ORIGINAL ARTICLE

Performance of 3 frailty scales for predicting adverse outcomes at 30 days in older patients discharged from emergency departments

Cesáreo Fernández Alonso[1], Carmen Del Arco Galán[2], Raquel Torres Garate[3], José Fernando Madrigal Valdés[4], Rodolfo Romero Pareja[5], Carlos Bibiano Guillén[6], Belén Rodríguez Miranda[7], Martín S. Ruiz Grinspan[8], Sonia Gutiérrez Gabriel[9], Ana Del Rey Ubago[2], Manuel E. Fuentes Ferrer[10], Francisco Javier Martín-Sánchez[1], on behalf of the Registro Frail-ED-Madrid.

Objective. To compare the ability of 3 frailty scales (the Clinical Frailty Scale [CFS], the Functional Index – eMergency [FIM], and the Identification of Seniors at Risk [ISAR] scale) to predict adverse outcomes at 30 days in older patients discharged from hospital emergency departments (EDs).

Methods. Secondary analysis of data from the FRAIL-Madrid registry of patients aged 75 years or older who were discharged from Madrid EDs over a period of 3 months in 2018 and 2019. Frailty was defined by a CFS score over 4, a FIM score over 2, or an ISAR score over 3. The outcome variables were revisits to an ED, hospitalization, functional decline, death, and a composite variable of finding any of the previously named variables within 30 days of discharge.

Results. A total of 619 patients were studied. The mean (SD) age was 84 (7) years, and 59.1% were women. The CFS identified as frail a total of 339 patients (54.8%), the FIM 386 (62.4%), and the ISAR 301 (48.6%). An adverse outcome occurred within 30 days in 226 patients (36.5%): 21.5% revisited, 12.6% were hospitalized, 18.4% experienced functional decline, and 3.6% died. The areas under the receiver operating characteristic curves were as follows: CFS, 0.66 (95% CI, 0.62-0.70; *P* = .022); FIM, 0.67 (95% CI, 0.62-0.71; *P* = .021), and ISAR, 0.64 (95% CI, 0.60-0.69; *P* = .023). Adjusted odds ratios (aOR) showed that frailty was an independent risk factor for presenting any of the named adverse outcomes: aOR for CFS >4, 3.18 (95% CI, 2.02-5.01), *P* < .001; aOR for FIM > 2, 3.49 (95% CI, 2.15-5.66), *P* < .001; and aOR for ISAR >3, 2.46 (95% CI, 1.60-3.79), *P* < .001.

Conclusions. All 3 scales studied — the CFS, the FIM and the ISAR — are useful for identifying frail older patients at high risk of developing an adverse outcome (death, functional decline, hospitalization, or revisiting the ED) within 30 days after discharge.

Keywords: Emergency department. Functional Index – eMergency (FIM). Clinical Frailty Scale (CFS). Identification of Seniors at Risk (ISAR). Prediction. Adverse outcomes.

Rendimiento de tres escalas de fragilidad para predecir resultados adversos a 30 días en los pacientes mayores dados de alta en los servicios de urgencias

Objetivo. Comparar la capacidad de tres escalas de fragilidad, Clinical Frailty Scale (CFS), Functional Index – eMergency (FIM) e Identification Senior at Risk (ISAR), para predecir resultados adversos (RA) a 30 días en los pacientes mayores dados de alta desde el servicio de urgencias hospitalario (SUH).

Método. Análisis secundario del registro FRAIL-Madrid que incluyó pacientes ≥ 75 años dados de alta de 10 SUH de Madrid durante un periodo de 3 meses entre 2018 y 2019. Se definió fragilidad como CFS ≥ 4, FIM ≥ 2 e ISAR ≥ 3. Las variables de resultado fueron revisita en urgencias, hospitalización, deterioro funcional, muerte y la variable compuesta por algún RA de los anteriores en los 30 días posteriores al alta del SUH.

Resultados. Se incluyeron 619 pacientes, la edad media fue de 84 años (DE 7), 59,1% eran mujeres. Hubo 339 pacientes (54,8%) identificados como frágiles en el SUH según CFS ≥ 4, 386 (62,4%) según FIM ≥ 2 y 301 (48,6%) según ISAR ≥ 3. Hubo 226 pacientes (36,5%) que presentaron algún RA a los 30 días tras el alta (21,5% revisita, 12,6% hospitalización, 18,4% deterioro funcional y 3,6% muerte). El área bajo la curva (ABC) de la escala CFS fue de 0,66 (0,62-0,70; p = 0,022), de FIM 0,67 (0,62-0,71; p = 0,021) y de ISAR 0,64 (0,60-0,69; p = 0,023). La presencia de fragilidad fue un factor independiente de presentar algún RA a los 30 días tras el alta (CFS ≥ 4 ORa 3,18 [IC 95% 2,02-5,01, p < 0,001], FIM ≥ 2 ORa 3,49 [IC 95% 2,15-5,66, p < 0,001] e ISAR ≥ 3 ORa 2,46 [IC 95% 1,60-3,79, p < 0,001]).

Conclusiones. Las tres escalas estudiadas –CFS, FIM, ISAR– son útiles y tienen una capacidad similar para identificar al paciente mayor frágil dado de alta del SUH con alto riesgo de presentar RA (muerte, deterioro funcional, hospitalización o revisita al SUH) a los 30 días.

Palabras clave: Urgencias. Functional Index – eMergency (FIM). Clinical Frailty Scale (CFS). Identification Senior at Risk (ISAR). Predecir, resultados adversos.

