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Identification of Seniors at Risk scale as a simple tool of elderly patients' assessment in an acute hospital department

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Abstract: Introduction: The aim of the study was to evaluate the usefulness of Identification of Seniors at Risk (ISAR) scale among elderly patients admitted to the department of internal medicine.
Material and methods: The ISAR score was performed among patients aged >59 years after admission to the hospital ward. Data from medical history about diseases, taken medicines, falls, length of hospital stay and mortality were compared in patients with ISAR score of 0–1 and over 1 and in subjects with and without history of falls. Regression analysis was used to detect predictors of the length of hospital stay or death.
Results: The sample consisted of 102 subjects aged 80.9 ± 7.9 years, 45.5% of men, 34.6% had history of falls. The number of diseases was 11.3 ± 3.9 and number of medicines — 8.9 ± 3.7. The score of ISAR ≥2 was found in 90.2% of patients, length of hospital stay was 10.3 ± 8.4 days, mortality rate was 9.9%. Patients with ISAR score <2 were younger, showed a smaller number of diseases, used less drugs and had less frequency of falls than those with score ≥2. Patients with history of falls had higher mean ISAR score, higher number of diseases and medicines than the others. The increased number of diseases and higher ISAR score significantly influenced the length of hospital stay. None of the analyzed factors had any impact on mortality.

C o n c l u s i o n: The score of ISAR scale together with number of diseases have a positive impact on the length of hospital stay.

Key words: ISAR, elderly, hospitalization, length of hospital stay.

Introduction

Population ageing is a major global demographic trend. The global share of older persons (aged 60 years or over) increased from 9.2 per cent in 1990 to 11.7 per cent in 2013 and will continue to grow as a proportion of the world population, reaching 21.1 per cent by 2050 [1]. Ageing has profound consequences on a broad range of economic, political, social processes and health care. Health expenditures tend to grow rapidly since older persons usually require more health care in general and more specialized services to deal with their more complex pathologies [1]. Patients 65 years and older represented 40 percent of hospitalized adults and nearly half of all healthcare dollars spent on hospitalization in 2008, but comprised less than 13 percent of the population in the United States [2]. With advancing age, patients tend to have more comorbid chronic illnesses and disability, making them more vulnerable during hospitalization to adverse events, including nosocomial complications and adverse drug reactions [3]. Moreover, bed rest, polypharmacy, tethering devices, sensory and sleep deprivation, and lack of proper nutrition, all contribute to functional, physical, and cognitive decline [3]. While most younger patients are discharged to home, 40 percent of patients 85 years and older are discharged to long term care facilities [4]. There are developed strategies that can improve outcomes for older patients during hospitalization. The best solution is the formation multidisciplinary hospital teams to integrate all care providers into the daily assessment and plan of care for older patients [5]. Assessment of risk of functional decline is crucial to plan early intervention in a selected group of patients. It can also be useful for planning health support after discharge. The most accurate tool for this purpose is a comprehensive geriatric assessment (CGA). CGA evaluates the most important problems of older patients, which are strongly related with further prognosis [6]. A disadvantage of CGA is the necessity of time and the involvement of specialized medical personnel. The alternative of CGA alone is a two-step approach with pre-screening tools. Some instruments predicting loss of function are developed based on clinical or empirical constructions using risk factors of functional decline. One of the most popular prescreening scale in hospitals is Vulnerable Elders 13-Survey (VES-13) — self-reported 13-item instrument [7]. Higher scores of VES-13 scale were associated with a greater number of deaths and functional decline in long term observation [8]. Another simple tool is ISAR score (Identification of Seniors at Risk) [9]. ISAR was

developed mainly to identify seniors in an emergency department (ED) setting at high risk of subsequent functional decline (including institutionalization and death). However, there is also observation that ISAR is unsuitable as a sole tool in clinical decision-making and have the poor predictive ability in older people discharged from acute medical units [10]. Some modification of ISAR scale were validated in primary care and in acutely hospitalized older patients [11, 12]. However, to our best knowledge there is no studies, which test utility of original ISAR scale in assessment of elderly population admitted to the acute hospital department. The aim of that study was the estimation of ISAR scale utility in a population of elderly patients admitted to the department of internal medicine for an acute worsening of health status.

