

The Identification of Seniors at Risk screening tool is useful for predicting acute readmissions

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ABSTRACT

INTRODUCTION: Acutely ill elderly medical patients have a higher chance of survival if they are admitted to a specialised geriatric unit instead of a general medical unit. This was shown in a meta-analysis from 2011 which included more than 10,000 elderly patients. The best effect of geriatric intervention is seen when patients are selected carefully. The patients' need for geriatric intervention was assessed to determine if there was a relation between a screening tool and the assessment made by a specialist of geriatrics (SG).

MATERIAL AND METHODS: A descriptive cohort study was conducted. Patients ≥ 65 years treated during a 14-day period were included. Their mean age was 78 years. Screening with the Identification of Seniors at Risk (ISAR) was performed ($n = 198$) by the Mobile Geriatric Team (MGT). The patients' medical journals were assessed retrospectively by the SG to determine any need for assessment and intervention.

RESULTS: 53% of the admitted and 77% of the non-admitted patients would have benefitted from assessment by the MGT, and 22% would have benefitted from transfer directly to the Geriatric Unit. The readmitted patients and the patients who died during follow-up had a mean ISAR score of three compared with the non-readmitted patients who had a mean score of two. Patients with either nutritional or cognitive problems, or depression had a mean score of three.

CONCLUSION: To identify elderly patients with a need for comprehensive geriatric assessment, we recommend that triage be supplemented with the ISAR screening. Furthermore, patients with a score of ≥ 2 should be assessed by the MGT so that a post-discharge plan including treatment/rehabilitation and follow-up may be drawn up.

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than 10,000 frail elderly medical patients from six countries. The analysis showed more surviving patients, less loss of functional capacity and more patients returning to independent living after treatment in a specialised geriatric unit versus treatment in a general medical department [1]. In a geriatric unit, the patient undergoes comprehensive geriatric assessment (CGA), i.e. a multi-dimensional, interdisciplinary diagnostic process focusing on assessment of the frail elderly patient's cognitive, emotional, physical and social functions, on the basis of which a plan for treatment is prepared. The CGA is therefore both a diagnostic and a therapeutic process designed to identify and treat all the patients' problems. The possibility that the patient has multiple problems and an age-related reduction of various organs and homeostasis makes it necessary to perform an assessment of several problems within the medical, psychiatric, functional and social domains, and this, in turn, calls for the involvement of a number of disciplines [1-4].

The frailty of elderly people is complex, and their degree of frailty can vary over time. There is no international consensus on the definition or on whether frailty is measurable. By frail elderly we understand a dynamic condition of an individual who has experienced a loss of one or more functional domains (physical, psychological, social) caused by several variables. This situation increases his or her risk of an adverse health outcome such as loss of function, increased risk of readmission to hospital and a higher mortality [5].

At Amager Hospital (AH), Denmark, the Geriatric Unit has been performing geriatric evaluations for the past ten-year period and is responsible for care of the elderly patients after stabilisation of an acute condition. As it is situated 800 m from the rest of the hospital and because the Unit only had telephone access to assistance from a physician during the evening and night, patients had to be stabilised of any acute condition before being admitted. The unit was moved to the main hospital in June 2013, and patients are now admitted directly from the medical Emergency Department (ED) and the Acute Medical Unit (AMU) to the Geriatric Unit. At the same time, the Mobile Geriatric Team (MGT) comprising a nurse and a doctor was supplemented with a physiotherapist and an occupational therapist. Apart

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Acutely ill, frail elderly medical patients have the best chance of survival if they are admitted to a specialised geriatric unit instead of a general medical unit. This was demonstrated in a meta-analysis from 2011 with more

FIGURE 1

The Identification of Seniors at Risk screening tool [10].

