

## Original article

# Detrimental impact of acute coronary syndrome on the independence of the elderly

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## ABSTRACT

**Objectives.** To evaluate the prognostic role of functional status in older adults hospitalized for acute coronary syndrome (ACS) and the implications of the coronary event on functional decline during follow-up. **Materials and Methods.** This was a single-center, prospective cohort study including patients aged  $\geq 65$  years hospitalized for ACS with (STEMI) or without ST-segment elevation in 2022. Patients with total dependence or lacking a care network were excluded. Functional status was assessed using the Barthel Index and the Lawton and Brody scales at admission, 30 days, and one year post-discharge. The association between initial functional status and major adverse cardiovascular events (MACE) was analyzed, as well as the impact of ACS on functional status over the short and long term. **Results.** A total of 110 patients older than 65 years were included (mean age  $78.8 \pm 4.6$  years; 61.8% male). At admission, 94.3% presented mild functional dependence according to the Barthel Index, with similar findings on the Lawton and Brody scales. At 30 days, a significant functional decline was observed (Barthel:  $71.2 \pm 11.3$ ,  $p < 0.001$ ; Lawton:  $4.8 \pm 2.5$ ,  $p = 0.02$ ), which persisted at one year. Initial functional status was not associated with MACE. ST-segment elevation ACS (STEMI) was an independent predictor of short-term functional decline (adjusted OR 1.75;  $p = 0.04$ ). **Conclusions.** In older adults with ACS, initial functional status did not predict adverse events; however, significant functional decline was observed, particularly after STEMI. This underscores the importance of personalized strategies for managing this vulnerable population.

**Keywords:** Acute Coronary Syndrome; Functional Status; Elderly (Source: MeSH-NLM).

## RESUMEN

## Impacto deletéreo del síndrome coronario agudo en la independencia del adulto mayor

**Objetivo.** Evaluar el rol pronóstico de la dependencia funcional en adultos mayores hospitalizados por síndrome coronario agudo (SCA) y las implicancias del evento coronario en la independencia durante el seguimiento. **Materiales y métodos.** Estudio unicéntrico observacional de cohorte prospectivo en pacientes  $\geq 65$  años hospitalizados por SCA con (SCACEST) o sin (SCASEST) elevación del segmento ST en 2022. Se excluyeron aquellos con dependencia total o sin red de cuidados. La dependencia multidimensional se evaluó mediante las escalas de Barthel y Lawton y Brody el día del ingreso al centro médico, a los 30 días y al año. Se analizó como objetivo primario la asociación entre la dependencia inicial y los eventos adversos cardiovasculares mayores (MACE), así como el impacto del SCA en la dependencia a corto y largo plazo. **Resultados.** Se incluyeron 110 pacientes mayores de 65 años (edad promedio  $78,8 \pm 4,6$  años; 61,8% hombres). Al ingreso, el 94,3% presentó dependencia funcional leve según Barthel y un grado similar en Lawton y Brody. A los 30 días, el deterioro funcional fue significativo (Barthel:  $71,2 \pm 11,3$ ;  $p < 0,001$ ; Lawton:  $4,8 \pm 2,5$ ;  $p = 0,02$ ), persistiendo al año. La dependencia inicial no se asoció con MACE. El SCACEST fue un predictor independiente del detrimento de la independencia funcional a corto plazo (OR ajustado 1,75;  $p = 0,04$ ). **Conclusiones.** En adultos mayores con SCA, la dependencia inicial no predijo eventos adversos, pero el deterioro en la independencia funcional fue relevante, especialmente tras SCACEST. Esto destaca la importancia de estrategias personalizadas en esta población vulnerable.

**Palabras clave:** Síndrome Coronario Agudo; Dependencia; Anciano (Fuente: DeCS-Bireme).

## Introduction

Acute coronary syndromes (ACS), both with ST-segment elevation (STEMI) and without ST-segment elevation (NSTEMI), are among the leading causes of cardiovascular morbidity and mortality worldwide. These conditions represent clinical emergencies that require prompt intervention to preserve myocardial viability and improve both short- and long-term outcomes <sup>(1)</sup>. In Argentina, the burden of disease attributable to ACS has been increasing as a result of the epidemiological transition, marked by population aging and a rise in cardiovascular risk factors among older adults <sup>(2)</sup>. In this context, older patients constitute a particularly vulnerable group due to the coexistence of comorbidities, frailty, and reduced functional reserve.

