Geriatric Assessment and Prognostic Factors of Mortality in Very Elderly Patients With Community-Acquired Pneumonia

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ABSTRACT

Introduction: To assess the relationship between the parameters obtained in the geriatric assessment and mortality in elderly people with community-acquired pneumonia in an acute care geriatric unit.

Methods: Four hundred fifty-six patients (≥75 years). Variables: age, sex, referral source, background, consciousness level, heart rate, breathing rate, blood pressure, laboratory data, pleural effusion, multilobar infiltrates, functional status (activities of daily living) prior to admission [Lawton index (LI), Barthel index (Blp)] prior to and at admission (Bla), cognitive status [Pfeiffer test (PT)], comorbidity [Charlson index (Ch)] and nutrition (total protein, albumin).

Results: A hundred ten patients died (24.2%) during hospitalization. These patients were older (86.6±6.4 vs 85.1±6.4, P<0.04), had more comorbidity (Ch: 2.35±1.61 vs 2.08±1.38; P<0.03), worse functional impairment [LI: 0.49±1.15 vs 1.45±2.32, P<0.001] [Blp: 34.6±32.9 vs 54.0±34.1, P<0.001] [Bla: 5.79±12.5 vs 20.5±22.9, P<0.001], a higher percentage of functional loss at admission (85.9±23.2 vs 66.4±28.6; P<0.001), worse cognitive impairment (PT: 7.20±3.73 vs 5.10±3.69, P<0.001) and malnutrition (albumin 2.67±0.54 vs 2.99±0.49, P<0.001). Mortality was higher with impaired consciousness [49.2% (P<0.01)], tachypnea [33.3% (P<0.01)], tachycardia [44.4% (P<0.002), high urea levels [31.8 (P<0.001)], anemia [44.7% (P<0.02)], pleural effusion [42.9% (P<0.002)], and multilobar infiltrates [43.2% (P<0.001)]. In the multivariate analysis, variables associated with mortality were: age≥90 years [OR: 3.11 (95% CI: 1.31–7.36)], impaired consciousness [3.19 (1.66–6.15)], hematocrit<30% [2.87 (1.19–6.94)], pleural effusion [3.77 (1.69–8.39)] and multilobar infiltrates [2.76 (1.48–5.16)]. Female sex and a preserved functional status prior (LI:5) and during admission (Bla:40) were protective of mortality [0.40 (0.22–0.70), 0.09 (0.01–0.81) and 0.11 (0.02–0.51)].

Conclusions: Geriatric assessment parameters and routine clinical variables were associated with mortality.

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PALABRAS CLAVE:
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Valoración geriátrica
Capacidad funcional
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RESUMEN

Introducción: Analizar la relación de parámetros obtenidos en la valoración geriátrica con la mortalidad en ancianos con neumonía extrahospitalaria (NEH) en una unidad de geriatría de agudos (UGA).

Método: Un total de 456 pacientes (≥75 años). Variables: edad, sexo, procedencia, antecedentes, nivel de conciencia, frecuencia cardíaca y respiratoria, presión arterial, datos de laboratorio, derrame pleural, afectación multilobar, capacidad funcional (independencia para actividades de la vida diaria) previa.
al ingreso (índice de Lawton [II], índice de Barthe previo [IBp]) y en el momento del ingreso (IBi), función cognitiva (test de Pfeiffer [TP]), comorbilidad (índice de Charlson [ICh]) y nutrición (proteínas totales, albúmina).

Resultados: Los 110 pacientes que fallecieron durante el ingreso (24,2%) tuvieron mayor edad (86,6 ± 6,4 vs 85,1 ± 6,4; p < 0,04), mayor comorbilidad (ICh 2,35 ± 1,61 vs 2,08 ± 1,38; p < 0,083), menor capacidad funcional (II: 0,49 ± 1,15 vs 1,45 ± 2,32; p < 0,001; IBp: 34,6 ± 32,9 vs 54,0 ± 34,1; p < 0,001; IBi: 5,79 ± 12,5 vs 20,5 ± 22,9; p < 0,001), mayor porcentaje de pérdida funcional al ingreso (85,9 ± 23,2 vs 66,4 ± 28,6; p < 0,0001), mayor deterioro cognitivo (TP: 7,20 ± 3,73 vs 5,10 ± 3,69; p < 0,001) y mayor desnutrición (albúmina 2,67 ± 0,54 vs 2,99 ± 0,49; p < 0,001). Hubo también mayor mortalidad con alteración de conciencia (49,2%; p < 0,01), taquipnea (33,3%; p < 0,01), taquicardia (44,4%; p < 0,002), urea elevada (31,8; p < 0,001), anemia (44,7%; p < 0,02), y afectación multilobar (43,2%; p < 0,001). En el análisis multivariado resultaron significativos: edad ≥ 90 años (OR: 3,11 [IC95%: 1,31-7,36]), alteración de conciencia (3,19 [1,66-6,15]), hematocrito < 30% (2,87 [1,19-6,94]), derrame pleural (3,77 [1,69-8,39]) y afectación multilobar (2,76 [1,48-5,16]). El sexo femenino y la capacidad funcional más conservada previa (II ≥ 5) y en el momento del ingreso (IBi ≥ 40) fueron protectores de mortalidad (0,40 [0,22-0,70]; 0,09 [0,01-0,81] y 0,11 [0,02-0,51]).

Conclusiones: Los parámetros de valoración geriátrica y las variables clínicas habituales estuvieron relacionados con la mortalidad.

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Finally, variables that showed significant association with greater mortality on the bivariate analysis were subsequently included in a binary logistic regression multivariate model.

