

# CHARLSON COMORBIDITY INDEX: A PREDICTOR OF IN-HOSPITAL DEATH IN ACUTE ISCHEMIC STROKE

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**Background:** Stroke is the third leading cause of death worldwide. Mortality is strongly influenced by the burden of the ischemic cerebral lesion and the comorbidities. Association of two or more chronic conditions, or multimorbidity, a condition particularly common in elderly patients, is related to a poor health status and a reduced life expectancy. Comorbidities represent a risk factor for adverse events in several critical illnesses. We aimed to evaluate whether elderly patients affected by multiple chronic pathologies, have a reduced in-hospital survival after ischemic stroke.

**Methods:** We enrolled all the subjects admitted to our Internal Medicine Department for ischemic stroke. For each patient we collected entry NIHSS score and all the comorbidities assessed by Charlson comorbidity index (CCI) (Tab.1). At the end of hospitalization, we assessed length of hospital stay, hospital-related infections and in-hospital mortality. We divided patients in four groups, according to CCI score: group 1 (CCI: 2-3), group 2 (CCI: 4-5), group 3 (CCI: 6-7) and group 4 (CCI: ≥8). Survival was evaluated with Kaplan-Meier and Cox regression analyses. The complete model considered in-hospital death as the main outcome, days of hospitalization as the time variable and CCI score as the main predictor, adjusting for NIHSS score, sex and nosocomial infections

**Results:** During a 3-year period, 294 patients were enrolled. The median number of chronic associated pathologies was 2 ( $\pm 1.20$ ), as shown in Fig. 1. In-hospital death was observed in 1.4 % of the patients in group 1, 5.4 % in group 2, 22.2 % in group 3, and 81.8 % in group 4; the difference in the distribution was significant on the Chi-squared test ( $p < 0.0001$ ) (Fig. 2). Cox regression analysis showed that CCI group 3 had a 3.81-fold increase in the HR of in-hospital mortality (95 % CI 1.58-9.18;  $p = 0.003$ ). The HR increased to 13.14 (95 % CI 4.84-35.73;  $p < 0.0001$ ) in patients in CCI group 4 (Charlson score  $\geq 8$ ). This effect was independent of NIHSS at admission, sex and nosocomial infections (Fig. 3).

Elderly stroke patients with multimorbidity presented higher risk of in-hospital death.

**Discussion:** Evidence exists that a growing complexity of the elderly patient is associated to a worse outcome and an increased risk of complications, such as thromboembolic diseases or early recurrences of atrial fibrillation. Our study shows that a higher number of comorbidities, evaluated by CCI, is a strong predictor of unfavourable outcome after acute ischemic stroke. CCI score should be considered for the planning of clinical management after stroke.