Author Affiliations:
[1]Emergency Department, Hospital Universitario Clínico San Carlos, Madrid, Spain.
[2]Emergency Department, Hospital Universitario de la Princesa, Madrid, Spain.
[3]Emergency Department, Severo Ochoa University Hospital, Leganés, Madrid, Spain.
[4]Emergency Department, Hospital de El Escorial, El Escorial, Madrid, Spain.
[5]Emergency Department, Hospital Universitario de Getafe, Madrid, Spain.
[6]Emergency Department, Hospital Universitario Infanta Leonor, Madrid, Spain.
[7]Emergency Department, Hospital Universitario Rey Juan Carlos, Madrid, Spain.
[8]Emergency Department, Hospital Universitario del Henares, Coslada, Madrid, Spain.
[9]Emergency Department, Hospital Universitario de Fuenlabrada, Fuenlabrada, Madrid, Spain.
[10]Research Unit, Hospital Universitario Nuestra Señora de Candelaria, Tenerife, Spain.

Author Contributions:
All the authors have confirmed their authorship in the document of author responsibilities, publication agreement and assignment of rights to EMERGENCIAS.

Corresponding Author:
Cesáreo Fernández Alonso
Emergency Department
Hospital Clínico San Carlos
Profesor Martín-Lagos, s/n
28040 Madrid, Spain

Email:
cesareofa@hotmail.com

Article information:
Received: 28-12-2022
Accepted: 22-2-2023
Online: 27-3-2023

Editor in Charge:
Aitor Alquézar Arbé

Introduction

The care of the elderly patient in the emergency department is one of the main healthcare challenges at present. Emergency care of this age group is progressively increasing worldwide because of population aging (20-30% of the general population).[1,2] In contrast to younger patients, older patients tend to make more appropriate use of this level of care, their care is more complex, they consume more resources and are associated with worse health outcomes.[3]

The organization and model of care in the ED are not sufficiently effective and are not adequately adapted to the needs of older patients. They are limited to the current clinical episode and do not consider other aspects identified in an ED-adapted geriatric assessment (AGA).[4] This assessment is recommended in frail elderly subjects and its knowledge allows the development of an individualized care plan to improve outcomes.[5-7]

Frailty is defined as a clinical syndrome characterized by a decrease in physiological reserve that makes the individual vulnerable to any stressful situation. In other words, a state with a high risk of presenting adverse outcomes (AOs) in the face of a triggering factor. However, there is neither a unanimous definition of frailty nor a tool that can be considered as a reference.[8-10] Currently, there is an approach focused on physical performance[11] and another multidimensional one.[12,13]

In the hospital emergency department (ED), frailty has been considered in a multidimensional manner since the aim is to identify elderly patients at high risk of AO, especially those discharged. The frailty screening scales Identification Senior at Risk (ISAR)[14-16] and Clinical Frailty Scale (CFS)[17,18] is the most widely used to date in Anglo-Saxon countries. In Spanish EDs they are not common practice. The ISAR requires a caregiver to respond to a series of questions on 5 domains (functional, mental, drugs, sensory deficit, and care). The CFS is a scale that includes a comorbidity, functional and cognitive assessment based on the clinical judgment of medical and/or nursing health personnel. Recent reviews question the usefulness of the ISAR[16] and promote the use of the CFS.[17,18]

Additionally, the Functional Index - eMergency (FIM) has been developed. This scale was designed to assess functional status in an abbreviated manner in four vignettes according to the patient's or caregiver's criteria[19] and could be used for frailty screening. It could be equivalent to the CFS scale, but shorter and does not require assessment by a healthcare professional.

To date, no studies have validated the FIM scale or compared these different frailty screening scales. Therefore, the aim was to compare the ability of different frailty scales -CFS, ISAR, FIM- to predict 30-day AO in older patients discharged from the emergency department.

Methods

Study design

This study is a secondary analysis of the FRAIL-ED-Madrid registry. It is a multipurpose, prospective, multicenter, observational cohort study that included, by opportunity sampling, patients ≥ 75 years discharged directly from any ED area regardless of diagnosis in 10 hospitals in Madrid during a 3-month period (November 1, 2018 to January 31, 2019). This work included those patients from the FRAIL-ED-Madrid registry in whom the studied scales -FIM, CFS and ISAR- and 30-day follow-up were available.

Independent variables

Demographic variables (age and gender), clinical variables (comorbidity according to the Charlson index,[20] number of regular drugs, reason for consultation) and VGU were collected: nutritional status (according to the abbreviated version of the Mini-Nutritional Assessment [SF-MNA]),[21] functional status according to the Barthel index (100 < 90 independent or mild dependence, 90 < 60 moderate dependence, 60 < 20 severe dependence and 20-0 total dependence),[22] history of dementia and depression, delirium in the ED according to the Confusion Assessment Method (CAM)[23] and social status. This information was obtained by the investigating physician at the time of ED discharge planning.

The total ISAR score was calculated, resulting from the sum of six dichotomous items translated from its original version[14]: 1) before the process for which you consulted the emergency department, did you need someone to help you on a regular basis; 2) since the current process for which you consulted the emergency department, have you needed more help than usual for your care; 3) do you have serious memory problems; 4) do you take 3 or more different drugs per day? 3) do you have serious memory problems; 4) do you take 3 or more different drugs per day; 5) do you generally see well (if you wear glasses, do you see well with glasses; and 6) have you been admitted to the hospital one or more nights in the last 6 months (excludes ED < 24 hours)? Each affirmative answer scores 1. The physician who evaluated the patient prior to discharge considered the patient to be frail if ISAR ≥ 3.[15,16]

The CFS was used according to its original version of 9 bullets with their respective explanatory text translated into Spanish (Figure 1)[12]: CFS = 1 very active; CFS = 2 well; CFS = 3 moderately well; CFS = 4, vulnerable; CFS = 5 moderately frail; CFS = 6 moderately frail; CFS = 7 severely frail; CFS = 8 extremely frail and CFS = 9 terminally ill. The physician assessed the baseline situation, prior to the current illness. The patient was considered as frail if CFS ≥ 4.

to the following question: Which best represents your baseline situation, prior to the current illness? A vignette of a FIM = 1 was considered pre-fragile, a

