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Impact of long term care and mortality risk in community care and nursing homes populations

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ABSTRACT

Objectives: To identify the survival time, the mortality risk factors and the individuals' characteristics associated with cognitive and physical status at discharge, among the Portuguese long-term care (LTC) populations.
Settings: Home-and-Community-Based Services (HCBS) and three types of Nursing Homes (NH).
Participants: 20,984 individuals admitted and discharged in 2015.
Measurements: The Kaplan-Meier survival analysis and the Cox Proportional Hazards Models were used to study the mortality risk; the Wilcoxon signed-rank test to identify the number of individuals with cognitive and physical changes between admission and discharge; two cumulative odds ordinal logistic regressions to predict the cognitive and physical dependence levels at discharge
Results: The mortality rate at HCBS was 30%, and 17% at the NH, with a median survival time of 173 and 200 days, respectively. The main factors associated with higher mortality were older age, male gender, family/neighbour support, neoplasms and cognitive/physical dependence at admission. In NH/HCBS, 26%/18% of individuals improve their cognitive status, while in physical status the proportion was 38%/27%, respectively. Finally, older age, being illiterate and being classified at the lowest cognitive and physical status at admission decrease the likelihood of achieving a higher level of cognitive and physical independence at discharge.
Conclusions: The adoption of a robust and complete assessment tool, the definition of guidelines to enable a periodical assessment of individuals' autonomy and the adoption of benchmark metrics allowing the comparison of results between similar units are some of the main goals to be taken into account for future developments of this care in Portugal.

1. Background

Needs assessments nowadays play a fundamental role in the planning process of healthcare and social services and are even considered a means in the clinical context to reach a specific diagnosis (Iezzoni, 2004). Being the main premise of the long-term care (LTC) sector "*care* over *cure*", it is important to define metrics of needs assessment in several areas to help healthcare providers to (re)design patient care, develop clinical pathways and predict with higher accuracy their rehabilitation outcome at discharge.

Although several studies analysed the differences between Nursing Homes (NH) and Home and Community-Based Services (HCBS) populations in order to identify factors determining admissions into each setting of care, it is not easy or consensual to define the best areas for outcome assessment. Usually, outcome measures are related either to mortality or to changes of cognitive and physical dependence levels. Thus, to assess these outcomes, it is important to incorporate different individual-mix factors, including socio-demographic characteristics, medical conditions as well as the physical and cognitive status (Iezzoni, 2004; Gindin et al., 2007; Fusco et al., 2009; Seematter-Bagnoud et al., 2013).

Regarding the mortality assessment, because the number of deaths in LTC is usually high, it is important to estimate the expected length of survival after an individual's admission and identify the main mortality predictors so that policy makers can optimize the planning of services provision. For that matter, in spite of different magnitudes between studies, several authors concluded that the most relevant mortality risk factors include older age, male gender, the absence of a social support network, the presence of certain medical conditions (e.g., neoplasms, musculoskeletal or respiratory diseases) and high levels of cognitive and physical dependence (Carlson et al., 2001; Jakobsson & Hallberg, 2006; Lee, Chau, Hui, Chan, & Woo, 2009; Hjaltadóttir, Hallberg,

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Ekwall, & Nyberg, 2011; Luo & Waite, 2014; Sung, 2014; Vetrano et al., 2018). After assessing the mortality rate, some authors found no differences between NH and HCBS, either after adjusting for baseline variables (age, gender, race, education, race, education, marital status, length of stay, cognition, and comorbidity) (Sloane et al., 2005) or when comparing patients receiving care at NH, HCBS or combined care (Lee, Yim, Cho, & Chung, 2014). Others found a higher mortality among those at NH (Jakobsson and Hallberg, 2006; Gruber-Baldini, Stuart, Zuckerman, Simoni-Wastila, & Miller, 2007; Wieland, Boland, Baskins, & Kinosian, 2010; Häcker & Hackmann, 2012).

Concerning the physical outcomes, whereas some authors found no significant differences in the deterioration in performing activities of daily living (ADL) between the two settings of care (Chiu, Shyu, & Liu, 2001; Frytak, Kane, Finch, Kane, & Maude-Griffin, 2001; Sloane et al., 2005; Marioni, Chatfield, Brayne, & Matthews, 2011), others found better outcomes among HCBS individuals (Rothera, Jones, Harwood, Avery, & Waite, 2003; Lee et al., 2014; Lee et al., 2015; Lee & Cho, 2016) and others concluded that only the NH population showed some ADL improvements (Kim & Yang, 2005). As for changes in cognitive status, although some authors found no statistical differences between the two settings of care (Kim & Yang, 2005; Sloane et al., 2005), others found better outcomes among those at HCBS (Rothera et al., 2003; Lee et al., 2014).