PLEASE ANSWER YES OR NO TO EACH OF THE FOLLOWING QUESTIONS			Reserved for the hospital
1. Have you needed help on a regular basis (from: home care, home nurse, relatives or others) prior to the illness that caused the hospitalisation?	<input type="checkbox"/> Yes <input type="checkbox"/> No		01 00
2. Have you needed more help (i.e. for personal care) than usual to be able to take care of yourself after the illness arose which caused the hospitalisation?	<input type="checkbox"/> Yes <input type="checkbox"/> No		01 00
3. Have you been hospitalised for one or more days during the last 6 months, not including visits to the Casualty Ward?	<input type="checkbox"/> Yes <input type="checkbox"/> No		01 00
4. Is your vision usually good?	<input type="checkbox"/> Yes <input type="checkbox"/> No		01 00
5. Do you usually have serious memory problems?	<input type="checkbox"/> Yes <input type="checkbox"/> No		01 00
6. Do you use more than 3 different types of medicine a day?	<input type="checkbox"/> Yes <input type="checkbox"/> No		01 00

from performing CGA in the AMU and other hospital units, the MGT carries out several other tasks including follow-up by phone after discharge, a home visit and contact to the primary health sector, as well as a follow-home service allowing old patients to be followed home by an occupational therapist upon discharge. The general Medical Department at the AH includes an AMU, where either a general practitioner or other doctors on duty (outside daytime hours) admit the patients. Some patients are also admitted via the ED, where they can arrive on their own accord.

The best effect of geriatric intervention is seen when it targets the category of elderly frail patients [6, 7]. The patients should therefore be selected carefully for the interventions. This can be done using a screening tool. One internationally recognised tool to identify frail elderly medical patients in the AMU is the Identification of Seniors at Risk (ISAR) screening tool [8]. The ISAR was tested at a Danish hospital in 2005 and the results demonstrated a sensitivity of 90% and a specificity of 26% compared with an assessment performed by a specialist in geriatrics (SG) [9]. During the past eight years, much has changed within the Danish AMUs, and it is therefore relevant to determine if the ISAR screening tool still identifies frail elderly medical patients there. One of the purposes of the present study was therefore to examine the ISAR's ability to predict adverse outcomes. At the AH, 40% of the AMU users are ≥ 65 years of age and not all are frail and in need of CGA. As the population of elderly patients admitted to the AMU had not been described previously, we cannot predict the need for geriatric intervention there. Thus, another purpose was to describe the elderly medical patients admitted to the

AMU. Based on this, our hypothesis was that the ISAR tool may predict length of stay in hospital, acute readmission and mortality.

MATERIAL AND METHODS

We conducted a descriptive cohort study. The setting was the ED and AMU of the AH, a small hospital in the Capital of Denmark. The population of the catchment area is 150,000. The study included patients ≥ 65 years of age who were admitted to the ED and AMU.

The baseline data included age, sex, discharged or admitted to hospital, type of unit and ISAR score.

Follow-up data were length of stay, number of health problems that needed treatment during hospitalisation, readmissions at one and three months, and mortality during the stay and after one and three months, respectively.

Identification of frail elderly patients

We used, the internationally recognised screening tool Identification of Seniors at Risk (ISAR) to identify the frail elderly patients (Figure 1). This is considered one of the best tools to identify frail elderly patients at risk of functional decline, unrecognised medical problems, readmission to hospital or to the ED and death – and it is easy to use in the AMU [8, 11, 12]. The ISAR consists of six questions to predict functional decline and other adverse outcomes after an ED stay. The answers were dichotomised (yes/no), and scores ranged from zero to six points; the higher the score, the larger the risk of readmission, loss of function or death. Results show that the ISAR has a sensitivity of 73% and a specificity of 51% at a cut-off score of two [13]. The ISAR has been translated into Danish and validated using a standardised method [14].

In the period 14-27 January 2013, the MGT received daily lists of all patients ≥ 65 years visiting (stay shorter than 24 h) the ED or admitted (stay longer than 24 h) to the AMU. They then assessed the patients during the day using the ISAR screening tool. In patients already dismissed, the screening was done by telephone. Patients admitted from a nursing home were not ISAR screened.

The medical journals of all included patients were assessed retrospectively by a SG to determine the patients' health problems. The SG was the head of the Geriatric Unit. At the time of the assessment, the SG did not know whether or not the patients had been ISAR screened and did not know the results of the screening.