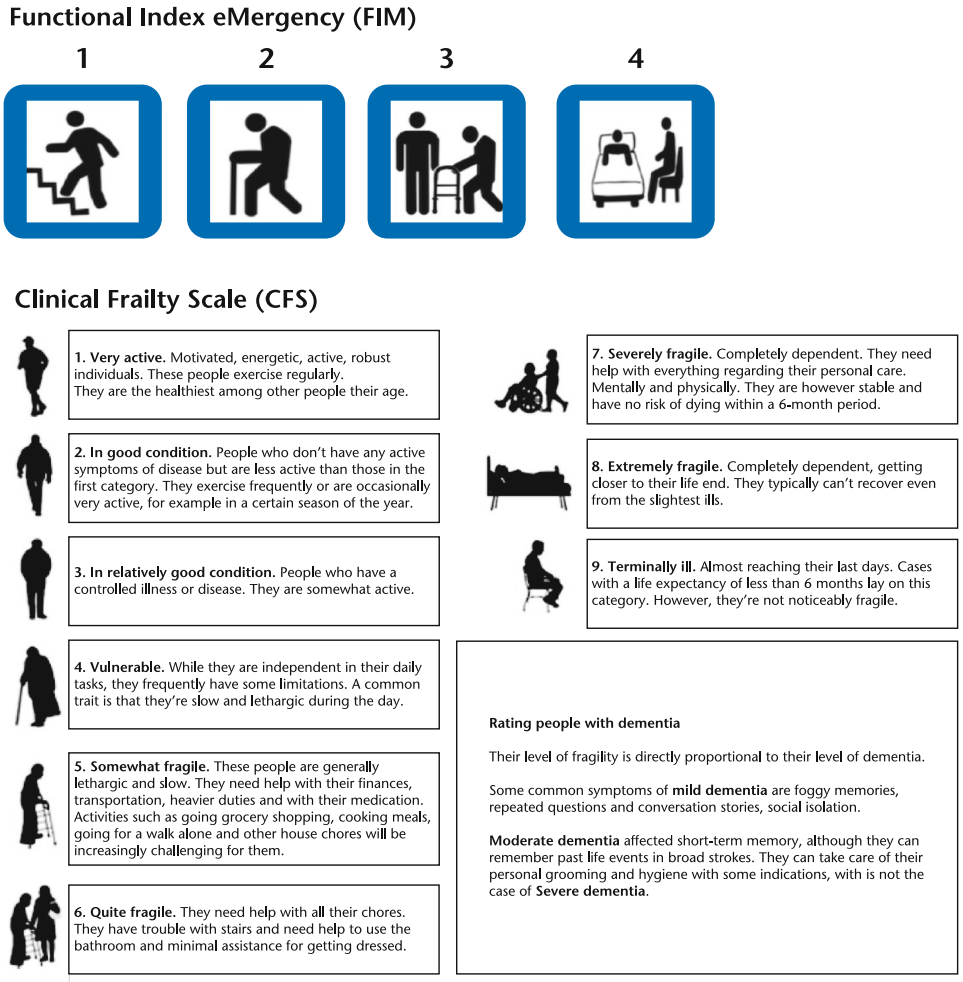


Figure 1. Frailty scales Functional Index - eMergency (FIM) and Clinical Frailty Scale (CFS).

FIM = 2 was considered mildly fragile, a FIM = 3 was considered moderately fragile, and a FIM = 4 was considered severely fragile. Therefore, a FIM ≥ 2 was considered fragile.

Outcome variable

The outcome variables were revisit, hospitalization, mortality, and functional deterioration (loss of 10 or more Barthel index points from baseline) for any cause and the composite variable for any of the above AO at 30 days after discharge from the ED. All patients were followed up 30 days after hospital discharge by telephone contact or electronic record review.

Statistical analysis

Qualitative variables are presented as absolute and relative frequencies. Quantitative variables are summarized as mean and standard deviation (SD) or as median and interquartile range (IQR). The concordance of predicting frailty of the three scales evaluated was assessed by calculating the Kappa index, together with its 95% confidence interval (CI), and the percentage of absolute agreement between them. The association of each of the scales with the 30-day follow-up outcome variables was evaluated using the chi-square test and the calculation of the odds ratio together with its 95% CI. The predictive capacity of the outcome variables at 30 days of each of the scales was analyzed by calculating the receiver operating curve (ROC) and its area under the curve (AUC) and its 95% CI. The AUC of each of the scales was compared using the nonparametric approach proposed by Delong. Finally, simple multivariate logistic regression was used to evaluate the crude and adjusted predictor effect of AR of the frailty scales adjusted for clinically relevant variables collected in the VGU or with statistically significant differences in the analysis according to the composite variable some AR. A p-value < .05 was accepted for all contrasts. Data processing and analysis were performed with the STATA 15.0 statistical package (StataCorp LLC., College Station, TX, USA).

Ethical considerations

All patients or legal representatives signed the informed consent form. The study was approved by the Research Ethics Committee of the Reference Center.

Results

Of the 820 patients in the Frail-ED-Madrid registry, 619 (75.5%) cases were included. Twenty-four cases (2.9%) were excluded because data from the 3 scales were not available and 177 cases (21.6%) because all the follow-up variables were not available. Table 1 shows the demographic and clinical characteristics and the data obtained using the VGU. There were no significant differences in the characteristics of the patients included compared to the 201 (24.5%) excluded.

According to the frailty screening scales, 339 patients (54.8%) were identified as frail according to a CFS ≥ 4, 386 (62.4%) according to a FIM ≥ 2 and 301 (48.6%) according to an ISAR ≥ 3. Two hundred and twenty-six patients (36.5%) had some AO at 30 days after discharge from the ED: 133 (21.5%) revisited, 78 (12.6%) hospitalized, 114 (18.4%) functionally impaired and 22 (3.6%) died.

