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Research paper

Prognostic factors of functional status improvement in individuals admitted to convalescence care units

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A B S T R A C T

Objectives: Convalescence care strives to achieve functional recovery of individuals, reducing likelihood of institutionalisation or re-hospitalisation. This work assesses the efficacy of convalescence units in Catalonia, and identifies prognostic factors related to functional improvement.
Design and setting: Retrospective analysis of information system data for 11,945 stays in convalescence units with admission and discharge within 2009.
Measurements: Main outcome is functional improvement, defined as the reduction of the number of dependent activities of daily life (ADL) between admission and discharge. Other outcomes were functional and cognitive status, Resource Utilization Groups III (RUG III) resource use categories, coverage and intensity of therapies, diagnosis, comorbidities and medical procedures. Logistic regression analyses were performed to identify factors related to functional improvement.
Results: Functional improvement was reached in 5618 individuals (47.0%). It was more likely in patients admitted from acute care hospitals (49.5%) than for other procedences (41.6%). Less than two thirds of the sample (63.5%) were able to return to their usual residence. Median length of stay was 35 days, and 93% of patients were discharged at three months. Identified negative factors that decreased the likelihood of functional improvement: cognition and alertness outcomes, complexity, RUG III categories, functional status and therapies received. Positive factors were: less than 9 dependent ADL, and intensity of training in walking skills and dressing/grooming.
Conclusion: Based on the identified prognostic factors for functional improvement, convalescence unit users may be classified by rehabilitative expectatives according to their diagnosis and degree of functional and cognitive impairment at admission.

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1. Introduction

Intermediate care is a model of care comprising a range of services intended to bridge acute, primary and social care in populations with complex care needs that cannot be provided at home or in nursing homes [1]. It serves a number of goals for a broad spectrum of individuals: rehabilitation and care of post-acute and sub-acute care patients discharged from acute health care facilities, preventing hospital admission of community-dwelling or institutionalised individuals, preventing hospital readmissions, or attending to social dependence [2]. In the region of Catalonia, intermediate care is provided in the so-called convalescence care units. These units are integrated within a network of social and health care (Pla Director Sociosanitari) that depends on both the health and welfare authorities, to assist patients with chronic diseases and old people [3,4]. The network has an information system (Conjunt Mínim Bàsic de Dades dels Recursos Sociosanitaris, CMBD-RSS) that collects administrative and medical data on all individuals admitted to social and health care facilities [5]. Similar in design and purpose to the Minimum Dataset in the US [6], CMBD-RSS comprises a selection of variables included in the Resident Assessment Instrument (RAI) that allows computation of the Resource Utilization Groups III (RUG III) [7–9].

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Convalescence care units are publicly funded and free-of-charge for patients. These units admit mostly older people, either in the functional recovery phase of an acute process (step-down post-acute treatment), or older people with sub-acute clinical situations (step-up treatment). In both situations, the individuals require specialised care that cannot be provided at home, but that is of lesser complexity than care in acute care hospitals.

Convalescence care units aim to achieve functional recovery of individuals, avoid their institutionalisation at discharge, and avoid the need for hospitalisation. In other cases, the goal of care is continuity of care for people with comorbidity and complex diseases. The study of the rehabilitation success obtained in convalescence units is useful to assess the performance of these units, and to identify prognostic factors related to greater or lower functional improvement [10–12]. These prognostic factors may lead to characterize admitted patients regarding their chances of rehabilitation. This work aims to ascertain the efficacy of convalescence units in Catalonia in attaining functional rehabilitation of patients, and to identify patient's characteristics related to greater or lower functional improvement.

2. Methods

We analysed data from CMBD-RSS corresponding to all individuals admitted to convalescence units during 2009, with discharge before end of 2009. For individuals with multiple admissions during this period, only the first one was considered.

The main outcome of the study is functional improvement, defined as the reduction of one or more in the number of dependent activities of daily life (ADL) between admission and the last assessment performed before discharge. The ADL considered in the CMBD-RSS are bed mobility, transfers, ambulation in room, ambulation in corridor, dressing, eating, toilet use, grooming and bathing. For each ADL, dependence was defined as needing limited or extensive help to conduct the ADL, or being unable to conduct it at all. On the contrary, independence was defined as needing no help or only supervision to conduct the activity. Individuals with no dependent ADLs both at baseline and discharge were considered as presenting functional improvement, because in individuals with full functionality at admission, functional status maintenance is the rehabilitative goal and it represents a success.