Comprehensive geriatric assessment (CGA) is a multidimensional tool that evaluates the medical, functional, psychological, and social aspects of older adults, offering a holistic approach to clinical decision-making <sup>(3)</sup>. Its application in the cardiovascular setting has proven valuable for risk stratification, prediction of adverse outcomes, and guidance of individualised interventions <sup>(4)</sup>. However, the implementation of this strategy in patients presenting with ACS remains limited, particularly in middle-income countries such as Argentina, where available resources and structural barriers may hinder its systematic use.

Multiple studies have shown that older adults with coexisting frailty or functional dependence are at increased risk of adverse clinical events, prolonged hospital stays, and greater deterioration in quality-of-life-related parameters during medium-term follow-up after ACS <sup>(5)</sup>. Despite this, therapeutic algorithms for ACS are often guided by protocols primarily based on clinical trials that exclude geriatric or frail patients.

The present study aimed to analyse the clinical implications of initial functional dependency assessment in older adults hospitalised for an ACS, evaluating its prognostic role in terms of clinical outcomes during follow-up and identifying independent predictors of post-ACS functional decline.

## Materials and methods

### Study design

A single-centre, prospective observational cohort study was conducted, including patients diagnosed with STEMI or NSTEMI according to the predefined criteria established in the Fourth Universal Definition of Myocardial Infarction <sup>(6)</sup>. The primary objective was to assess the association between baseline functional dependency and major adverse cardiovascular events (MACE) during follow-up, as well as the impact of ACS on short-

and long-term functional independence. The secondary objective was to identify factors associated with functional decline in older adults following an ACS event.

### Study population

The analysis included adult patients diagnosed with STEMI and NSTEMI, identifying the subgroup aged  $\geq 65$  years to represent the older adult population, recruited between January and December 2022 at a high-complexity, multidisciplinary medical centre in Argentina. From the total study population, patients with complete functional dependence at baseline assessment, as well as those lacking a supportive social network for post-discharge care following the index hospitalisation, were excluded.

### Variables

The variables of interest included demographic characteristics such as sex, age, body mass index (BMI), degree of functional dependence, and the burden of concomitant cardiovascular comorbidities, including hypertension, dyslipidaemia, current or past smoking, diabetes *mellitus* and its pharmacological management, chronic kidney disease (CKD), left ventricular ejection fraction, and ACS type (STEMI vs. NSTEMI). Regarding anatomical features and details of the index revascularisation procedure, the severity of atherosclerotic coronary artery disease was assessed using the SYNTAX score <sup>(7)</sup>. Additional variables included the presence or absence of complete revascularisation, the culprit coronary artery of the index event, total ischaemia time, and total length of hospital stay following the revascularisation procedure.

### Definition of terms

- SYNTAX score (SS): a reproducible quantitative measure of the complexity and severity of coronary artery disease, categorised as follows: SS = 0–21, “low anatomical complexity”; SS = 22–32, “intermediate anatomical complexity”; SS  $\geq 33$ , “high anatomical complexity” <sup>(7)</sup>.
- Coronary flow grade: assessed using the Thrombolysis in Myocardial Infarction (TIMI) flow classification, defined as follows: TIMI 0, “complete occlusion with no antegrade perfusion”; TIMI 1, “penetration beyond the site of coronary obstruction without perfusion of the distal vascular bed”; TIMI 2, “partial perfusion distal to the obstruction, with antegrade flow and slow clearance of contrast material”; TIMI 3, “complete perfusion with antegrade flow and rapid clearance of contrast material” <sup>(8)</sup>.
- Culprit vessel of the index coronary event: defined as the coronary artery with angiographic evidence of total or subtotal thrombotic luminal occlusion, with topographic correlation to ST-segment elevation on electrocardiography.

- Bleeding: the severity of haemorrhagic events was classified according to the Bleeding Academic Research Consortium (BARC) scale. For the purposes of this study, only bleeding events classified as BARC  $\geq 3$  were considered <sup>(9)</sup>.
- Barthel Index: an assessment tool used to evaluate an individual's functional capacity, with a particular emphasis on physical performance, specifically their independence in activities of daily living (ADLs). This index is especially useful in the context of geriatric rehabilitation and patients with physical disabilities.

The index assesses ten activities: feeding, bathing, dressing, bowel and bladder control, transfers (from bed to chair and vice versa), bed mobility, use of the toilet, stair climbing, walking, and wheelchair mobility. Each activity is assigned a score ranging from 0 (total dependence) to 10 or 15 (minimal dependence or full independence), depending on the task. The total score reflects the individual's level of autonomy, with higher scores indicating greater independence. A score  $< 20$  denotes total dependence, while a score of 100 indicates complete independence <sup>(10)</sup>.