Concordance between a CFS ≥ 4 and a FIM ≥ 2 was very good, with a kappa index of 0.81 (95% CI 0.76-0.86) and an absolute agreement of 90.8%. Agreement between a CFS ≥ 4 and an ISAR ≥ 3 was moderate, with a kappa index of 0.57 (95% CI 0.51-0.64) and an absolute agreement of 78.7%. Between a FIM ≥ 2 and an ISAR ≥ 3, agreement was moderate, with a kappa index of 0.52 (95% CI 0.46-0.59) and an absolute agreement of 75.9%.

The predictive ability of the different frailty screening scales for the outcome variables is shown in Figure 2. The predictive ability of the three scales was discrete, better for the mortality variable, lower for functional deterioration and hospitalization, and worse for revisit. There were no statistically significant differences between them either for the composite outcome variable or individually.

Table 2 shows the predictive validity indices of the FIM, CFS and ISAR, according to the frailty cutoff points, for the composite outcome variable and for each of the variables in isolation. FIM and CFS were the most sensitive tools. Regarding the isolated variables, the FIM scale stands out for a high negative predictive value (NPV) for mortality (NPV 99.6), hospitalization (NPV 95.3) and functional impairment (NPV 94.7).

Table 3 shows the univariate analysis of demographic, clinical and VGU-derived variables in relation to the composite outcome variable. Older age, higher degree of comorbidity and number of drugs, risk of malnutrition, severe dependence, history of dementia and delirium in the ED were associated with a higher risk of presenting any AO 30 days after discharge. After multivariate analysis, adjusted for age, sex, moderate or severe comorbidity, risk of malnutrition, severe or total dependence, history of dementia, ED delirium and reason for ED visit at the index visit, the presence of frailty was independently associated with the composite variable for any AR at 30 days according to CFS ≥ 4 (ORa 3.18 CI 95%: 2.02-5.01, $P < .001$), FIM ≥ 2 (ORa 3.49 95% CI: 2.15-5.66, $P < .001$) and ISAR ≥ 3 (ORa 2.46 95% CI: 1.60-3.79, $P < .001$). Table 4 reflects the crude and adjusted effect of each scale with outcome variables at 30 days after ED discharge.

Table 1. Characteristics of the study population

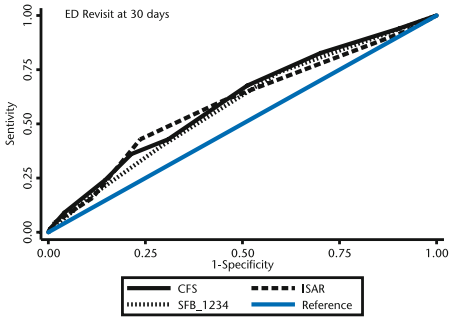
Variable	N (%)
Demographic	
Age (years) [mean (SD)]	83 (7)
Gender: female	366 (59.1)
Place of residence:	
Socio-health center	58 (9.4)
Reason for consultation	
Cardiovascular	180 (29.1)
Abdominal	164 (26.5)
Infection	25 (4.0)
General malaise	44 (7.1)
Neurological	26 (4.2)
Trauma	55 (8.9)
Limb problem	45 (7.3)
Other	80 (12.9)
Degree of comorbidity	
Charlson index [median (IQR)]	3 (1-4)
Moderate or severe comorbidity, Charlson Index > 3	313 (50.6)
Number of drugs [mean (SD)]	8.2 (3.6)
Frailty screening scales	
ISAR [median (IQR)]	2 (1-4)
CFS [median (IQR)]	4 (2-5)
FIM [median (IQR)]	2 (1-3)
Baseline functional status (Barthel index)	
100 < 90 independent or mild dependence	283 (45.7)
90 < 60 moderate dependence	192 (31.0)
60 < 20 severe dependence	105 (17.0)
20-0 total dependence	39 (6.3)
Nutritional status (SF-MNA)	
MNA-SF < 12 (risk of malnutrition)	435 (70.3)
Cognitive status	
History of dementia	126 (20.4)
History of depression	165 (26.7)
Delirium in the ED	46 (7.4)
Social status	
Alone and insufficient help	112 (18.1)

IQR: rango intercuartil; DE: desviación estándar; ISAR: Identification Senior at Risk; CFS: Clinical Frailty Scale; FIM: Functional Index - eMergency; SF-MNA: Mini Nutritional Assessment Short Version.

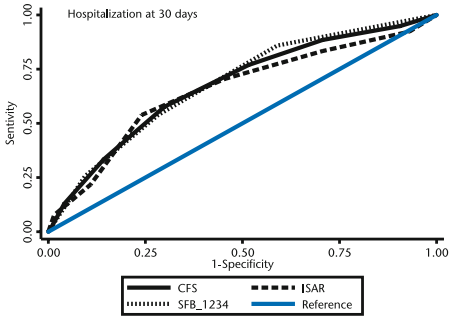
Discussion

The present work shows the following main results. First, at least one in three older patients had some AO in the first 30 days after ED discharge. Second, approximately one in two patients aged 75 years or older discharged from the ED was identified as frail or high risk according to three frailty scales: the FIM, the CFS and the ISAR. Third, the presence of frailty was a poor short-term prognostic factor. Fourth, the frailty screening scales evaluated predict adverse events in the short term. Fifth, the FIM scale, followed by the CFS, was the tool with the highest sensitivity and NPV for both the composite outcome variable and the isolated variables. Sixth, the concordance between the FIM and the CSF was very good, but not with the ISAR.