Levels of dependency, clinical complexity and cost of participants were described by the seven main clinical categories of RUG III. These categories are hierarchically organised, from higher to lower levels of dependency, clinical complexity and cost: extensive care, special care, clinically complex care, impaired cognition, behaviour problems and reduced physical function. RUG III classification is based on data collected by nursing staff on expected minutes of therapy, activities of daily living, need for special services, and certain clinical conditions.

Comorbidity was assessed by an adapted version of the Charlson index [13] based on medical records data on history of cerebrovascular accident, diabetes mellitus, chronic obstructive pulmonary disease, congestive heart failure, dementia, peripheral arterial disease, chronic renal failure, and cancer. The comorbidity index is a weighted score that assigns 1 point to the first six conditions, and 2 points to the last two conditions. A value of 0 in the index is interpreted as no comorbidity, values 1 or 2 are considered as low comorbidity, and values equal or higher to 3 are considered high morbidity. This short version has proven to have similar prognostic value at short term than the original version [14,15].

Univariate analyses were performed for all clinically relevant variables in CMBD-RSS by means of Chi² tests for categorical variables, or t-tests for quantitative variables. Only grouped main diagnoses in CMBD-RSS with frequencies > 5% in the sample were considered. Multivariate logistic regression models were built including clinically relevant variables, with a frequency over 10%, not collinear, and statistically significant in the univariate analyses at the $P < 0.1$ level [16]. Individual variables included in the RUG III or CPS, or overlapping with other more clinically relevant variables were excluded. Logistic regression models were built following a backwards step-wise process based on the likelihood ratio test. Goodness-of-fit of the resulting model was assessed with the Hosmer-Lemeshow test (calibration) and the area under the ROC curve (discrimination) [16].

3. Results

We analysed 11,945 stays in convalescence units during 2009. At discharge, 5618 individuals (47.0%) presented functional improvement, while 6327 (53.0%) maintained or worsened the functional dependence shown at admission. Individuals admitted to convalescence units are mostly elderly (mean age: 79 years) and female (60.1%) (Table 1). Convalescence units serve mostly as a step-down from acute care hospitals (68.6%), and only a small percentage of patients come from their usual residence (14.4%) or other facilities (17.1%). Functional improvement more likely in individuals admitted from acute care hospitals. Up to 63.5% of patients were able to return to their usual residence at discharge. Median length of stay in the unit is 35 days, and 93% of patients are discharged at three months.

A third of the sample (36.40%) presented at least one selected comorbidity (history of cerebrovascular accident, diabetes mellitus, chronic obstructive pulmonary disease, congestive heart failure, dementia, peripheral arterial disease, chronic renal failure, or cancer) (Table 1).

Individuals with more comorbidities were less likely to present functional improvement at discharge. Grouped main diagnoses with frequencies > 5% accounts for 88.7% of the total sample. The most frequent grouped diagnoses are fractures (22.6%) and stroke (11.5%). Clinical complexity is frequent in the sample and it related to less likelihood of functional improvement. The most frequent complexities are continence related problems (incontinence, use of diapers, and sphincter control program), prevention of problems derived from confination to bed (mobilisation program and pressure reducing devices), and care of surgical wounds. The only complexity positively related to functional improvement the care of surgical wounds.

Cognitive and mood disturbances are present in up to a third of the sample and their presence related to a lack of functional improvement (Table 2). The most frequent cognitive disturbances are problems with recent and distant memory (33.9% and 29.1% respectively) and cognitive impairment for decision taking (30.0%). Most of the patients admitted to convalescence units classified into the resource use categories of rehabilitation and clinically complex care (75%). The category of extensive care presents the lowest rate of functional improvement.

The patients admitted to convalescence units present a high degree of functional impairment at admission, with 58.2% of the sample presenting 8 or 9 dependent ADL. Functional impairment at admission and functional improvement at discharge present a non-linear relationship (Fig. 1). Individuals with no impairment at admission mostly maintain their full independence (90%). In individuals with mild to moderate dependence (up to 6 dependent ADLs), the likelihood of functional improvement increases with higher degrees of dependence at admission. In more severe dependence, the relationship is inversed.

Coverage and intensity of therapies are shown in Table 2. Coverage of rehabilitative therapies is not universal, and 14.9% of individuals do not receive any kind of rehabilitative therapy. These