- Lawton Scale: also known as the "Lawton and Brody Scale," this assessment tool is used to evaluate the functional capacity of older adults in relation to instrumental ADLs.

Unlike the Barthel Index, which evaluates basic activities of daily living, the Lawton Scale focuses on more complex tasks that are essential for independent living in the community.

The scale assesses eight domains: use of the telephone, shopping, food preparation, housekeeping, laundry, transportation, medication management, and handling finances. Each activity is scored as 0 (total dependence) or 1 (full independence). A higher total score indicates greater capacity to perform instrumental activities of daily living, with a score of 0 reflecting maximum dependence and a score of 8 indicating complete independence <sup>(11)</sup>.

### Procedures or interventions

All patients were managed in accordance with national and international clinical practice guidelines for the treatment of STEMI and NSTEMI. Management included conservative medical therapy with fibrinolytic agents, percutaneous transluminal coronary angioplasty (PTCA), and coronary artery bypass grafting (CABG), depending on the availability of resources at each centre and the clinical judgement of the treating medical team <sup>(12-15)</sup>. Functional dependence was assessed on the day of admission for ACS using validated tools such as the Barthel Index and the Lawton and Brody Scale. The assessments were conducted by a medical team specialised in internal medicine and geriatrics. Follow-up evaluations were

performed at 30 days and one year after hospital discharge to assess the decline in functional independence related to the ACS event. This longitudinal assessment was conducted through in-person visits at the outpatient follow-up unit of the medical centre and was carried out by the same team of physicians who performed the initial in-hospital evaluation.

### Ethical aspects

The study was approved by the ethics committees of the participating centre, and it was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki, Good Clinical Practice guidelines, and current regulations governing research ethics. Written informed consent was obtained from all patients prior to study enrolment, at the time of hospital admission and following ACS diagnosis. Consent was obtained by the medical team involved in the study, after providing a detailed explanation of the benefits and potential risks associated with the diagnostic and therapeutic procedures to be performed during hospitalisation. Participation in the study did not change the therapeutic approach applied. The confidentiality of participants' personal and clinical data was strictly maintained, and all information was used exclusively for the purposes of the research.

### Data analysis

Continuous variables were expressed as mean and standard deviation or as median and interquartile range, depending on the distribution characteristics. Normality was assessed using the Kolmogorov-Smirnov or Shapiro-Wilk test, as appropriate. Categorical variables were reported as absolute frequencies and percentages, and were analysed using the chi-square test or Fisher's exact test, as applicable.

Comparisons of numerical variables were performed using the Student's t-test or the Mann-Whitney U test, depending on their distribution. To assess the association between patients' multidimensional functional dependency status at hospital admission, as measured by the pre-specified scales, and the occurrence of adverse clinical events during follow-up, a multivariable logistic regression model was employed. This model was adjusted for predefined potential confounders (age, sex, BMI, diabetes *mellitus*, STEMI, NSTEMI, and CKD), and the results were reported as odds ratios (ORs) with 95% confidence intervals (95% CIs). Adverse clinical events were defined as the composite of MACE, including cardiovascular death, recurrent acute myocardial infarction (AMI), stroke, and the need for repeat revascularisation due to ischaemia at 30 days and one year after hospital discharge.

To analyse the progression of scores on the Barthel and Lawton and Brody scales from the day of hospital admission through 30 days and one year after discharge, a repeated-measures analysis of variance (one-way ANOVA) was used when assumptions of normality and homogeneity of variances were met. If these assumptions were not satisfied, the non-parametric Friedman test was applied. Post hoc comparisons were performed with Bonferroni-adjusted significance levels.

Moreover, the impact of ACS on the Barthel and Lawton and Brody scores was evaluated using multivariable linear regression models, adjusted for pre-specified potential confounding variables.

A two-tailed  $p$ -value  $< 0.05$  was considered statistically significant (Type I error  $\leq 5\%$ ). All analyses were conducted using StataBE statistical software (StataCorp LLC, version 18.0, College Station, Texas, USA).

## Results

During the study period, 170 patients hospitalised for ACS were identified. The mean age of the study population was  $73.9 \pm 7.52$  years, and 60.8% were male. Among the entire cohort, patients aged  $\geq 65$  years accounted for 64.7% ( $n = 110$ ).

In terms of baseline characteristics, the older patient subgroup exhibited a higher burden of concomitant cardiovascular comorbidities, such as dyslipidaemia, hypertension, and diabetes mellitus, compared to the younger subgroup (**Table 1**).

