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Inflammation and disability as risk factors for mortality in elderly acute care patients

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ABSTRACT

Although the role of inflammation has been studied in specific diseases or in community living elderly, data in hospitalized acute care elderly patients are scarce. The present study was designed to determine the predictive value of sociodemographic, clinical and biological factors for mortality in acute care geriatric wards. Retrospective study was conducted in two acute care wards in a university-based geriatric hospital with elderly patients ($n = 224$) consecutively admitted to acute care wards with available medical files. Sociodemographic variables, primary medical diagnosis and number of associated conditions, dementia, depression, pressure sores, functional status (measure by the activities of daily living = ADL scale), weight, and plasma levels of albumin, transthyretin, C-reactive protein (CRP) and orosomucoid were recorded at admission. Patients who died in the acute care wards were compared to those who survived. The mean length of stay was 16 ± 13 days; mortality was 12%. Univariate analysis revealed that disability, no anti-depressant drug, pressure ulcers, a higher number of associated conditions, living with another person, and biological markers of malnutrition (albumin <35 g/l, transthyretin <200 mg/l) and inflammation (CRP ≤ 30 mg/l, orosomucoid ≥ 1.25 g/l) were significantly associated with an increase in the risk of death. The logistic regression model retained CRP ≥ 30 mg/l (odds ratio (OR) = 3.72, 95% confidence interval (CI) = 1.34–10.31; $p = 0.009$) and disability for at least one ADL item (OR = 2.16, 95% CI = 1.55–2.99; $p < 0.001$) as independent risk factors for death. We conclude that CRP and disability are strong independent risk factors for death in this population, and special attention should be paid to these patients in an integrated therapeutic approach to geriatric care.

1. Introduction

Although many older patients hospitalized in acute care wards do well and recover, 7–15% of them die in the hospital (Incalzi et al., 1996; Alarcon et al., 1999; Sullivan et al., 1999; Ponzetto et al., 2003). Through the identification of prognostic indicators and early assessment, patients at risk of death could be targeted to improve early intervention.

Several risk factors for mortality have been identified in elderly hospitalized patients. Studies have consistently shown an association between mortality and malnutrition as assessed by low albumin levels (Reinhardt et al., 1980; Agarwal et al., 1988; Constans et al., 1992a; Hermann et al., 1992; Ferguson et al., 1993), body mass index (Potter et al., 1988), weight loss (Sullivan et al., 1991; Satish et al., 1996; Liu et al., 2002; Bouillanne et al., 2005), energy intake (Sullivan et al., 1999) or loss of appetite (Satish et al., 1996). Moreover, malnutrition has been identified as an independent risk factor for death in elderly hospitalized patients after controlling for functional status, sociodemographics and medical factors (Incalzi et al., 1996; Covinsky et al., 1999a). However, none of these studies considered inflammation, despite the fact that it may play a key role in both disease and malnutrition. Although the Prognostic Inflammatory and Nutritional Index (PINI) is able to predict death in elderly hospitalized patients (Constans et al., 1992b; Bonnefoy et al., 1998), it cannot be used to determine the specific role of nutrition or inflammation in predicting outcome and its predictive value has not been studied after controlling for confounding factors. Inflammation per se may be an important risk

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factor for mortality (Rosenthal et al., 1997; Henry et al., 1999), but the few relevant studies available either did not control for other risk factors or did not use routine inflammation markers.

Other factors are reported to be predictive of mortality in elderly hospitalized patients. Disability in particular is strongly associated with the risk of death (Narain et al., 1988; Incalzi et al., 1992a; Minicuci et al., 2003; Ponzetto et al., 2003). In addition, disease-related factors such as congestive heart failure, cancer, kidney failure, cardiovascular disease, cognitive impairment, depression, pressure ulcer and polypharmacy have previously been identified as risk factors for mortality in older hospitalized patients, but less data

are available (Fields et al., 1986; Casiglia et al., 1993; Allman, 1997; Alarcon et al., 1999; Covinsky et al., 1999b; Walter et al., 2001).

The present study was designed to determine the predictive value of nutrition, inflammation and functional status, disease and sociodemographic factors for mortality in acute care geriatric wards.

2. Subjects and methods

2.1. Participants

In a retrospective study, 300 patients admitted consecutively to the two acute care wards of the Charles Foix University Geriatric Hospital from January 1st to June 10, 2003 were considered. Only 224 medical files could be used for data collection.

Table 1
Baseline characteristics of the study population ($n = 224$)

Parameter	Total, n	Mean ± S.D.	Range	Median	Q1–Q3	n (%)
Age (year)	224	85 ± 7.8	61–103	85	79–91	
Sex						
Female						159 (71.0)
Male						65 (29.0)
ADL score	222	3.6 ± 1.9	0–6	3.5	2.5–5.5	
≤5						162 (73.0)
>5						60 (27.0)
MMSE score	94	19.4 ± 6.5	3–30	20	16–24	
Dementia	223					
Yes						111 (49.8)
No						112 (50.2)
Antidepressants	223					
Yes						52 (23.3)
No						171 (76.7)
Pressure ulcer	224					
Yes						15 (6.7)
No						209 (93.3)
Primary conditions	224					
Cardiovascular and respiratory						45 (20.1)
Neuropsychiatric						64 (28.6)
Infectious						22 (9.8)
Cancer						24 (10.7)
Other						69 (30.8)
No of associated conditions	224	3.3 ± 1.7	1–10	3	2–4	
Weight (kg)	211	58.6 ± 14.9	31.2–125	57.4	47.0–67.5	
Albumin (g/l)	167	31.7 ± 6.5	14–46	32	27–36	
<35						110 (65.9)
≥35						57 (34.1)
Transthyretin (mg/l)	166	174 ± 73.3	41.0–363.0	170.5	121.0–218.0	
<200						112 (67.5)
≥200						54 (32.5)
CRP (mg/l)	213	40.4 ± 56.2	1.0–313.0	15 (5–60)		
<30						145 (68.1)
≥30						68 (31.9)
Orosomucoid (g/l)	166	1.43 ± 0.61	0.44–2.92	1.32 (0.91–1.82)		
<1.25						70 (42.2)
≥1.25						96 (57.8)
Residence at adm.	224					
Own home						198 (88.4)
Nursing home						26 (11.6)
Domiciliary care	199					
Yes						114 (57.3)
No						85 (42.7)
Living situation	199					
With another person						82 (41.2)
Alone						117 (58.8)
Proxies	224					
Yes						196 (87.5)
No						28 (12.5)