Baseline data were described using means and medians. Correlation analyses were used to examine the relationship between ISAR score, readmission and mortality. A p-value < 0.05 was considered significant. All statistical procedures were performed using SPSS for Windows, version 14.0 (SPSS Inc., Chicago, IL, USA).

Patients admitted from a nursing home were not ISAR screened because a high score was expected in these frail patients and use of the ISAR may therefore have biased the results.

Trial registration: The study was approved and registered with the Danish Data Protection Agency under the Capital Region of Denmark's joint notification of health research (j.no.: 2007-58-0015, AMH-2013-003, I-Suite no: 02495).

RESULTS

In the inclusion period, 278 patients ≥ 65 years visited the ED or were admitted to the AMU and then assessed. Among these, 5% were re-admissions. The mean age was 78 years. The patients' baseline data are presented in **Table 1**. A total of 154 patients were admitted to the medical unit. Among these, 8% were admitted directly to the Geriatric Unit from the AMU and another 8% were transferred at a later date.

The ISAR screening was performed on 198 patients. Among the 80 who were not screened, 18 (7%) were medically unstable, two (1%) had not provided their telephone number, 28 (10%) were admitted from a nursing home, 26 (9%) had other reasons (for instance did not answer their telephone), and six (2%) gave no reason. 68% had an ISAR score of two or more. Patients with a stay of less than 24 h had a median ISAR score of one, and those with a stay of more than 24 h scored three.

We found that the median overall length of stay in hospital for patients admitted for more than 24 h was six days. The mean was nine days as two patients stayed more than one and three months, respectively. 27% were readmitted within one month, and the corresponding figure for three months was 38%, as presented in **Table 2**. Death during hospital stay was 4%, after one month it was 7%, and after three months 11%.

In relation to health problems, the SG found that 50% of the patients suffered from pain, 34% were dizzy or had experienced falls, 22% had emotional problems, 18% had nutritional problems, and 16% suffered from cognitive deficits. They all had an ISAR score ≥ 2 and a significant ($p = 0.00$) positive correlation (Pearson's $r = 0.55$) between the ISAR score and the number of health problems was found as seen in **Table 3** and **Table 4**.

A significant ($p = 0.00$) positive correlation was found between the patients' ISAR score and the number of days they spent in hospital (Pearson's $r = 0.36$) as well as their number of health problems. A significant correlation was also seen between the ISAR score and readmission within one ($\gamma = 0.32$; $p = 0.02$) and three months ($\gamma = 0.51$; $p = 0.00$), **Table 4**.

TABLE 1

Baseline data and distribution (N = 278). The values are n (%).

	AMU + ED	AMU	ED
Patient ≥ 65 years visiting	278 (100)	122 (44)	156 (56)
Admitted from nursing homes	28 (10)	–	–
Female	154 (55)	–	–
<i>ISAR score</i>			
0	24 (12)	–	–
1	39 (20)	–	–
2	43 (22)	–	–
3	48 (24)	–	–
4	28 (14)	–	–
5	12 (6)	–	–
6	4 (2)	–	–
<i>Patients discharged to</i>			
Independent living	211 (76)	–	–
Nursing home/rehabilitation	53 (19)	–	–
<i>Length of stay < 24 h</i>	124 (45)	23 (8)	101 (36)
<i>Patients discharged to:</i>			
Independent living	108 (87)	19 (15)	89 (72)
Nursing home/rehabilitation	15 (12)	4 (3)	11 (9)
<i>Length of stay ≥ 24 h</i>	154 (55)	98 (35)	56 (20)
<i>Patients transferred to:</i>			
AMU	28 (18)	–	–
Cardiology Unit	54 (35)	–	–
Pulmonary Medicine Unit	30 (19)	–	–
General Medical Unit	26 (17)	–	–
Stroke Unit	4 (3)	–	–
Geriatric Unit	12 (8)	–	–
<i>Patients discharged to:</i>			
Independent living	103 (67)	59 (38)	44 (29)
Nursing home/rehabilitation	38 (25)	27 (18)	11 (7)
<i>Admitted to Geriatric Unit:</i>			
From AMU/ED	12 (8)	11 (7)	1 (1)
Transferred from other unit	12 (8)	–	–

AMU = Acute Medical Unit; ED = Emergency Department; ISAR = Identification of Seniors at Risk screening tool.