## References

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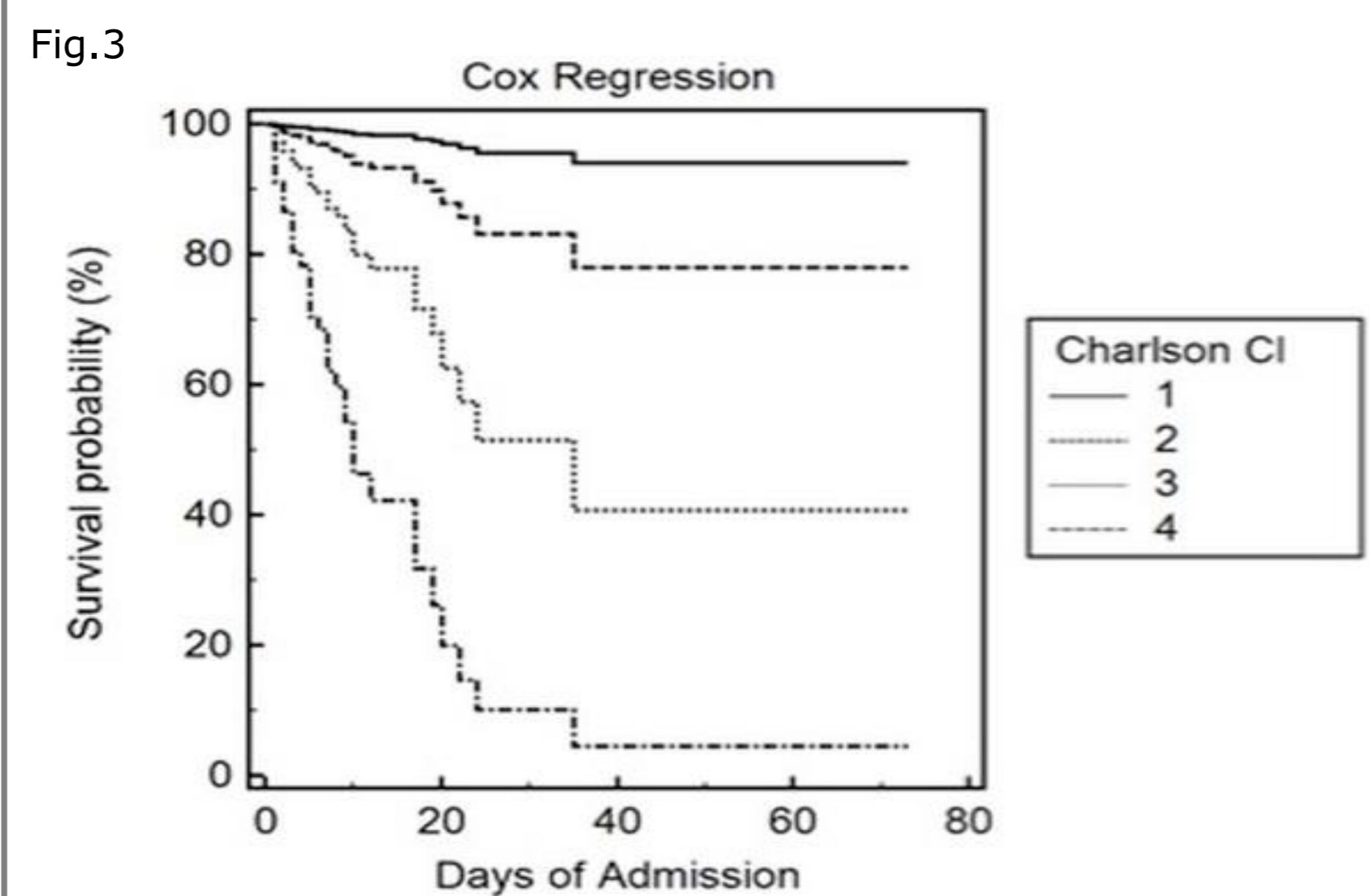
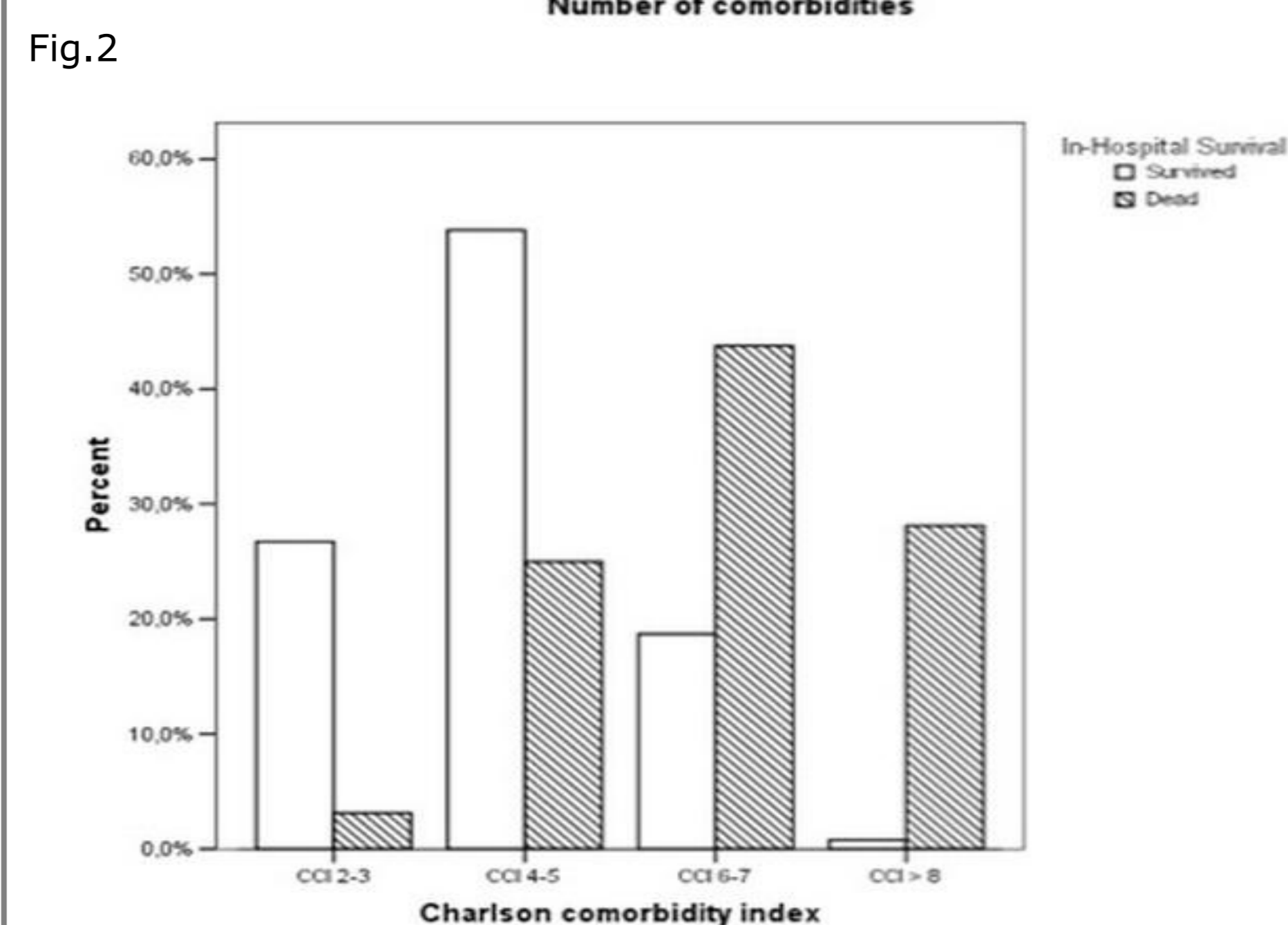
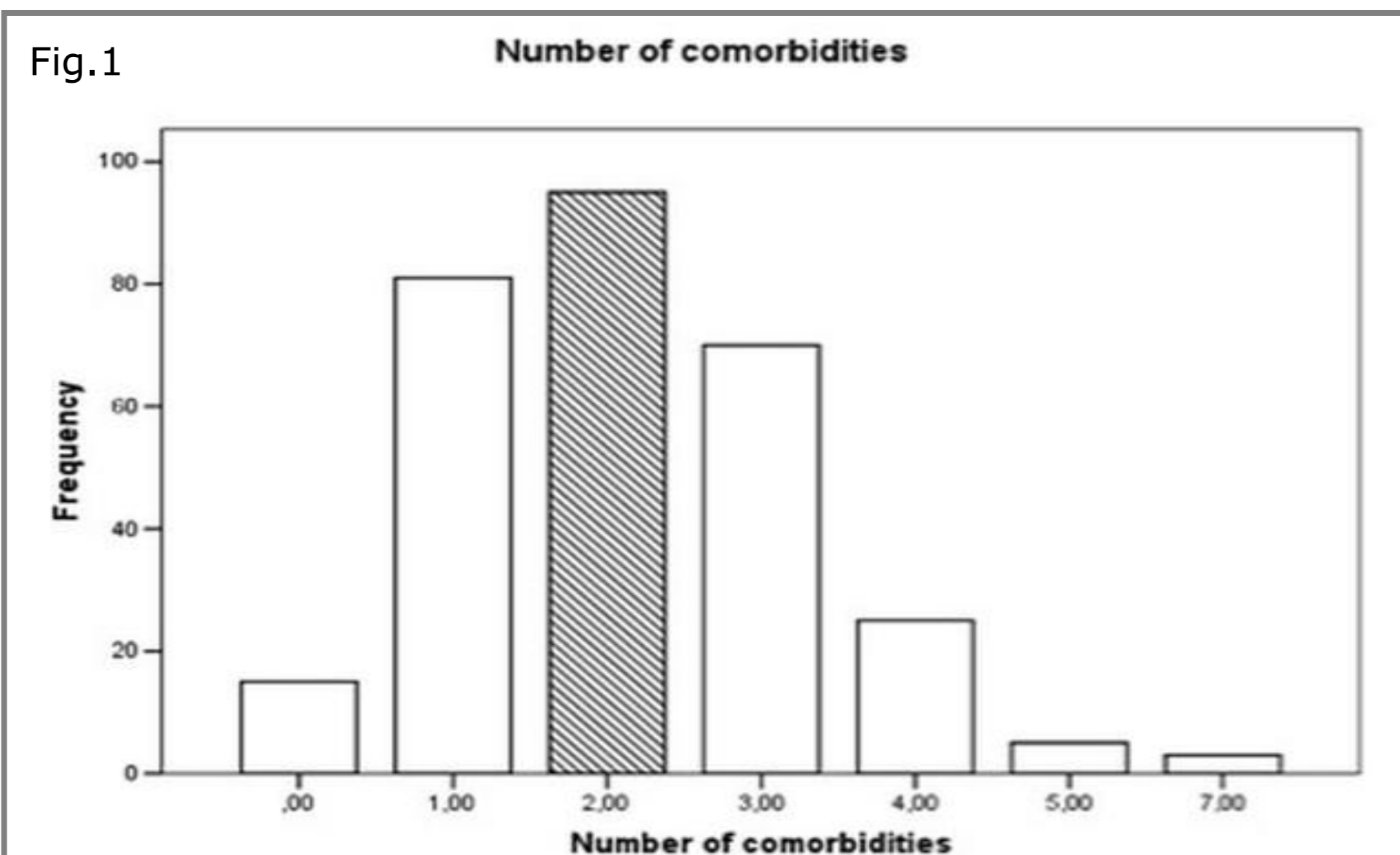


Table 1 Charlson comorbidity index

Comorbidity	Score	Weight
Hemiplegia		+2
Moderate or severe renal disease		+2
History of myocardial infarction	+1	+2
Congestive heart failure	+1	+2
Peripheral disease (includes aortic aneurysm $\geq 6$ cm)	+1	+2
Cerebrovascular disease (with mild or no residua or TIA)	+1	+2
Dementia	+1	+2
Chronic pulmonary disease	+1	+2
Connective tissue disease	+1	+3
Peptic ulcer disease	+1	+6
Mild liver disease (no portal hypertension, includes chronic hepatitis)	+1	+6
Diabetes without end-organ damage (excludes diet-controlled alone)	+1	+0
		+1
		+2
		+3

Tab.1