

BRIEF REPORT

Utility of the Identification of Seniors at Risk score to predict short-term adverse outcomes in elderly patients discharged from a short-stay unit

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Objective. To determine whether the Identification of Seniors at Risk (ISAR) score predicts short-term adverse outcomes in elderly patients discharged from a short-stay unit.

Methods. Prospective, observational analysis of outcomes in a cohort of all patients 75 years or older who were discharged home from a short-stay unit during a 2-month period. The ISAR score was calculated for each patient. The variable of interest was the development of any adverse outcome (acute severe functional deterioration, death, or any-cause readmission) within 30 days of discharge.

Results. One hundred twenty patients (64.2%) with a mean (SD) age of 81.5 (5.4) years were enrolled. An adverse outcome within 30 days of the index event was observed in 36 patients (30%). The ISAR score cut point of 3 had the strongest predictive ability for the composite outcome and for individual components of the composite at 30 days.

Conclusions. An ISAR score of 3 or higher is able to identify elderly individuals at high risk of an adverse outcome within 30 days of discharge from a short-stay unit.

Keywords: Frail older adults. Identification of Seniors at Risk score. ISAR score Short-stay unit.

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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

Objetivo. Determinar si la escala Identification of Seniors at Risk (ISAR) predice los resultados adversos (RA) a corto plazo en los ancianos dados de alta desde una unidad de corta estancia (UCE).

Método. Estudio analítico observacional de cohorte prospectivo que seleccionó a todo paciente ≥ 75 años dado de alta a domicilio desde una UCE durante 2 meses. Se calculó la puntuación total del ISAR. La variable resultado fue presentar algún RA (deterioro funcional agudo grave, muerte o reingreso por cualquier causa) a los 30 días del alta.

Resultados. Se incluyeron 120 pacientes con una edad de 81,5 (DE 5,4) años, 36 (30%) presentaron algún RA a los 30 días tras el evento índice. El punto de corte de ISAR menor o igual a 3 es el que presentó una mejor capacidad predictiva tanto para las variables resultado aisladas como para la variable compuesta a los 30 días.

Conclusiones. La ISAR puede identificar al anciano con alto riesgo de presentar un resultado adverso a los 30 días tras el alta de una UCE, siendo el punto de corte de 3 el que mostró una mejor capacidad predictiva.

Palabras clave: Anciano frágil o de riesgo. *Identification of Senior at Risk*. ISAR. Unidad de corta estancia.

Introduction

Short stay units (SSUs) are alternatives to conventional hospitalization which have shown good results in terms of activity, efficacy and safety in a great number of urgent admission processes¹. The elderly make up more than half of the patients admitted to Spanish SSU^{2,3}. A previous study has shown that nearly a quarter of the elderly admitted to a SSU suffered an acute functional impairment (AFI) during hospitalization, which determines the final destination⁴. AFI is the result of the impact of a dynamic process in fragile elderly patients. Fragility is considered a dynamic state of vulnerability; if it is not detected and treated early

it can trigger adverse outcomes (AO) such as death, dependency or institutionalization⁵.

There are various scales for screening of frail elderly patients or high risk of AO in the emergency department (ED)^{6,7}. The Identification Seniors at Risk (ISAR) scale correlates with a wide range of short-term AO, and is a tool for screening high-risk elderly patients discharged directly from the emergency department (ED)⁷. The results of ISAR in hospital areas are not as convincing and there are no data on its use in a SSU⁸. Considering the above, the objective of this study was to determine whether ISAR is a tool to aid in predicting short-term AO in the elderly discharged from a SSU.

Method

We performed an analytical observational prospective cohort study that included all patients older than or equal to 75 years discharged from a SSU in a tertiary university hospital during 2 months. The study was approved by the Clinical Research Ethics Committee of the Hospital San Carlos de Madrid.

The study included patients aged 75 years or over discharged home from a SSU during weekdays from November 1 to December 31, 2013. We excluded those who were admitted to hospital or referred to their health centers, and those who did not give their informed consent or whose follow-up data were not obtained.

The SSU has 16 beds which are attended by ED medical officials providing assistance on weekdays and there is a guard shift for holidays.

The variables were collected from medical records and the information provided by the patient and caregivers using a standardized form, by an independent investigator, during hospitalization and by telephone during the first 30 days of discharge. The independent variables were: age, sex, hospitalization in the previous 6 months, the Charlson comorbidity index, number of drugs, principal discharge diagnosis, functional status according to Barthel Index (BI) at baseline and admission, presence of delirium according to the Confusional Assessment Method, probable depression by 5- Geriatric Depression Scale and probable dementia according to Six Items Screening or previous history of dementia and social dependency, living alone or with someone unable to help. ISAR total score was calculated resulting from the sum of six dichotomous items where each affirmative response counted as one point (needing help with basic activities on a regular basis before the acute process or further assistance after the acute process, sensory deficit, cognitive impairment, hospitalization in the last six months and consumption of three or more drugs) (maximum score 6 points).