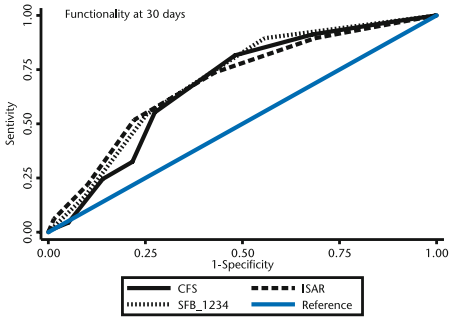
It has been previously reported that approximately one in three older patients presents AO in the short



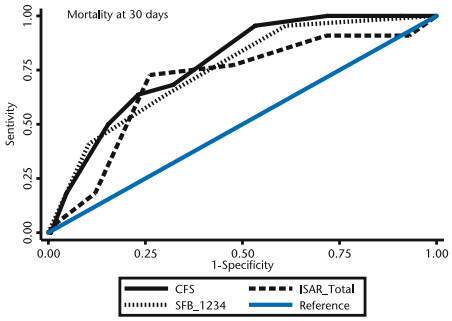
Results	AUC	CI	*P*	
ED revisit after 30 days discharge				
CFS	0.604	0.551-0.657	0.027	CFS *vs* FIM 0.088
FIM	0.585	0.533-0.637	0.026	FIM *vs* ISAR 0.677
ISAR	0.595	0.539-0.650	0.028	ISAR *vs* CFS 0.668



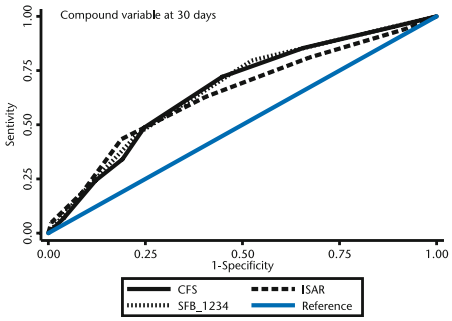
Hospitalization after 30 days ED discharge				
CFS	0.675	0.611-0.739	0.032	CFS *vs* FIM 0.605
FIM	0.683	0.624-0.742	0.030	FIM *vs* ISAR 0.321
ISAR	0.655	0.586-0.724	0.035	ISAR *vs* CFS 0.466



Functional impairment after 30 days ED discharge				
CFS	0.680	0.632-0.729	0.025	CFS *vs* FIM 0.117
FIM	0.702	0.655-0.749	0.024	FIM *vs* ISAR 0.735
ISAR	0.694	0.643-0.746	0.026	ISAR *vs* CFS 0.567



Mortality after 30 days ED discharge				
CFS	0.779	0.701-0.857	0.039	CFS *vs* FIM 0.051
FIM	0.750	0.658-0.843	0.047	FIM *vs* ISAR 0.472
ISAR	0.700	0.585-0.815	0.058	ISAR *vs* CFS 0.238



Any adverse outcome after 30 days ED discharge				
CFS	0.661	0.618-0.705	0.022	CFS *vs* FIM 0.649
FIM	0.666	0.623-0.708	0.021	FIM *vs* ISAR 0.235
ISAR	0.643	0.598-0.688	0.023	ISAR *vs* CFS 0.335

Figure 2. Predictive capacity of frailty scales for adverse outcomes 30 days after discharge from the emergency department. AUC: area under the curve; ISAR: Identification Senior at Risk; CFS: Clinical Frailty Scale; FIM: Functional Index - eMergency.

Table 2. Predictive ability of the CFS ≥ 4, FIM ≥ 2, and ISAR ≥ 3 scales for outcome variables at 30-day follow-up after ED discharge

Fragility scale	N	Adverse outcome	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)	AUC ROC (95% CI)
ED revisit at 30 days							
CFS ≥ 4	339	90	67.7 (59.0-75.5)	48.8 (44.2-53.3)	26.5 (21.9-31.6)	84.6 (79.9-88.7)	0.58 (0.54-0.63)
CFS < 4	280	43					
FIM ≥ 2	386	98	73.7 (65.3-80.9)	40.7 (36.3-45.3)	25.4 (21.1-30.0)	85.0 (79.7-89.3)	0.57 0.53-0.62
FIM < 2	233	35					
ISAR ≥ 3	301	81	60.9 (52.1-69.2)	54.7 (50.2-59.2)	26.9 (22.0-32.3)	83.6 (79.1-87.5)	0.61 (0.57-0.65)
ISAR < 3	318	52					
Hospitalization at 30 days							
CFS ≥ 4	339	60	76.9 (66.0-85.7)	48.4 (44.1-52.7)	17.7 (13.8-22.2)	93.6 (90.0-96.1)	0.63 (0.58-0.68)
CFS < 4	280	18					
FIM ≥ 2	386	67	85.9 (76.2-92.7)	41.0 (36.9-45.3)	17.4 (13.7-21.5)	95.3 (91.7-97.6)	0.64 (0.59-0.68)
FIM < 2	233	11					
ISAR ≥ 3	301	55	70.5 (59.1-80.3)	54.5 (50.2-58.8)	18.3 (14.1-23.1)	92.8 (89.3-95.4)	0.61 (0.57-0.65)
ISAR < 3	318	23					
Functional impairment at 30 days							
CFS ≥ 4	339	93	81.6 (73.2-88.2)	52.0 (47.4-56.5)	28.5 (23.7-33.8)	92.3 (88.5-95.2)	0.67 (0.63-0.71)
CFS < 4	280	21					
FIM ≥ 2	386	102	89.5 (82.3-94.4)	44.3 (39.9-48.9)	27.4 (22.9-32.3)	94.7 (90.9-97.2)	0.67 (0.63-0.71)
FIM < 2	233	12					
ISAR ≥ 3	301	84	73.7 (64.6-81.5)	57.1 (52.6-61.6)	28.8 (23.6-34.3)	90.2 (86.3-93.3)	0.65 (0.61-0.70)
ISAR < 3	318	30					
Mortality at 30 days							
CFS ≥ 4	339	21	95.5 (77.2-99.9)	46.7 (42.7-50.8)	6.19 (3.9-9.3)	99.6 (98.0-100)	0.71 (0.66-0.76)
CFS < 4	280	1					
FIM ≥ 2	386	21	95.5 (77.2-99.9)	38.9 (34.9-42.9)	5.44 (3.4-8.2)	99.6 (97.6-100)	0.64 (0.60-0.67)
FIM < 2	233	1					
ISAR ≥ 3	301	17	77.3 (54.6-92.2)	52.4 (48.3-56.5)	5.65 (3.3-8.9)	98.4 (96.4-99.5)	0.65 (0.58-0.75)
ISAR < 3	318	5					
Compound variable of any adverse outcome at 30 days							
CFS ≥ 4	339	163	72.1 (65.8-77.9)	55.2 (50.1-60.2)	48.1 (42.7-53.5)	77.5 (72.2-82.3)	0.64 (0.59-0.68)
CFS < 4	280	63					
FIM ≥ 2	386	180	79.6 (73.8-84.7)	47.6 (42.6-52.6)	46.6 (41.6-51.7)	80.3 (74.6-85.2)	0.64 (0.60-0.67)
FIM < 2	233	46					
ISAR ≥ 3	301	142	62.8 (56.2-69.1)	59.5 (54.5-64.4)	47.2 (41.4-53.0)	73.6 (68.4-78.3)	0.61 (0.57-0.65)
ISAR < 3	318	84					