**Results**

The characteristics of the 456 patients included in the study are shown in Table 1. The sample comprises very elderly patients with a high mean age, many of whom were already dependent before admission for activities of daily living, as can be seen from the low mean LI and BIp scores. The patients were also very dependent at the time of admission with a mean Bla score of 17.1 (range 0–100). Moreover, mean cognitive function scores and nutritional parameters, such as albumin, were altered, and immobility syndrome and cognitive deterioration before admission were common. All these characteristics confirm that the sample consisted of a group of elderly patients in a compromised state of health.

The clinical variables and laboratory data are given in Table 2, showing high rates of cerebrovascular disease, tachypnea, raised urea and low oxygen saturation. These same variables are considered in the Fine PSI index as indicative of poor prognosis and associated with greater mortality.

It can be seen from Table 3 that patients who died during admission had a higher comorbidity burden and were older. This table also shows that all parameters recorded in the geriatric assessment were significantly related with death during admission. Patients who died, therefore, had significantly lower mean LI, Bla and PT scores, indicating greater dependence in activities of daily living (both prior to and at admission) and poorer cognitive function. Moreover, the mean percentage loss of functional capacity caused by pneumonia was significantly greater in patients who died (85.9%±23.2% vs 66.4%±28.6%; P<.001). Nutritional
parameters revealed mean total protein and albumin values below normal limits in all patients. Furthermore, these parameters were even lower, to a significant extent, in the group of patients who died. It can be seen from Table 4 that immobility, PU and delirium during admission were significantly more common in patients who died.

Table 5 shows the relationship between clinical variables and laboratory data and mortality. Male sex, admission from home, tachypnea, tachycardia, raised urea, anemia, pleural effusion and multilobar involvement on chest X-ray were significantly more common in patients who died.

Lastly, Table 6 shows variables significantly related with mortality in the multivariate analysis. Age $\geq$ 90 years, altered consciousness, anemia, pleural effusion and multilobar involvement present an elevated relative risk of death with OR values higher than 1. Female sex and better functional capacity (8a $\geq$ 40; 11 $\geq$ 5) present a relative risk of less than 1, suggesting that these variables may act as protective factors against mortality.

Discussion

Mortality among elderly CAP patients in this study was 24%, higher than that reported by other authors. This may be due to 3 factors:
of consciousness variable can be explained by the appearance of hypoactive delirium, a common clinical situation in this population that is directly related with in-hospital mortality, irrespective of associated pathology.34,52 The high prevalence of altered consciousness in our study may be due to the fact that our population was very elderly and presented multiple risk factors for delirium. A significant relationship between delirium and in-hospital mortality in elderly subjects with pneumonia has been described in other studies. This relationship was also identified in our population with the univariate analysis (Table 4), although statistical significance was not reached on the multivariate analysis. This may be due to the under-diagnosis of delirium, this being more difficult to determine than mere altered consciousness.7,8,26

Plasma urea is included in the main indexes for predicting mortality in CAP (CURB 65, PSI). It was also identified in our study as a predictive factor in the univariate, but not in the multivariate, analysis. This may be explained by the existence of other, more potent, factors in this elderly population. Ewig et al.7 suggested that urea may not be a very specific predictor of mortality in the elderly, as this is a disturbance commonly found in this population. In contrast, in our study and in other publications,6,8,27 anemia and malnutrition, also common in the elderly, were prognostic factors for mortality. Nevertheless, only anemia reached statistical significance in the multivariate analysis, suggesting that it can be regarded as a potent prognostic indicator (Table 6). The predictive value of these variables may be explained by both anemia and malnutrition being indirect indicators of a poorer state of health that may also be related with underlying disease.

A better functional capacity prior to and at admission was a protective factor against in-hospital mortality. Several authors have underlined the importance of functional capacity as a predictor of mortality in various diseases.3,10,11,28 Marrie and Wu3 found that functional status is a strong predictor of in-hospital death in patients with CAP. Likewise, Davis et al.3 reported that prior functional status has a similar or better predictive value for in-hospital mortality than laboratory data. Torres et al.10 also using the Barthel index, similarly concluded that a better prior functional status acts as a protective factor against death after an episode of CAP. In contrast with these findings, Ma et al.2 did not find a significant relationship between functional capacity and mortality; these differences may be due to the use of different scales and the different characteristics of the populations studied.

Geriatric syndromes give an overall view of the clinical and functional status of the patient and are indicators of the morbidity and mortality produced by different diseases.3,9,28 These syndromes are generally interrelated, and the appearance of one often leads to the appearance of another, so it is sometimes difficult to evaluate each individually. A significant relationship was found in the univariate analysis between geriatric symptoms and mortality, although this was not statistically significant in the multivariate analysis. This may be because all elderly patients included in this study had pneumonia that met admission criteria, indicating severe disease. This could suggest that the severity of the pneumonia might have influenced mortality more than the geriatric syndromes. Even so, immobility appears to one of the most significant of the geriatric syndromes; in their study, Marrie and Wu3 found that it produces a risk of in-hospital death in CAP of up to 25%, compared to a 4% risk in patients who could walk unaided. Similarly, Riquelme et al.29 reported a relative risk of mortality of 10.7 in bedridden patients.

As we have seen, the parameters obtained in the geriatric assessment have proven their value in the prognosis of mortality in elderly subjects with CAP, as confirmed in our study (Tables 3 and 4). Although the multivariate analysis suggests that age and clinical and laboratory variables are useful for establishing a short-term prognosis of death in a very elderly population, some variables obtained from the geriatric assessment are also very useful for predicting mortality. Functional capacity (greater level of independence) was identified as a protective factor against death and an indicator of good prognosis in the multivariate analysis (Table 5). Nevertheless, the need for similar studies with larger populations of elderly subjects must be emphasized.

Conflicts of Interest

The authors state that they have no direct or indirect conflicts of interest related to the contents of this manuscript.

References