The outcome variable was defined as the presence of some AO within 30 days of SSU discharge, considered as all-cause death or readmission for any serious AFI, understood as the presence of severe functional dependence (BI<60) in a patient who had a mild functional dependence or independence (BI > 90) in the 30 days prior to admission⁹.

Qualitative variables are presented with their frequency distribution. Quantitative variables are summarized with the mean and standard deviation (SD). The comparison of qualitative variables was performed using chi-square test or Fisher's exact test. The comparison of quantitative variables was performed using Student's t test. The area under the ROC curve (AUC) was calculated together with 95% confidence interval (CI), and the sensitivity, specificity, positive likelihood ratio and negative ISAR scale for each of the outcome variables at three cutoff points (2, 3 and 4). Logistic regression model was adjusted to study the effect of ISAR scale score on the development of some AO, adjusting for

those factors proving significant ($p \leq 0.10$) in the univariate analysis. For all tests a value of $p < 0.05$ was considered significant. Processing and analysis of data was performed using SPSSv.15.0.

Results

Of the total 187 patients who were discharged directly home, 120 (64.2%) were included. We excluded 60 (32.1%) for being referred to other hospital areas or other facilities or discharged on a holiday and 7 (3.7%) due to lack of data following discharge. Thirty-six (30%) patients showed some AO within 30 days after the index event, including 4 (3.3%) who died, 22 (18.3%) readmitted and 21 (17.5%) with serious AFI.

Table 1 shows the characteristics of the population included in the study and the univariate analysis of the independent variables related with the outcome variable (some AO within 30 days). Patients who had an ISAR rating of ≥ 3 were more likely to present an AO at 30 days (OR: 7.8; 95% CI 3.2 to 18.8; $p < 0.001$). After multivariate analysis (adjusted for sex, comorbidity, number of drugs, admission BI, probable delirium and dementia) the effect of ISAR ≥ 3 remained statistically significant (OR 5.4; 95% CI: 1.7 -17.0; $p = 0.003$).

The cutoff points 2, 3 and 4 of the ISAR scale were significantly associated with the presence of an AO at 30 days. Table 2 shows the characteristics of the test for the three selected cutoff points for each of the ISAR, and for the composite AO variable at 30 days. The ISAR cutoff of greater than or equal to 3 presented the best relationship between sensitivity and specificity, for each of the variables in isolation and for the composite variable. Comparing the AUC between the three cutoff points evaluated for each of the output variables, ISAR score greater than or equal to 3 presented significantly ($p < 0.05$ in all cases) greater AUC than for a score greater than or equal to 2 ISAR, while compared with ISAR score greater than or equal to 4 alone it was statistically superior in severe functional impairment ($p = 0.022$).

Discussion

The present study shows that the ISAR scale could be a helpful tool to predict an AO in elderly frail patients (serious AFI, readmission or death) within 30 days after being discharged from a SSU. A study of 667 patients aged 70 and older conducted in an inpatient unit for short stay in the UK documented that the cutoff of 2 had poor predictive ability of AO at 90 days¹⁰. Despite the important differences between location and design between the studies since they excluded those with cognitive impairment and differed in the definition of the outcome variable and the follow-up period, both concluded that the ISAR cutoff of 2 or more had limited predictive capacity.

Table 1. Characteristics of the patients included in the study and univariate analysis of the independent variables with the outcome variable any event during 30 days of follow up

	Total (N = 120) n (%)	No adverse outcome (N = 84) n (%)	Adverse outcome (N = 36) n (%)	p
Average age years (SD)	81.5 (5.4)	81.4 (5.0)	81.7 (6.2)	0.834
Female sex	71 (59.2)	45 (53.6)	26 (72.2)	0.057
Hospitalization	28 (23.3)	17 (20.2)	11 (30.6)	0.221
Diagnosis				0.935
Cardiovascular	27 (22.5)	20 (23.8)	7 (19.4)	
Digestive	42 (35.0)	29 (34.5)	13 (36.1)	
Infectious	16 (13.3)	10 (11.9)	6 (16.7)	
Cancer	9 (7.5)	6 (7.1)	3 (8.3)	
Other	26 (21.7)	19 (22.6)	7 (19.4)	
Charlson Index ≥ 3	79 (65.8)	49 (58.3)	30 (83.3)	0.008
Drugs > 5	80 (66.7)	51 (60.7)	29 (80.6)	0.035
Baseline Barthel Index < 60	18 (15.0)	10 (11.9)	8 (22.2)	0.147
Admission Barthel Index < 60	28 (23.3)	14 (16.7)	14 (38.9)	0.008
Delirium	4 (3.3)	1 (1.2)	3 (8.3)	0.080
Probable dementia	39 (32.5)	23 (27.4)	16 (44.4)	0.052
Depression	21 (17.5)	13 (15.5)	8 (22.2)	0.373
Lives alone or incapable companion	34 (28.3)	24 (28.6)	10 (27.8)	1.000
Cutoff point on ISAR				
≥ 2 points	81 (67.5)	52 (61.9)	29 (80.6)	0.046
≥ 3 points	47 (39.2)	21 (25.0)	26 (72.2)	< 0.001
≥ 4 points	27 (22.5)	9 (10.7)	18 (50.0)	< 0.001