NSTEMI was the most common clinical presentation in both the older (76.6%) and younger (67.4%) patient subgroups. The left anterior descending artery was the most frequent culprit vessel among older patients (76.3%), whereas the right coronary artery predominated in the younger subgroup. No statistically significant differences were observed in total ischaemia time between the two

groups; however, older patients exhibited greater anatomical complexity according to the SYNTAX score. The most frequently employed revascularisation strategy in both subgroups was percutaneous coronary intervention (PCI), followed by CABG. Nonetheless, a longer hospital stay was observed in the older subgroup (**Table 2**).

In terms of functional dependency assessment at hospital admission, the older patient subgroup had a mean Barthel Index score of  $94.63 \pm 17.42$ , corresponding predominantly to a mild degree of functional dependence. Among older patients, 94.3% ( $n = 103$ ) were classified as having mild dependence, 5.6% ( $n = 6$ ) moderate dependence, and 0.1% ( $n = 1$ ) severe functional dependence. No statistically significant differences in Barthel Index scores were observed between the older and younger subgroups at the time of hospital admission (**Figure 1**).

Regarding functional dependence as assessed by the Lawton and Brody Scale, the older patient subgroup had a mean score of  $7.22 \pm 1.36$ , also corresponding to a mild degree of dependence. Compared to younger patients, there was a non-statistically significant trend toward lower functional dependence in the older subgroup (**Figure 1**).

In terms of the prognostic value of functional dependency assessment at hospital admission on clinical outcomes at 30-day follow-up, and after adjusting for potential confounding factors, no statistically significant association was observed between Barthel Index scores and the occurrence of the composite of MACE at 30 days following the index coronary event (adjusted OR: 1.03 [95% CI: 0.10–2.38];  $p = 0.89$ ). A

**Table 1.** Baseline characteristics of the study population.

| Variable    | Total<br>(n=170) | Patients < 65 years<br>(n=60, 35.3%) | Patients $\geq 65$ years<br>(n=110, 64.7%) | p-value * |
|-------------|------------------|--------------------------------------|--------------------------------------------|-----------|
| Age (years) | $73.91 \pm 7.52$ | $57.8 \pm 6.23$                      | $78.84 \pm 4.58$                           | 0.01      |
| Male sex    | 103 (60.8)       | 35 (58.7)                            | 68 (61.82)                                 | 0.07      |
| BMI         | $22.83 \pm 5.34$ | $25.71 \pm 4.28$                     | $22.31 \pm 2.56$                           | 0.89      |
| HTN         | 106 (62.2)       | 24 (40.1)                            | 82 (74.5)                                  | 0.01      |
| DLP         | 77 (45.3)        | 23 (37.7)                            | 54 (49.09)                                 | 0.02      |
| DM          | 30 (17.8)        | 8 (12.87)                            | 22 (20.0)                                  | 0.04      |
| Smoking     | 82 (48.5)        | 35 (58.1)                            | 47 (42.7)                                  | 0.02      |
| CKD         | 10 (6.16)        | 1 (1.3)                              | 9 (8.2)                                    | 0.04      |
| PVD         | 5 (3.08)         | 1 (1.6)                              | 4 (3.6)                                    | 0.05      |
| AF          | 11 (6.72)        | 3 (4.2)                              | 8 (7.3)                                    | 0.08      |
| Cancer      | 3 (1.73)         | 1 (1.6)                              | 2 (1.8)                                    | 0.97      |
| COPD        | 46 (27.2)        | 13 (21.6)                            | 33 (30.0)                                  | 0.08      |
| PPM         | 4 (2.1)          | 1 (1.6)                              | 3 (2.7)                                    | 0.62      |
| LVEF        | $55.3 \pm 5.83$  | $52.47 \pm 4.39$                     | $51.63 \pm 3.61$                           | 0.94      |

Data are expressed as n (%), mean  $\pm$  standard deviation..

\* p-values represent comparisons between patients aged  $< 65$  and  $\geq 65$  years.

BMI: body mass index; HTN: hypertension; DLP: dyslipidaemia; DM: diabetes mellitus; CKD: chronic kidney disease; PVD: peripheral vascular disease; AF: atrial fibrillation; COPD: chronic obstructive pulmonary disease; PPM: permanent pacemaker; LVEF: left ventricular ejection fraction.