PPV: positive predictive value; NPV: negative predictive value; AUC: area under the curve; ROC: receiver operating curve; ISAR: Identification Senior at Risk; CFS: Clinical Frailty Scale; FIM: Functional Index - eMergency.

term after discharge from the ED.[6,15] The present study adds to the evidence on the high frequency of frailty in older patients and its effect in predicting AO in the ED setting.[4,6] In previous studies, the frequency described is similar[15,24] and higher than that documented in the community.[25] The presence of frailty was an independent factor for poor short-term outcomes after adjusting for moderate or severe comorbidity and severe or total dependency, among others. The results obtained justify the incorporation of frailty screening in elderly patients into clinical practice in the ED at the time of discharge planning, to reduce the incidence of adverse events.

The frailty screening scales studied have shown their usefulness in predicting short-term AO. The scales used have the best performance in predicting mortality, followed by functional deterioration, hospitalization and, lastly, 30-day ED revisits. These data are in agreement with those previously referenced.[10-27] In a systematic review, the ISAR was found to be a more sensitive tool for identifying mortality (99.2%) than functional impairment (87%), hospitalization (84.9%), and ED revisit (75.7%) at 30 days.[16] In another review, 30-day CFS predicted 30-day mortality 87% of the 68 times it was assessed, comorbidity 73% of the 62 cases analyzed, and function (current function or functional impairment) 91% of the 45 times it was assessed.[18] All-cause revisit is a difficult outcome variable to predict in studies.[16,18] It has been proposed to redefine it as AO in the first 3-9 days after ED discharge.[28]

As a novelty, the FIM scale has shown in this study good results in identifying elderly patients discharged from the ED at risk of presenting an AO in the first 30 days after discharge. Being identified as robust with the FIM scale is related to a high probability of continuing to live, without functional deterioration and without the need for hospitalization 30 days after discharge from the ED.

In Anglo-Saxon countries, the CFS is routinely used to screen for frailty in those over 75 years of age presenting to the ED.[18,29] In fact, the European Task Force

Table 3. Analysis of the variables collected in a geriatric assessment adapted to the emergency department (VGU) according to any adverse outcome 30 days after discharge

Variables	Any adverse result after 30 days N (%)		*P* value
	Yes 393 (63,5)	No 226 (36,5)	
Age (years) [mean (SD)]	83 (7)	84 (6)	**.046**
Gender: female	222 (57.7)	142(62.8)	.151
Moderate or severe comorbidity, Charlson index > 3	185 (47.1)	128 (56.6)	**.031**
Number of drugs [mean (SD)]	7.9 (3.6)	8.9 (3.9)	**.004**
Risk of malnutrition (SF-MNA < 12)	250 (63.6)	185 (81.9)	< **.001**
Severe or total dependence, Barthel index < 60	72 (18.3)	61 (27.0)	**.011**
History of dementia	71 (2.5)	55 (24.3)	.062
Delirium in the ED	22 (5.6)	24 (10.6)	**.022**
Lives alone or has insufficient support	70 (17.8)	42 (18.6)	.724
Reason for consultation grouped			.279
Cardiovascular, abdominal or infection	243 (61.8)	126 (55.8)	
Malaise, neurological, trauma or extremities	101 (25.7)	69 (30.5)	
Other	49 (12.5)	31 (13.7)	

SF-MNA: Mini Nutritional Assessment Short Version.
Bold p-values denote statistical significance ($P < .05$).

on Geriatric Emergency Medicine recommends the CSF as a tool for frailty screening in emergency triage.[30] In this study, the FIM showed a similar predictive capacity and good concordance with the CFS. It would have the advantage of greater simplicity, speed and not requiring assessment by healthcare personnel. We are aware that these frailty scales, in isolation, may be insufficient. But they serve to identify the frail or most at-risk patient who would benefit most from a VGU, which is the reference tool for identifying specific problems on which to intervene.[3-10,30]

The present study has important clinical implications. Screening tools such as the FIM, CFS or ISAR could be incorporated as frailty screening scales in Spanish emergency departments. According to Rockwood et al.[12] frailty screening should be performed in all patients aged 70 years or older seen in the emergency department. In this study, the evaluation was performed in patients aged 75 years or older once the decision had been made to discharge them from the ED. In our opinion, it would be ideal to incorporate this tool in the first assessment, in the form of dual geriatric triage, or before making the decision to discharge or admit,[8,30] to facilitate decision-making in the ED discharge process and guarantee continuity of care.

The present study has certain limitations. In the first place, those in accordance with the type of study, such as having carried out an opportunity sampling. This is a secondary analysis, so the sample size may be limited in terms of having sufficient power. Second, the cut-off points used to define frailty may influence the frequency and the ability to predict the results. Third, no external validation of the FIM scale has been performed, nor has its performance been measured if used by medical or nursing staff. Nor has an interobserver correlation analysis of the investigators been performed to validate a homogeneous use of the scales.