A novel aspect of this study was the analysis of the different cutoff points on the ISAR scale in this area of study. In this regard, it was found that the score of 3 or more showed the greatest predictive capacity to identify the elderly at high risk of a short-term AO. In addition, and perhaps even more interesting for the clinical applicability of the scale, it was found that as the total score of ISAR increased, in the cutoff points studied, sensitivity decreased but the specificity of the detection of the elderly at risk of suffering a short-term AO actually increased. If these results are confirmed in future studies with external validation, the translation would be that the lower score of 2 would allow discharging the elderly patient from the SSU quite safely, and that a score of 3 or higher would indicate the need for a specific inter-

vention plan and close outpatient follow-up. In fact, some authors have used an ISAR scale score greater than or equal to 2 as a screening method to select those patients who should undergo comprehensive geriatric assessment¹¹.

This work has important limitations related to the design, sample size and single-center nature of the study but we believe it highlights a real need to develop strategies for the detection of frailty in the elderly admitted to a SSU (30% of the elderly had an AO within 30 days of discharge). In this regard, it can be concluded that the ISAR scale is a simple tool that can be useful to detect elderly patients at high risk of AO after SSU discharge and the total score may be helpful for clinical decision-making and designing a care plan at discharge.

Table 2. Validity index of the ISAR scale with different cutoffs for each of the outcome variables at 30 days follow up

	Sensitivity (95% CI)	Specificity (95% CI)	LR + (95% CI)	LR- (95% CI)	ROC AUC (95% CI)
Hospital readmission (18.3%)					
ISAR ≥ 2 points	81.8 (74.9-88.7)	35.7 (27.1-88.7)	1.27 (1.0-1.63)	0.51 (0.20-1.28)	0.59 (0.49-0.68)
ISAR ≥ 3 points	72.7 (64.8-80.7)	68.4 (60.0-76.7)	2.30 (1.56-3.39)	0.40 (0.20-0.80)	0.71 (0.60-0.81)
ISAR ≥ 4 points	54.5 (45.6-63.4)	84.7 (78.2-91.1)	3.56 (1.95-6.51)	0.54 (0.34-0.85)	0.69 (0.58-0.81)
Severe acute functional impairment (17.5%)					
ISAR ≥ 2 points	85.7 (79.4-91.2)	36.4 (27.8-45.0)	1.35 (1.07-0.40)	0.39 (0.13-1.16)	0.61 (0.52-0.70)
ISAR ≥ 3 points	80.9 (73.9-87.9)	69.7 (61.5-77.9)	2.67 (1.86-3.84)	0.27 (0.11-0.67)	0.75 (0.65-0.85)
ISAR ≥ 4 points	42.9 (34.0-51.7)	81.8 (74.9-88.7)	2.36 (1.23-4.50)	0.70 (0.48-1.02)	0.62 (0.50-0.74)
Death (3.3%)					
ISAR ≥ 2 points	100.0 (39.8-100.0)	33.6 (25.2-42.1)	1.51 (1.32-1.71)	- 0.67 (0.62-0.71)	
ISAR ≥ 3 points	100.0 (39.8-100.0)	62.9 (54.3-71.6)	2.70 (2.13-3.42)	- 0.81 (0.77-0.86)	
ISAR ≥ 4 points	75.0 (67.2-82.7)	79.3 (72.1-86.6)	3.63 (1.86-7.07)	0.32 (0.06-1.73)	0.77 (0.52-1.00)
Some event (30.0%)					
ISAR ≥ 2 points	80.6 (66.2-94.9)	38.1 (27.1-49.1)	1.30 (1.03-1.64)	0.51 (0.25-1.05)	0.59 (0.49-0.70)
ISAR ≥ 3 points	72.2 (56.2-88.2)	75.0 (65.1-84.9)	2.89 (1.89-4.41)	0.37 (0.22-0.64)	0.74 (0.64-0.84)
ISAR ≥ 4 points	50.0 (32.3-67.7)	89.3 (82.1-96.5)	4.67 (2.32-9.38)	0.56 (0.40-0.78)	0.70 (0.58-0.81)

LR +: positive likelihood ratio; LR-: negative likelihood ratio; ROC AUC area under the ROC curve.

Conflict of interest

The authors declare no conflict of interest in relation to the present article.

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