Study population

The survey was conducted among 102 patients over 59 years of age consecutively admitted to the hospital internal medicine ward. All patients had hospital referral from ED without geriatric evaluation. Patients with diagnosed dementia or delirium or without family members who could help to answer the questions, have been excluded from the study.

Data collection

The ISAR score was completed by the researcher on recruitment within 48 hours after admission. ISAR consists of six self-report questions with yes/no responses [13]. The questions cover the common and most frequently observed problems in seniors such as functional loss (2 questions), cognitive impairment, polypharmacy, visual impairment and frequent hospitalizations. ISAR questions were slightly modified for purpose of this study. We omitted the word "injury" and replaced the phrase "Emergency Department" with the word "Hospital" in the first two questions. The total scale range is from 0 to 6, as each item is scored 1 if the patient reports having the problem and 0 if not. A total score ≥2/6 on the Identification of Seniors At Risk (ISAR) tool recognizes patients at high risk of adverse health outcomes [9, 13].

Other baseline variables from medical documentation were included such as demographic data, history of falls in the past, the number of diagnosed diseases, the number of drugs at discharge, duration of hospitalization and death.

Statistical analysis

Simple descriptive statistics were used to define the characteristics of the study population. We analyzed the distribution of ISAR scores among all patients and

number of those with score over 1.0 point. We also performed several analyses of ISAR scores comparing the medical data of patients with 0 or 1 point and over 1 point, below and over the mean score value and in three groups: I — 0–2 scores, II — 3–4 scores and III — 5–6 scores. Moreover, we compared the results between the subjects with history of falls and those without falls in the past. Statistical analysis was performed with the aid of the U Mann–Whitney, Kruskal–Wallis one-way analysis of variance and Chi2 tests. Multivariate stepwise backward regression analysis was used to detect parameters which can constitute predictors of the length of hospital stay or death. All analyzed clinical data were used as independent variables.

Results

We studied 102 subjects aged 80.9 ± 7.9 years, 45.5% of men, 34.6% had history of falls. Patients suffered from approximately 11.3 ± 3.9 different diseases, and they were treated with 8.9 ± 3.7 medicines. Mean ISAR score was 3.6 ± 1.5. The mean length of hospital stay was 10.3 ± 8.4 days (range 1–59 days). Ten subjects (9.9%) died during hospitalization. Over 70% of patients (70.3%) needed help in the past, half of them (56.4%) presented an acute change of functioning, 65.3% complained of poor vision and almost 43.6% — of memory problems. Forty percent of the study population (40.6%) were hospitalized during last 6 months and 89.1% used 3 or more medicines. The score of ISAR ≥2 was found in almost all patients (90.2%). The most frequent scores were 3 and 4 points (60.9% patients) (Fig. 1). Patients with ISAR score <2 were younger, had a smaller number of diseases, used less drugs, lower percent of them had a history of falls than those with score ≥2 (Table 1).

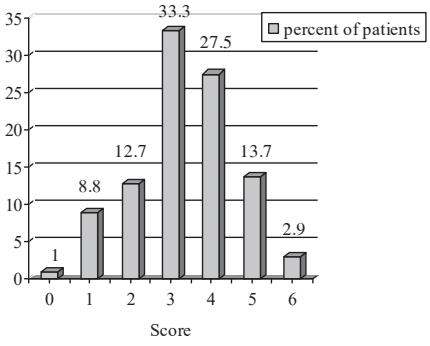

Fig. 1. Distribution of ISAR score in the study elderly hospitalized patients.

Table 1. Clinical characteristics in the group of patients with score 0–1 point and score over 1 point.

	Score 0–1 (n = 10)	Score >1 (n = 92)	p-value
Age [years]	75.9 ± 7.3	81.4 ± 7.9	0.030
History of falls [%]	0.0	39.1	NS
Mean ISAR [score]	0.9 ± 0.3	3.6 ± 1.0	<0.001
Number of diseases	8.3 ± 2.9	11.6 ± 3.9	0.020
Number of drugs	5.1 ± 1.3	9.0 ± 3.6	0.004
Days of hospitalization	8.8 ± 5.2	10.3 ± 8.9	0.810
Deceased [%]	50	3.3	NS

NS — non significant

Groups above and below the mean score differed by an average score and by the length of hospital stay (Table 2). Groups of patients with different ranges of ISAR scores also differed by an average score and by the number of used drugs (Table 3).