In conclusion, the present study shows that the FIM, CFS and ISAR frailty screening scales can be simple tools to identify elderly patients discharged from the ED at high risk of presenting AO (revisit, hospitalization, functional deterioration, or death) within 30 days. There is a need to increase the scientific evidence in the field of geriatric emergency medicine to improve the outcomes and quality of life of older patients seen in Spanish EDs.[31]

Conflict of interests Disclosure: None reported.

Funding/Support: The present study was financed by grant PI17/01624 of the Instituto de Salud Carlos III from funds of the Ministerio de Sanidad, Servicios Sociales e Igualdad (MSSSI) and Fondo Europeo de Desarrollo Regional (FEDER).

Ethical responsibilities: All authors have confirmed the maintenance of confidentiality and respect for patient rights in the document of author responsibilities, publication agreement and assignment of rights to EMERGENCIAS. The study was approved by the Research Ethics Committee of the Reference Center.

Article not commissioned by the Editorial Committee and with external peer review.

Addendum

Collaborators Frail-ED-Madrid Register: Juan González del Castillo (Hospital Clínico San Carlos), Juan Mariano Aguilar Mulet (Hospital de la Princesa), Marta Merlo Loranca, Virginia Álvarez (Hospital Universitario de Getafe), Alfonso Martín Martínez (Hospital Severo Ochoa), Esther Rodríguez Adrada (Hospital Rey Juan Carlos), Rodrigo Pacheco Puig (Hospital Universitario Infanta Leonor), María Teresa Lorca Serralta, Carlos Piccone Saponara, Luís Ernesto Calderón Jave (Hospital Universitario del Tajo), Ester Mora Bastante (Hospital El Escorial), Sixto I. Aranda Sánchez, Salvador Maroto Martín (Hospital Universitario del Sureste), Elena Tejero Sánchez, Carlos Javier García Parra, Sonia Sánchez Sánchez (Hospital de Fuenlabrada).

References

1 Strange GR, Chen EH. Use of emergency departments by elder patients: a five-year follow up study. Acad Emerg Med. 1998;5:1157-62.
2 Roberts DC, McKay MP, Shaffer A. Increasing rates of emergency department visits for elderly patients in the United States, 1993 to 2003. Ann Emerg Med. 2008;51:769-74.
3 Martín-Sánchez FJ, Fernández Alonso C, Merino C. The Geriatric patient and emergency care. An Sist Sanit Navar. 2010;33:163-72.
4 Carpenter CR, Shelton E, Fowler S, Suffoletto B, Platts-Mills TF, Rothman RE, et al. Risk factors and screening instruments to predict adverse outcomes for undifferentiated older emergency department patients: a systematic review and meta- analysis. Acad Emerg Med. 2015;22:1-21.
5 Fernández Alonso C, Fuentes Ferrer ME, Jiménez Santana MI, Fernández Hernández L, de la Cruz García M, González del Castillo J, et al. Intervención multidimensional que mejora el pronóstico a corto plazo entre los ancianos frágiles dados de alta desde una unidad de corta estancia: estudio cuasiexperimental. Rev Clin Esp. 2018;4:163-9.
6 Martín-Sánchez FJ, Fernández Alonso C, Gil Gregorio P. Puntos clave en la asistencia al anciano frágil en Urgencias Med Clin. 2013;140:24-9.
7 Sternberg SA, Schwartz AW, Karunananthan S, Bergman H, Clarfield AM. The identification of frailty: a systematic literature review. J Am Geriatr Soc. 2011;59:2129-38.
8 Puig-Campmany M, Blázquez-Andión M, Ris-Romeu J. Triage tools: a cautious (and critical) view towards their use in old patients. Eur Geriatr Med. 2022;13:319-22.

Table 4. Crude and adjusted effect of each scale with the outcome variables 30 days after discharge from the emergency department

Scales	OR	95% CI	P value	Adjusted OR*	95% CI	*P* value
ED revisit						
CFS < 4	1	Reference		1	Reference	
CFS ≥ 4	1.99	1.33-2.99	< 0.001	2.06	1.22-3.48	**.007**
FIM = 1	1	Reference		1	Reference	
FIM ≥ 2	1.92	1.26-2.95	0.002	2.08	1.20-3.61	.056
ISAR < 3	1	Reference		1	Reference	
ISAR ≥ 3	1.88	1.27-2.79	0.001	1.89	1.14-3.12	**.013**
Hospitalization						
CFS < 4	1	Reference		1	Reference	
CFS ≥ 4	3.13	1.80-5.44	< 0.001	2.66	1.27-5.56	**.010**
FIM = 1	1	Reference		1	Reference	
FIM ≥ 2	4.24	2.19-8.20	< 0.001	4.23	1.78-10.05	< **.001**
ISAR < 3	1	Reference		1	Reference	
ISAR ≥ 3	2.87	1.71-4.80	< 0.001	2.26	1.13-4.49	**.020**
Functional impairment						
CFS < 4	1	Reference		1	Reference	
CFS ≥ 4	4.79	2.89-7.94	< 0.001	4.48	2.45-8.18	< **.001**
FIM = 1	1	Reference		1	Reference	
FIM ≥ 2	6.77	3.63-12.64	< 0.001	5.74	2.79-11.81	< **.001**
ISAR < 3	1	Reference		1	Reference	
ISAR ≥ 3	3.73	2.37-5.87	< 0.001	4.08	2.35-7.10	< **.001**
Mortality						
CFS < 4	1	Reference		1	Reference	
CFS ≥ 4	18.42	2.46-137.85	< 0.001	12.73	1.53-106.01	**.019**
FIM = 1	1	Reference		1	Reference	
FIM ≥ 2	13.35	1.78-99.90	0.012	7.33	0.87-61.95	.067
ISAR < 3	1	Reference		1	Reference	
ISAR ≥ 3	3.75	1.36-10.29	0.005	2.06	0.62-6.85	.237
Compound variable**						
CFS < 4	1	Reference		1	Reference	
CFS ≥ 4	3.19	2.24-4.54	< 0.001	3.18	2.02-5.01	< **.001**
FIM = 1	1	Reference		1	Reference	
FIM ≥ 2	3.55	2.43-5.19	< 0.001	3.49	2.15-5.66	< **.001**
ISAR < 3	1	Reference		1	Reference	
ISAR ≥ 3	2.49	1.78-3.48	< 0.001	2.46	1.60-3.79	< **.001**

ISAR: Identification Senior at Risk; CFS: Clinical Frailty Scale; FIM: Functional Index - eMergency.
*Adjustment variables: age, sex, moderate or severe comorbidity, risk of malnutrition, severe or total dependence, history of dementia, ED delirium, and ED grouped reason for consultation at the index visit.
**The composite variable corresponds to any of the above adverse events within 30 days of ED discharge.
Bold p-values denote statistical significance ($P < .05$).