**Table 2.** Clinical presentation, anatomical characteristics, and revascularisation procedures.

| Variable                       | Total<br>(n=170) | Patients < 65 years<br>(n=60, 35.3%) | Patients ≥ 65 years<br>(n=110, 64.7%) | p-value * |
|--------------------------------|------------------|--------------------------------------|---------------------------------------|-----------|
| Acute coronary syndrome        |                  |                                      |                                       |           |
| STEMI                          | 46 (27.1)        | 20 (33.3)                            | 26 (23.6)                             | 0.07      |
| NSTEMI                         | 124 (72.9)       | 40 (67.4)                            | 84 (76.6)                             | 0.10      |
| Ischaemia time (min)           | 134.2 ± 32.0     | 134.5 ± 26.8                         | 140.5 ± 38.1                          | 0.14      |
| Vascular access                |                  |                                      |                                       |           |
| Radial                         | 155 (91.1)       | 57 (94.3)                            | 97 (88.3)                             | 0.22      |
| Femoral                        | 15 (8.8)         | 3 (5.7)                              | 13 (11.7)                             | 0.04      |
| Culprit vessel                 |                  |                                      |                                       |           |
| LAD                            | 88 (51.8)        | 23 (38.7)                            | 84 (76.3)                             | 0.03      |
| RCA                            | 68 (39.9)        | 33 (54.2)                            | 9 (8.2)                               | 0.01      |
| CX                             | 14 (8.3)         | 4 (7.1)                              | 17 (15.5)                             | 0.04      |
| SYNTAX score                   | 22.4 ± 6.86      | 19.3 ± 5.7                           | 28.7 ± 11.1                           | 0.02      |
| Revascularisation strategy     |                  |                                      |                                       |           |
| PCI                            | 168 (98.9)       | 58 (97.6)                            | 110 (100.0)                           | 0.43      |
| CABG                           | 2 (1.1)          | 2 (3.3)                              | 0 (0)                                 | 0.07      |
| Post-PCI TIMI flow             |                  |                                      |                                       |           |
| 0                              | 39 (17.1)        | 8 (25.0)                             | 28 (23.9)                             | 0.31      |
| I                              | 0                | 0 (0)                                | 0 (0)                                 | -         |
| II                             | 9 (3.9)          | 2 (6.3)                              | 4 (3.4)                               | 0.08      |
| III                            | 180 (78.9)       | 22 (68.8)                            | 85 (72.6)                             | 0.16      |
| Number of stents               | 1.33 ± 1.02      | 1.86 ± 1.59                          | 1.42 ± 1.04                           | 0.32      |
| Stent length (mm)              | 32.15 ± 26.14    | 33.48 ± 26.49                        | 31.05 ± 22.30                         | 0.25      |
| Length of hospital stay (days) | 3 (1-4)          | 3 (1-4)                              | 5 (2-6)                               | 0.04      |

Data are expressed as n (%), mean ± standard deviation, or median (interquartile range).

\* p-values represent comparisons between patients aged <65 and ≥65 years.

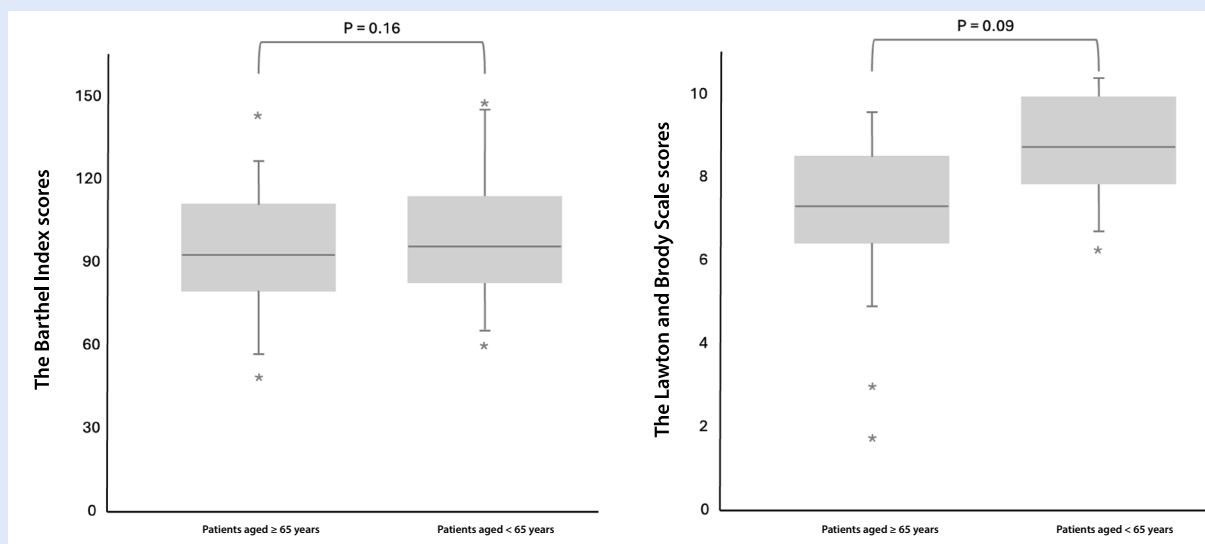
STEMI: ST-segment elevation myocardial infarction; NSTEMI: non-ST-segment elevation myocardial infarction; LAD: left anterior descending artery; RCA: right coronary artery; CX: circumflex artery; PCI: percutaneous coronary intervention; CABG: coronary artery bypass grafting; TIMI: Thrombolysis in Myocardial Infarction.