TABLE 2

Readmission and mortality. The values are n (%).

	Base-line stay	1 month	3 months
<i>All admissions to AMU + ED (N = 278)</i>			
Readmission	–	69 (25)	93 (34)
Death	12 (4)	18 (7)	30 (11)
Length of stay > 1 month	–	2 (1)	1 (0.5)
<i>Length of stay < 24 h (N = 124)</i>			
Readmission	–	28 (23)	34 (27)
Death	1 (1)	2 (2)	3 (2)
<i>Length of stay ≥ 24 h (N = 154)</i>			
Readmission	–	41 (27)	59 (38)
Death	11 (7)	16 (10)	27 (18)
Length of stay > 1 month	–	2 (1)	1 (1)

AMU = Acute Medical Unit; ED = Emergency Department.

TABLE 3

Correlation between patients status, geriatric problems and their Identification of Seniors at Risk score (N = 198).

	Baseline stay in hospital		1 month		3 months	
	n (%)	ISAR, mean (SD)	n (%)	ISAR, mean (SD)	n (%)	ISAR, mean (SD)
<i>Patients' status</i>						
Not readmitted	—	—	143 (72)	2.1 (1.5)	118 (60)	1.8 (1.4)
Readmitted	—	—	47 (24)	2.9 (1.5)	66 (33)	3.0 (1.4)
Dead	—	—	8 (4)	3.4 (0.9)	14 (7)	3.4 (1.2)
<i>Health problems</i>						
Fall/dizziness	68 (34)	2.6 (1.4)	—	—	—	—
Pain	98 (50)	2.4 (1.5)	—	—	—	—
Nutrition	35 (18)	3.2 (1.2)	—	—	—	—
Cognitive	31 (16)	3.4 (1.3)	—	—	—	—
Depression	44 (22)	3.2 (1.3)	—	—	—	—

ISAR = Identification of Seniors at Risk screening tool; SD = standard deviation.

DISCUSSION

For the elderly, admittance to a hospital is a risk in itself. Admittance may lead to an irreversible decline in function, even if the disease causing hospitalisation is treated optimally. This situation may be reversed by the use of the CGA, especially in a geriatric unit [1]. As a supplement to the usual triage in the AMU and ED, we ISAR screened all elderly patients to identify those who needed the most thorough intervention. We found that 68% had an ISAR score of two or more. In comparison, an earlier study found an ISAR score of two or more in 73%, including patients ≥ 70 years [15].

The ISAR score seems to predict readmission because the higher the ISAR score the patients had, the larger was their risk of readmission within one and three months. We found a considerable difference in readmission in patients scoring 0-1 compared with those scoring 2-6. Hence, 15% of the patients with an ISAR score of one were readmitted and 30% of the patients with an ISAR score of two were readmitted. It seems that a cut-off score of two is reasonable, which was also shown in previous studies [12].

If patients' length of stay was less than 24 h, their mean ISAR score was one compared with the score of three observed in patients with a longer stay. This information is important as part of the overall evaluation and decision concerning discharge of the patient is based on a cut-off at of two points.

With regard to mortality, the number of patients was too limited to draw any conclusions.

According to our findings, it seems that the number of health problems for each patient also correlated with a higher ISAR score. Patients with emotional problems had an ISAR score of three, as did patients with falls and

nutritional problems. Patients with pain had an ISAR score of two. Patients who were categorised as having a cognitive deficit had an ISAR score of three. This could be because memory is included in one of the questions of the ISAR score. The connection between health problems as assessed by an SG and the ISAR score has not been studied before.

