only a minority of those affected receive medical care, according to the study of Onishi and Shibata (2023). Social activity (0.011) may increase incontinence, possibly due to greater physical effort. Previous studies emphasize the importance of systematic assessments in preventing incontinence-related complications (Georgiou et al., 2001; Morgan et al., 2008). Incontinence tends to increase with age, negatively impacting quality of life and increasing medical costs (Komesu et al., 2016; Onishi & Shibata, 2023), in addition to affecting mental and social health (Farrés-Godayol et al., 2022). Good nursing practices in changing diapers (−1.724) and teaching (−1.453) are predictive factors for reducing hospitalizations, as well as reducing the use of medication for the nervous (−33.775) and cardiovascular (−1.016) systems. Preventing these complications can improve the efficiency of the healthcare system and the quality of life of residents, as around 20–35% of unplanned hospitalizations could be avoided with appropriate treatment in primary care (Purdy & Huntley, 2013). Low health literacy increases the risk of hospitalization, especially in complex situations, and is linked with other risk factors like cognitive deficits and substance abuse (Reed et al., 2015).

## Limitations

The results may not be generalizable to other regions due to the specific demographic and contextual characteristics of the Trás-os-Montes case study. Unmeasured variables and practice biases across units may limit validity, reinforcing the need for further research. Including external expert input and a post-panel survey could enhance result robustness.

## Conclusion

This study offers a preliminary exploration of quality indicators in long-term care using Donabedian's model. It highlights the relevance of structural (e.g., interdisciplinar team, Individual Intervention Plan, case manager, psychosocial care, staff hours), process (e.g., dependence rate, prevalence of PU, medication use), and outcome indicators (e.g., rates of falls, incontinence, bedridden patients, incidence of PU, deaths, avoidable hospitalizations). The time spent by Nurses and Nurse Assistants, particularly during morning and night shifts with dependent users, emerged as a key factor, especially in LDMU, where complexity is higher.

It is important to further explore the potential of quality indicators to address specific gaps and challenges in portuguese integrated continuing care. Their practical application can support evidence-based decision-making within the NICCN framework, optimize resource allocation through greater team engagement, based on data that reflects their own practice, and strengthen supervision processes through continuous quality monitoring and more agile corrective interventions. Moreover, QIs can drive the continuous improvement of care quality and public policies, with a particular focus on prevention, the adoption of tailored protocols, targeted professional training, and the development of a national quality benchmark for integrated continuing care.

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## Declarations

**Informed Consent** All participants were provided with informed consent forms before being recruited into the study. In cases where participants were not able to read the consent form, the content of the information and consent sheet was orally communicated to them and signed by the caregiver.

**Ethical Treatment of Experimental Subjects (Animal and Human)** No experimental treatment was conducted on either human or animal subjects in this study.

**Competing interests** We declare no competing interests.

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