similar finding was observed for functional assessment using the Lawton and Brody Scale, with no statistically significant association between functional status at admission and 30-day clinical outcomes (MACE, adjusted OR: 1.06 [95% CI: 0.09–3.52];  $p = 0.96$ ). Comparable results were observed for longer-term outcomes at one-year follow-up, with no significant increase in the risk of the composite clinical endpoint associated with initial functional dependency as assessed by either the Barthel Index (MACE, adjusted OR: 1.28 [95% CI: 0.54–5.19];  $p = 0.68$ ) or the Lawton and Brody Scale (MACE, adjusted OR: 1.12 [95% CI: 0.19–4.32];  $p = 0.71$ ).

At 30-day follow-up after the index coronary event, the functional dependency assessment in the older patient subgroup, as measured by the Barthel Index, yielded a mean score of  $71.24 \pm 11.36$ , indicating a mild level of dependence and showing a statistically significant decline compared to the baseline assessment at hospital admission ( $94.63 \pm 17.42$

vs.  $71.24 \pm 11.36$ ;  $p < 0.01$ ). At one-year follow-up, the mean Barthel score was  $77.85 \pm 7.49$ , also significantly lower than the baseline value ( $94.63 \pm 17.42$  vs.  $77.85 \pm 7.49$ ;  $p < 0.01$ ), with a non-significant upward trend compared to the 30-day assessment ( $71.24 \pm 11.36$  vs.  $77.85 \pm 7.49$ ; repeated-measures ANOVA  $p = 0.04$ ). Similar findings were observed with the Lawton and Brody Scale, which showed a significant decline in functional independence at 30 days post-ACS ( $7.22 \pm 1.36$  vs.  $4.83 \pm 2.54$ ;  $p = 0.02$ ) and at one year ( $7.22 \pm 1.36$  vs.  $5.64 \pm 1.68$ ), with a non-significant upward trend between the 30-day and one-year assessments ( $4.83 \pm 2.54$  vs.  $5.64 \pm 1.68$ ; repeated-measures ANOVA  $p = 0.04$ ) (**Figure 2**).

Through multivariable logistic regression analysis adjusted for potential confounding factors, STEMI was identified as a parameter significantly associated with functional decline at 30-day follow-up. This association was evident when functional status was assessed using both the



**Figure 1.** Baseline functional assessment according to the Barthel Index and the Lawton and Brody Scale, stratified by age subgroup.

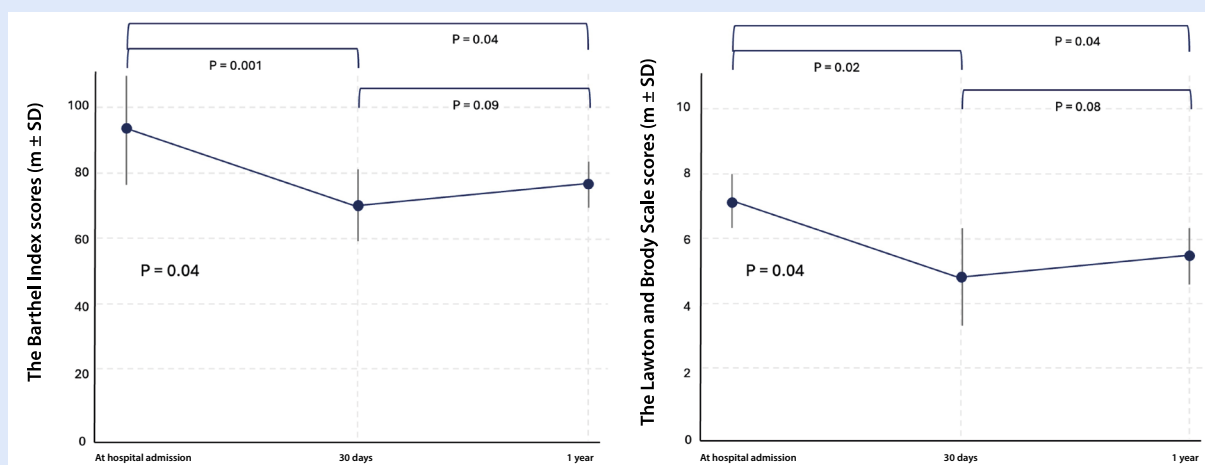
Barthel Index (adjusted OR: 1.75 [95% CI: 1.20–2.50];  $p = 0.04$ ) and the Lawton and Brody Scale (adjusted OR: 1.58 [95% CI: 1.09–2.23];  $p = 0.04$ ) (**Figure 3**).