Most hospitals currently triage AMU patients according to their vital signs. This is insufficient for frail elderly people. Patients with emotional and nutritional problems, falls and pain have an ISAR score of two or more. Thus, we found that the ISAR screen could be a very important supplement to the triage. Early identification of frail elderly patients is important because they do not tolerate a long stay in a busy AMU. We also found a higher mortality in these patients. Thus, early identification and intervention are essential for patient safety reasons.

The patients discharged without hospitalisation had a lower ISAR score than the admitted patients, readmitted patients and the patients who died (Table 3). It is the first time the Geriatric Unit at the AH has studied the number of patients ≥ 65 years who need assessment by the MGT or the SG at visitation or admission.

Many of the acutely admitted frail elderly patients have several other problems which include loss of physical, psychological and social function apart from the sentinel event. This means that newly admitted frail elderly with an ISAR score of two or more would benefit from an assessment performed by the MGT because such an assessment would identify those patients who are best suited for direct admission to the Geriatric Unit or for a collaborative process that would involve the patient and his or her family to prepare a plan ensuring that the patient's post-discharge needs would be met.

The frail elderly medical patients who are not admitted to hospital are often in need of a plan for rehabilitation and follow-up. Therefore, the MGT should play a more important role in the preparation, implementation and follow-up of such a plan.

A visit to the ED is an important event in the life of the frail elderly. An international study [8] as well as the present study have shown that an ED visit predicts a later decline in the patient's health which may lead to revisits to the ED, admission to hospital and further loss of function.

CONCLUSION

Future triage should be supplemented with the ISAR screening tool in the ED or the AMU to identify frail elderly patients who need CGA assistance. Previous studies have shown that this is an optimal method for identifying those patients who are facing the highest risk of future adverse health outcomes after returning



TABLE 4

ISAR score	Baseline stay in hospital		1 month			3 months		
	days in hospital, mean (SD) ^a	health problems, n, mean (SD) ^b	not readmitted, n (%)	readmitted, n (%) ^c	dead, n (%)	not readmitted, n (%)	readmitted, n (%)	dead, n (%)
0	0.0	1.7 (1.0)	22 (92)	2 (8)	0	22 (92)	2 (8)	0
1	1.2 (2.3)	4.1 (2.0)	33 (85)	6 (15)	0	30 (77)	8 (21)	1 (2)
2	3.5 (6.1)	4.1 (2.2)	30 (69)	12 (30)	1 (1)	28 (65)	14 (33)	1 (2)
3	6.9 (6.8)	6.1 (2.4)	31 (65)	13 (27)	4 (8)	22 (46)	19 (40)	7 (14)
4	6.4 (5.7)	6.5 (2.5)	19 (68)	7 (25)	2 (7)	13 (46)	12 (43)	3 (11)
5	15.5 (11.1)	6.5 (2.3)	7 (58)	4 (33)	1 (8)	3 (25)	8 (67)	1 (8)
6	3.3 (1.5)	7.5 (1.3)	1 (25)	3 (75)	0	0	3 (75)	1 (25)

ISAR = Identification of Seniors at Risk screening tool; SD = standard deviation.

a) Pearson's $r = 0.36$; $p = 0.00$; b) Pearson's $r = 0.55$; $p = 0.00$; c) $\gamma = 0.32$; $p = 0.02$; d) $\gamma = 0.51$; $p = 0.00$.

Correlation between the Identification of Seniors at Risk score and days in hospital, health problems, readmissions and death (N = 198).

home, including loss of function, revisit to the ED, re-admission to hospital, admission to a nursing home or death. The ISAR screening tool is easy to use and may be administered quickly, and it has the advantage of being designed for use in the ED or the AMU.

International studies now tend to recommend assessment of function of frail elderly patients as an integrated part of the general work procedures in the ED and the AMU as a patient safety precaution measure and to avoid unnecessary complications.

The optimal solution would be to hold back any discharge from the ED or the AMU of frail elderly medical patients until a plan for further assessment and/or rehabilitation in an outpatient clinic or in the primary care sector has been drawn up. Such plans should be implemented and they should include follow-up. Plans should be implemented as a collaborative effort including the MGT, the patient, the family and the primary care sector after the patient has returned home.

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