Table 2. Clinical characteristics in the group of patients with score higher or lower than the mean score of ISAR scale.

	Score <3.6 (n = 40)	Score >3.6 (n = 61)	p-value
Age [years]	80.2 ± 8.1	81.7 ± 7.8	0.32
History of falls [%]	28.1	40.4	NS
Mean ISAR [score]	2.4 ± 0.8	4.4 ± 0.6	<0.001
Number of diseases	10.8 ± 3.8	12.0 ± 4.0	0.16
Number of drugs	8.3 ± 3.6	9.2 ± 3.5	0.17
Days of hospitalization	8.9 ± 7.8	11.8 ± 9.5	0.03
Deceased [%]	8.8	6.7	NS

NS — non significant

Table 3. Clinical characteristics in three groups of patients with different range of ISAR scores.

	0–2 scores (n = 23)	3–4 scores (n = 62)	5–6 scores (n = 17)	p-value
Age [years]	79.1 ± 9.4	81.6 ± 8.0	80.3 ± 5.6	0.25
Mean ISAR [score]	1.5 ± 0.6	3.5 ± 0.5	5.2 ± 0.4	<0.001
Number of diseases	10.5 ± 4.0	11.2 ± 3.9	12.7 ± 4.0	0.17
Number of drugs	7.5 ± 3.9	8.6 ± 3.4	10.4 ± 3.4	0.05
Days of hospitalization	8.7 ± 5.5	9.7 ± 7.8	13.9 ± 13.3	0.16
Deceased [%]	8.8	8.8	5.9	NS

NS — non significant

The distribution of ISAR scores was similar among fallers and non-fallers (data not shown). The percentage of patients with the score over 1,0 point were similar in groups with (n = 36) and without (n = 66) history of falls (100% vs. 84.8%, respectively). However, patients with history of falls had higher mean values of ISAR scale (3.7 ± 1.1 vs. 3.1 ± 1.2, p = 0.04), higher number of diseases (12.8 ± 4.3 vs. 10.5 ± 3.5, p = 0.007) and were treated with more drugs (10.5 ± 3.2 vs. 7.7 ± 3.4, p <0.001) than the others.

In regression analysis, the length of hospital stay was significantly (corrected R2 = 0.08; p <0.006) influenced by the increased number of diseases (β coefficient = 0.22, p = 0.03) and higher values of the ISAR score (β coefficient = 0.20, p <0.04). None of analyzed clinical parameters was a predictor of death among study subjects.

Discussion

To our knowledge, this study is the first survey checking of the utility the ISAR scale in Polish geriatric population. Over half of patients confirmed functional and visual problems. Almost half had complaints of a memory impairment. Polypharmacy was detected in almost all patients and forty percent of them was hospitalized during last sixth months. Almost all studied patients presented 2 scores or more of ISAR scale. Mean ISAR score was higher among patients with falls in the past than without such history. Analyzed data revealed that score of ISAR scale together with number of diseases have a positive impact on the length of hospital stay. However, none of analyzed data have an impact on mortality.

ISAR scale was developed in Canada as a short self-report screening tool of elderly patients, instead of time-consuming full geriatric tests [13]. ISAR score allowed predicting adverse effects after ED visit such as functional decline, admission to a nursing home or long-term care hospital, hospitalization or death [9]. Moreover, it facilitated the choice of patients who need further evaluation and special medical care. In the next steps the ISAR scale was evaluated in different countries whether it could predict increased risk of adverse health outcomes, but the results was not equally satisfactory to predict outcome [14–17]. The latest review of ten studies has revealed that it is not suitable to use the ISAR alone for identifying seniors at risk for adverse outcomes in the ED, because with a cutoff score at least 2, the ISAR was proved to have poor validity related to revisiting the ED and hospital readmission [10]. It has also shown poor to fair validity related to mortality and composite outcomes.

Till now, there was no use of ISAR scale neither in EDs nor in hospital wards in Poland. In our study we tried to evaluate ISAR in population of elderly people admitted to hospital after ED visit. We choose cut-off 2 or more in our research. This cut-off is recommended for optimal identification of high risk seniors. The choice of a higher cut off point reduces the workload of the staff, but it is missed the sensitivity of tool [14]. The majority of our patients had at least two geriatric problems according to the ISAR scale.