## Discussion

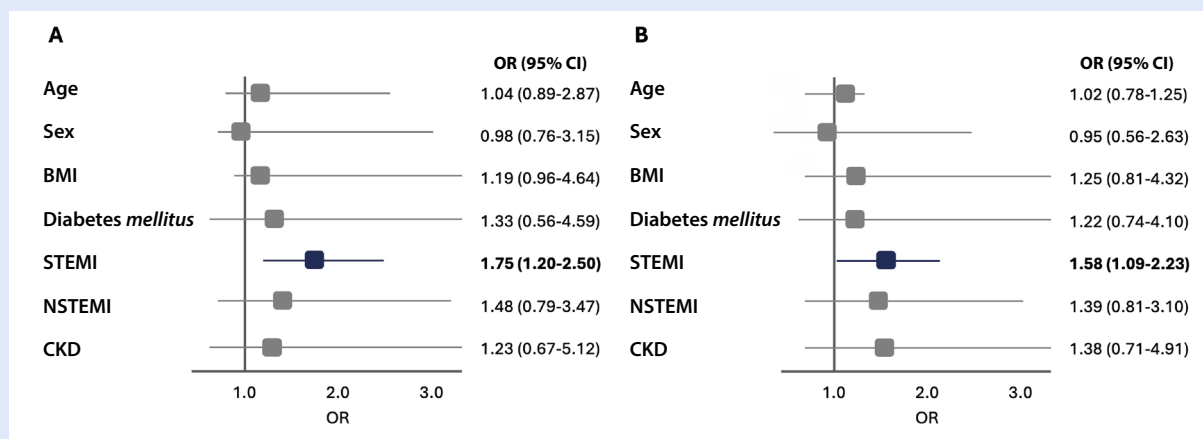
Based on the findings of the present study, the following key result is highlighted: in older patients with ACS, the multidimensional assessment of functional independence at the time of hospital admission, using validated and purpose-specific scales, did not demonstrate predictive value regarding the occurrence of adverse clinical events during follow-up.

The lack of a clear prognostic role for initial functional independence assessment may be attributable to several factors.

The Barthel and Lawton and Brody scales primarily focus on evaluating a patient's ability to perform daily activities such as mobility, hygiene, feeding, and self-care. The Barthel Index was originally developed to assess the severity of disability in patients with neuromuscular and musculoskeletal disorders, particularly those affecting independent limb movement. However, it quickly became widely adopted for monitoring functional changes in patients undergoing rehabilitation after stroke<sup>(16)</sup>. Given that stroke and ACS share certain pathophysiological mechanisms, it is reasonable to hypothesise that these scales could have prognostic utility in this clinical context. Additionally, the Lawton and Brody Scale has demonstrated predictive value for adverse clinical events across various clinical settings involving older adults, including those with neurocognitive impairment<sup>(17)</sup> and haematological malignancies<sup>(18)</sup>. This supports its potential as



**Figure 2.** Longitudinal functional assessment using the Barthel Index and the Lawton and Brody Scale following an acute coronary syndrome. m: mean; SD: standard deviation.



**Figure 3.** Clinical implications of ACS on functional assessment in older adults at 30 days following the index coronary event. **A.** Assessment using the Barthel Index, **B.** Assessment using the Lawton and Brody Scale. BMI: body mass index; STEMI: ST-segment elevation myocardial infarction; NSTEMI: non-ST-segment elevation myocardial infarction; CKD: chronic kidney disease; OR: odds ratio, 95% CI: confidence interval.

a risk stratification tool in older adults with ACS, a population often affected by substantial physical decline. Furthermore, these scales may serve as valid instruments to quantify the deleterious impact of ACS on functional dependence in older adults, both in the medium- and long-term follow-up.