Besides the overall differences in outcomes between these two populations, several findings can be highlighted concerning the influence of different variables as predictors of physical and cognitive changes. Older age seems to be related to a higher cognitive impairment (Anderson, Sachdev, Brodaty, Trollor, & Andrews, 2007; Moraes, Pinto, Lopes, Litvoc, & Bottino, 2010); moreover, some studies concluded that younger age positively influences the physical improvement (Frytak et al., 2001; Gindin et al., 2007; Häcker & Hackmann, 2012; Kim, Kwon, & Shin, 2013; Seematter-Bagnoud et al., 2013) but others found no significant effect (Bagg, Pombo, & Hopman, 2002; Perrig-Chiello, Perrig, Uebelbacher, & Stähelin, 2006; Jerez-Roig, de Brito Macedo Ferreira, de Araújo, & Costa Lima, 2017; Phillips, Leary, Blankenship, & Zimmerman, 2017). In most health facilities with similar rehabilitation programmes, men and women are expected to achieve similar progress and outcomes. Despite gender being an independent risk factor for cognitive function (Anderson et al., 2007; Moraes et al., 2010), some authors found no statistically significant association between gender and changes in cognitive (Marioni et al., 2011) and physical status (Cameron, Schaafsma, Wilson, Baker, & Buckley, 2012; Kim et al., 2013; Jerez-Roig et al., 2017; Phillips et al., 2017). Others concluded that women were twice as likely to show physical improvements compared to men (Gindin et al., 2007). Within HCBS individuals, one study concluded that women were more likely to achieve functional recovery (Seematter-Bagnoud et al., 2013), while others concluded the opposite (Perrig-Chiello et al., 2006; Häcker & Hackmann, 2012).

Since LTC patients are usually elderly people with chronic diseases, what often influences their dependence levels, accurate information regarding medical diagnoses is essential for care planning and monitoring for predicting their rehabilitation outcomes. As concluded by several studies, individuals with fewer chronic diseases are more likely to achieve better outcomes (Gindin et al., 2007; Cameron, Schaafsma, Wilson, Baker, & Buckley, 2012; Seematter-Bagnoud et al., 2013). Finally, whereas global limitations in motor functions at admission combined with cognitive impairment can influence the overall levels of disability at discharge (Gindin et al., 2007; Vogt, Wieland, Bach, Himmelreich, & Banzer, 2008; Fusco et al., 2009; Cameron et al., 2012; Häcker & Hackmann, 2012; Kim et al., 2013; Seematter-Bagnoud et al., 2013; Jerez-Roig et al., 2017) limitations in the ability to perform single ADL at admission like the use of a wheelchair (Singh, Hunter, Philip, & Todd, 2006), walking (Suzuki et al., 2006) or transfers (to the toilet and/or to the bed/chair) (Gialanella, Santoro, & Ferlucci, 2012), can also be seen as important outcome predictors.

1.1. The long-term care in Portugal

In Portugal, the National Network for Long-term Integrated Care (*Rede Nacional de Cuidados Continuados Integrados*, RNCCI) was created in 2006 as a partnership between the Ministry of Health and the Ministry of Employment and Social Solidarity (Decree-Law 101/2006). As defined by the Portuguese legislation, the RNCCI is organized into two main settings of care (Decree-Law 101/2006): HCBS and NH.

As for the HCBS, the care is provided between 8am and 8pm at home under the responsibility of the primary care centre teams, to people with functional dependence but who do not require acute care. Of the several services provided, stands out the personal hygiene, medical, nursing and rehabilitation care, occupational therapy, education and psychosocial support involving both patients and their caregivers (Ordinance no. 174/2010; ISS, 2017). Individuals with care needs during the night, in need for only social support or without informal caregivers, are excluded.

In order to respond to different needs, the NH in Portugal are organized into three types of care units (Decree-Law 101/2006). Although services like personal hygiene, drugs prescription and administration, psychological and social support are provided to all patients (Ordinance no. 174/2010; ISS, 2017), the intensity of nursing, medical and physiotherapy care differs according to the type of care units, namely (Decree-Law 101/2006; Ordinance no. 174/2010): (i) Convalescence Units (*Unidades de Convalescença,* UC), which provide nursing, medical and physiotherapy care on a daily basis for individuals discharged from hospitals in need of convalescence care up to 30 consecutive days; (ii) the Medium-Term and Rehabilitation Units (*Unidades de Média Duração e Reabilitação,* UMDR), which provide less intensive and differentiated care (while the nursing care is provided daily, the medical and rehabilitation care is provided two days per week) for individuals with an expected length of care between 31 and 90 consecutive days; and (iii) the Long-Term and Maintenance Units (*Unidades de Longa Duração e Manutenção,* ULDM), which provide daily nursing care (medical and rehabilitation care only once a week) for individuals with difficulties with community inclusion as well as for caregivers' respite care, with a length of care higher than 90 consecutive days.

2. Objectives

The main goal of this research is to contribute to a better understanding of two areas in the LTC sector that may help policy makers and staff to improve the way care is provided to such a fragile population: mortality and patients' outcomes. Regarding the first one, we aim to identify the median survival time within NH and HCBS settings of care and identify the predictive power of several variables on the mortality risk in each setting. Then, we aim to quantify the impact of care provided by looking at the number of individuals who showed changes in their physical and cognitive dependence level between admission and discharge as well as to identify the individuals' characteristics associated with each status at discharge.

3. Data and methods

3.1. Data source

The dataset contains records of 20,984 individuals aged ≥60 years, admitted and discharged in 2015 in Portugal mainland, of which 14,140 were from NH and 6844 from HCBS.

Besides the identification of the length of care, referral entity, region and setting of care, this study includes results from the Portuguese screening tool used by LTC healthcare professionals to assess patients' dependence levels, called Integrated Bio-psychosocial Assessment Instrument (Abreu Nogueira, Girão, & Guerreiro, 2010). The information collected by this tool and used in this study is divided in three areas