The main area of evaluation of ISAR scale was ED. However, some researches assessed ISAR tool in a population of elderly hospitalized patients in a general internal ward of hospital. Hoogerduijn *et al.* [18] has compared ISAR with COMPRI (Complexity Prediction Instrument) and HARP (Hospital Admission Risk Profile)

screening tools. ISAR had the best sensitivity and the best negative predictive value to predict functional decline than other scales [18]. Moreover, it had comparable predictive values for assessing functional decline with TRST (Triage Risk Screening Tool) but higher than VIP (Variable Indicative of Placement risk scale) [19]. None of the instruments was strong in predicting which patient was at risk while also giving a valid indication of those patients not at risk. So lately, it was developed the new screening tool for patients acutely admitted to an internal ward [12]. Those scale (Identification of Seniors at Risk–Hospitalized Patients — ISAR-HP) also used a threshold 2 to identify high risk subjects for functional decline, but recognized the following four problems: pre-admission need for assistance in instrumental activity of daily living on a regular basis, use of a walking device, need for assistance in travelling and no education after age 14. The ISAR-HP adequately identified hospitalized older people at risk for low physical and cognitive functioning, mortality, loneliness and, to a lesser extent, quality of life at 3 and 12 months after hospital admission [20]. It was also supported that the amended ISAR-HP was able to accurately identify those at risk of functional decline following cardiac surgery [21]. Lately published, multicenter, prospective, observational study has shown that by using ISAR-HP at hospital admission, patients at low, intermediate or high risk for functional decline could be identified, with distinct clinical characteristics and outcomes [22].

One of the great geriatric problems are falls and their impact on the outcome of elderly patients. In our study we compared analyzed data in the groups of fallers and non-fallers in the past. The mean values of ISAR was higher in the group with a history of falls than in the others and all of them had ISAR score over 1.0 point. Fallers have diagnosed more diseases and used more drugs that non-fallers. Moreover, there was a higher percentage of patients with falls in the group with the score of 3.6 and above than the others. No studies evaluated ISAR scale to predict risk of falls. However, it should be pointed out that ISAR scale contains many questions of geriatric problems (physical disabilities, visual impairment, memory problems, polypharmacy) usually evaluated among old patients with risk of falls [23, 24]. It was also confirmed that underlying diseases very often had more important influence on risk of falls than drugs [25].

ISAR scale was found as a good predictor of recurrent visits on ED and rehospitalizations [26]. We did not assess such data. However, we have revealed that score of ISAR scale together with number of diseases have a positive impact on the length of hospital stay. There are no studies that evaluated association between ISAR scale and length of hospital stay. Nevertheless, there are researches that confirmed connection between length of stay of geriatric patients and polypharmacy, comorbidity, dehydration, protein-energy malnutrition, urinary catheterization and Barthel score <45 on admission [27–29].

ISAR scale identified also patients at risk of mortality after discharge from ED [30]. Our results did not confirmed this relationship, but the number of deaths was low and observation time was relatively short.

Our study have some limitations. Study group of patients was relatively small as well the time of the observation. Moreover, patients were excluded from the study cohort if they could not be interviewed because of their clinical status or cognitive impairment and no informant was available. We analyzed only a few clinical parameters and did not perform CGA. Data presented do not have the character of the analysis of reliability and validity. Additionally, the sheer ISAR scale has also same limitations. First, ISAR is not a diagnostic test. It should be followed by more detailed evaluation including social conditions. Same questions in scale could be inappropriate for older people living in nursing homes. Elderly patients could assess too optimistically their dependence for example because of shame, and member of family could underrate status of patients because of a fear. It is necessary to assess the mental status of a patient because of risk of inappropriate answer for questions. The implementation of pre-screening tool also requires planning other steps that should be taken.

However, results of our survey gives an information that ISAR may be the utility tool in a short screening of geriatric problems in Polish elderly patients. Evaluation of answers to ISAR questions made it possible to detect 3–4 geriatric problems in a majority of study cohort and even more in one third. Higher values of ISAR score were also connected with the longer time of hospitalization. Further researches should be performed to better evaluation or to creation of ISAR modification, which will be more suitable as a geriatric screening tool among different cohorts of Polish patients. This approach may contribute to better defining of treatment goals at hospital, earlier initiation of preventive interventions and better communication with patients and caregivers.

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Conflict of interest

None declared.

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