While functional independence assessments are useful for evaluating the ability to perform daily activities, they may not fully capture the complexity of the underlying clinical conditions in patients with ACS, such as comorbidities, cognitive impairment, frailty, and specific pathophysiological characteristics, which may exert a more substantial influence on the occurrence of adverse clinical events. These conditions are not always adequately identified by functional assessment tools, which primarily focus on the ability to carry out routine tasks, without accounting for more complex aspects of physical and mental health. This context highlights the need for a more comprehensive evaluation of patients' clinical status, encompassing not only functional dependence but also cognitive function, frailty, and comorbid conditions. In this regard, there is robust evidence that the presence of cognitive impairment and concurrent frailty is associated with worse clinical outcomes in older adults hospitalised with ACS<sup>(19-20)</sup>. However, despite the established prognostic value of functional assessment in other clinical scenarios involving older adults<sup>(21,22)</sup>, there remains limited scientific evidence to date specifically addressing the prognostic role and clinical implications of functional status in older patients hospitalised with ACS<sup>(23)</sup>. Therefore, although functional assessment remains a valuable tool for understanding the degree of dependence and guiding rehabilitative care, its predictive capacity for adverse clinical events during follow-up in older patients with ACS appears limited. These findings underscore the importance of adopting a more holistic assessment approach, integrating functional evaluation with cognitive status, frailty, and ACS-specific characteristics, to enhance the prediction of clinical outcomes in this vulnerable population.

This study identified STEMI as a factor strongly associated with reduced functional independence at 30 days following the index coronary event, a finding that persisted throughout the one-year follow-up. However, no significant changes were observed between the 30-day and one-year assessments, suggesting that the clinical impact of STEMI on functional independence is most pronounced in the short term. In older adults, cardiovascular functional reserve is often diminished due to the cumulative effects of ageing and coexisting cardiovascular comorbidities, which increases the risk of delayed recovery and worsening functional status<sup>(24,25)</sup>. Furthermore, ACS can contribute to a generalised process of physical deconditioning. Prolonged hospitalisation, diagnostic and therapeutic interventions during the index admission, or periprocedural complications may result in relative immobility or the development of muscle weakness. In this context, physical deconditioning associated with immobility and prolonged bed rest contributes to functional decline, especially in elderly patients who already experience age-related reductions in muscle mass and strength<sup>(26,27)</sup>. The psychosocial impact also plays a critical role. Hospitalisation for ACS in older patients not only poses a physical challenge but also an emotional one. Anxiety, stress, and depression may be triggered by the acute illness, potentially interfering with the patient's motivation to engage in rehabilitation activities or adhere to medical recommendations<sup>(28)</sup>. Cognitive impairment and frailty, both common in this age group, can be further exacerbated by the stress of a cardiovascular event, amplifying the negative effects on functional capacity. Finally, post-ACS pharmacological therapy, including anticoagulants, beta-blockers, or angiotensin-converting enzyme inhibitors, may also have side effects that impair physical performance, such as orthostatic hypotension<sup>(29)</sup>, dizziness, or fatigue<sup>(30)</sup>, all of which can contribute to functional deterioration during the first months after the event.

This study has limitations inherent to its observational design, which preclude the establishment of direct causal relationships between functional independence assessment

and the occurrence of adverse clinical events during follow-up. Unmeasured or uncontrolled factors may have influenced the results. The inclusion of patients with comorbidities and frailty introduced heterogeneity, which limits the generalisability of the findings to other populations. Moreover, although the functional assessment scales used are validated, they focus on specific aspects of daily living and do not account for other dimensions, such as cognitive status or frailty, which may have a greater impact on predicting adverse outcomes. The absence of more detailed follow-up of additional variables, such as post-event rehabilitation and psychosocial effects, also limits a comprehensive understanding of the factors influencing functional capacity and the occurrence of adverse events.

In conclusion, among older adults hospitalised for ACS, geriatric assessment of functional independence at hospital

admission does not predict adverse clinical events during follow-up. However, STEMI is associated with a reduction in multidimensional independence at 30 days, and this functional decline persists over the subsequent year. These findings underscore the importance of addressing both cardiovascular and functional aspects in this vulnerable population, highlighting the need for early interventions and comprehensive management strategies.

### Authors' contributions

**PC, IC y PP:** Conceptualisation, Data Curation, Writing – Original Draft, Writing – Review & Editing **FA:** Data Curation, Writing – Original Draft, Writing – Review & Editing. **PC y CMG:** Methodology, Formal Analysis, Visualisation, Writing – Original Draft, Writing – Review & Editing.

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