9 Rodriguez-Mañas L, Feart C, Mann G, Viña J, Chatterji S, Chodzco-Zajko W, et al. Searching for an operational definition of frailty: a Delphi method based consensus statement: the frailty operative definition-consensus conference project. J Gerontol A Biol Sci Med Sci. 2013;68:62-7.
10 Clegg A, Rogers L, Young J. Diagnostic test accuracy of simple instruments for identifying frailty in community-dwelling older people: a systematic review. Age Ageing. 2015;44:148-52.
11 Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, et al. Frailty in older adults: evidence for a phenotype. J Gerontol A Biol Sci Med Sci. 2001;56:M146-56.
12 Rockwood K, Song X, MacKnight C, Bergman H, Hogan DB, McDowell I, et al. A global clinical measure of fitness and frailty in elderly people. Can Med Assoc J. 2005;173:489-95.
13 Clegg A, Bates C, Young J, Ryan R, Nichols L, Teale EA, et al. Development and validation of an electronic frailty index using routine primary care electronic health record data. Age Ageing. 2016;45:353-60.
14 McCusker J, Bellavance F, Cardin S, Trépanier S. Screening for geriatric problems in the emergency department: reability and validity. Identification of Seniors at Risk (ISAR) Steering Committee. Acad Emerg Med. 1998;5:883-93.
15 Fernández Alonso C, González Armengol JJ, Perdigones J, Fuentes Ferrer ME, González Del Castillo J, Martín-Sánchez FJ. La utilidad de la escala Identification of Seniors at Risk (ISAR) para predecir los eventos adversos a corto plazo en los pacientes ancianos dados de alta desde una unidad de corta estancia. Emergencias. 2015;27:181-4.
16 Rivero-Santana A, Del Pino-Sedeño T, Ramallo-Fariña Y, Vergara I, Serrano-Aguilar P. Valor de los instrumentos ISAR y TRST para predecir resultados adversos en población general geriátrica asistida en los servicios de urgencias: metanálisis. Emergencias. 2017;29:49-60.
17 Sternberg SA, Schwartz AW, Karunananthan S, Bergman H, Clarfield AM. The identification of frailty: a systematic literature review. J Am Geriatr Soc. 2011;59:2129-38.
18 Church S, Rogers E, Rockwood K, Theou O. A scoping review of the Clinical Frailty Scale. BMC Geriatr. 2020;20:393.
19 Martín-Sánchez FJ, Christ M, Miró Ò, Peacock WF, McMurray JJ, Bueno H, Maisel AS, et al. Practical approach on frail older patients attended for acute heart failure. Int J Cardiol. 2016;222:62-71.
20 Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: Development and validation. J Chronic Dis. 1987;40:373-83.
21 Rubenstein LZ, Harker JO, Salva A, Guigoz Y, Vellas B. Screening for Undernutrition in Geriatric Practice: Developing the Short-Form Mini Nutritional Assessment (MNA-SF). J Geront. 2001;56:366-77.
22 Cid-Ruzafa J, Damián-Moreno J. Valoración de la discapacidad física: el índice de Barthel. Rev Esp Salud Pública. 1997;71:127-37.
23 Inouye S, Van Dyck C, Alessi C, Balkin S, Siegal A, Horwitz R. Clarifying confusion: The confusion assessment method. A new method for detection of delirium. Ann Intern Med. 1990;113:941-8.
24 Theou O, Campbell S, Malone ML, Rockwood K. Older Adults in the Emergency Department with Frailty. Clin Geriatr Med. 2018;34:369-86.
25 Santos-Eggimann B, Cuenoud P, Spagnoli J, Junod J. Prevalence of frailty in middle-aged and older community-dwelling Europeans living in 10 countries. J Gerontol A Biol Sci Med Sci. 2009;64:675-81.

26 Rockwood K, Theou O. Using the Clinical Frailty Scale in Allocating Scarce Health Care Resources. Can Geriatr J. 2020;23:210-5.
27 Deschodt M, Flamaing J, Wellens N, Boonen S, Moons P, Milisen K. Comparison of three screening tools to predict hospital readmission in older adults. Eur Geriat Med. 2012;3:S130.
28 Rising KL, Victor TW, Hollander JE, Carr BG. Patient returns to the emergency department: the time-to-return curve. Acad Emerg Med. 2014;21:864-71.
29 Elliot A, Taub N, Banerjee J, Aijaz F, Jones W, Teece L, et al. Does the Clinical Frailty Scale at Triage Predict Outcomes From Emergency Care for Older People? Ann Emerg Med. 2021;77:620-7.
30 Lucke JA, Mooijaart SP, Heeren P, Singler K, McNamara R, Gilbert T, et al. Providing care for older adults in the Emergency Department: expert clinical recommendations from the European Task Force on Geriatric Emergency Medicine. Eur Geriatr Med. 2022;13:309-17.
31 Martín-Sánchez FJ, Bermejo Boixareu C. EDEN: una oportunidad para conocer y mejorar la atención integral de las personas mayores en los servicios de urgencias españoles. Emergencias. 2022;34:409-10.