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RESEARCH

THE IMPORTANCE OF COGNITIVE COMPONENT OF COMPREHENSIVE GERIATRIC ASSESSMENT IN HOME-LIVING ELDERLY PATIENTS

ABSTRACT

Introduction: We aimed to apply a protocol of comprehensive geriatric assessment including comorbidity, self-reported disability, cognitive state, socio-economics, nutritional state, and spiritual issues in a sample of elderly patients and to test the same variables in middle-aged patients. We also targeted to identify the determinants of functional decline and to estimate cognitive and nutritional levels in elderly patients.

Materials and Method: Randomly allocated 137 geriatric and middle-aged participants living at home were included in the study. Comprehensive geriatric assessment was performed for all patients.

Results: Functional level, education level, monthly income (TL), spouse and friend support, and scores of Mini Mental State Examination and Mini Nutritional Assessment Tests were lower in elderly than middle-aged participants. Cognitive state measured by Mini Mental State Examination was the major determinant of functional and nutritional level.

Conclusion: Strategies to increase physical activities and to strengthen cognitive abilities in the elderly should be developed.

Key Words: Comprehensive geriatric assessment; Function; Cognition; Nutrition; Comorbidity; Elderly.

ARAŞTIRMA

EVDE YAŞAYAN YAŞLI HASTALARDA KAPSAMLI GERİATRİK DEĞERLENDİRMENİN BİLİŞSEL PARÇASININ ÖNEMİ

ÖZ

Giriş: Bir yaşlı hasta örnekleminde ko-morbidite, kendiliğinden-bildirilen yeti kaybı, bilişsel durum, sosyo-ekonomik göstergeler, beslenme durumu, ve ruhsal konuları içeren kapsamlı geriatrik değerlendirme protokolü uygulamayı ve aynı değişkenleri orta-yaşlı hastalarda kontrol etmeyi amaçladık. Aynı zamanda, yaşlı hastalarda bilişsel ve beslenme düzeylerini ölçmeyi ve işlevsel azalmanın belirleyicisini saptamayı hedefledik.

Gereç ve Yöntem: Rastgele atanan ve evde yaşayan 137 geriatrik ve orta yaşlı katılımcı çalışmaya alındı. Tüm olgulara kapsamlı geriatrik değerlendirme uygulandı.

Bulgular: Yaşlı hastalardaki işlevsel düzey, eğitim seviyesi, aylık gelir (TL), eş ve arkadaş desteği ve Mini Mental Durum Değerlendirme ve Mini Beslenme Test puanları, orta-yaşlı hastalardan daha düşüktü. Mini Mental Durum Değerlendirmesi ile ölçülen bilişsel durum, işlevsel düzey ve beslenme düzeyinin ana belirleyicisiydi.

Sonuç: Yaşlılarda hem fiziksel aktiviteleri artıran, hem de bilişsel yetileri kuvvetlendiren stratejiler geliştirilmelidir.

Anahtar Sözcükler: Kapsamlı geriatrik değerlendirme; Fonksiyon; Biliş; Beslenme; Ko-morbidite; Yaşlı.

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INTRODUCTION

Comprehensive geriatric assessment (CGA) is defined as a multidimensional interdisciplinary diagnostic process focused on determining a frail elderly person's medical, psychological and functional capability in order to develop a coordinated and integrated plan for treatment and long term follow up (1,2). CGA is critically important to the process of matching care needs with appropriate support services to achieve the best outcome for a growing older population (3, 4). It is also an integral part of understanding the role of geriatric rehabilitation.

CGA in inpatient settings has been used to improve cognition, to improve functional status, to prevent placement in a nursing home, to reduce readmissions to the hospital, and to lower the mortality (1-5). Recent data confirm the benefit of inpatient CGA in increasing the chance of patients to live at home in the long-term, although it does not reduce the long-term mortality (5).

CGA for geriatric outpatients is not so well studied. However, the meta-analysis by Stuck et al. has shown efficacy of CGA in improving survival and function for both inpatients and outpatients (6). CGA is criticized for requiring intense resources and being time-consuming. Therefore, there were global efforts to develop minimum geriatric screening tools (7-9). However there is no consensus on study protocols for geriatric assessments which would allow making comparisons between results of different elderly populations.

Activities of daily living (ADL), instrumental ADL, the risk of fall, cognition, depression, social complexity, malnutrition, pain, risk of functional decline, comorbidity and polypharmacy were assessed in most geriatric study protocols (1-9). As a matter of fact, elderly people are at risk of under-nutrition, and also have a higher prevalence of cognitive impairment and disability (10). Patients with lower levels of cognition are less likely to achieve independence in ADL and ambulation (10-12). There were limited number of comprehensive studies looking into nutrition, functions and cognition in the elderly (13-16). However, many studies have been published on nutrition in the elderly (17-26).

Unfortunately, there were no CGA studies evaluating both socioeconomic position and spiritual components in the elderly. In addition, there were only a couple of studies about CGA for elderly people living at home with their families, possibly because they belong to minority populations in developed countries. Therefore, we were interested in suggesting these patients coping strategies for their problems using CGA.

Our aim was to perform CGA including comorbidity, self-reported disability, mental state, socio-economics, nutritional state, and spiritual issues in a sample of home-living elderly patients and to test the same variables in a middle-aged patient group. The rationale for using cluster-analysis is to explore similar components of CGA. We also aimed to identify the determinants of functional decline and to estimate both cognitive and nutritional level in home-living geriatric patients.

MATERIALS AND METHOD

Participants

Eligibility criteria for elderly patients: Patients having medical, functional, or psychosocial problems interfering with home-living were referred to geriatric rehabilitation. Severely demented patients, medical patients with a single medical disease, terminal (or palliative) care patients, and the patients who were independent in ADL were excluded.

Inpatients and outpatients admitted to the Internal Medicine and Physical Medicine & Rehabilitation departments of Ankara Training and Research Hospital were selected by the researchers with a randomized design. Data were collected from patients admitted to the departments of the same hospital. Half of the elderly patients and half of the middle-aged participants were inpatients.

All patients were living at home with their families before admission to the hospital for medical care. The study protocol was approved by the local ethic committee of the same hospital. An informed consent was taken from the eligible patients before application of the study protocol.

Interventions

CGA lasted for approximately 40 minutes for each participant. CGA was administered in a silent and comfortable evaluation room designed for just two persons, a patient and a physician. Face-to face interviews were carried out and no other person was allowed to enter the interview room.

Outcomes

The following outcomes were examined and recorded consecutively for each patient by experienced researchers in geriatrics:

1. *Physical health* screened with ICD-10 codes found in the database of hospital-information-management-system and two comorbidity indexes (Table 1). One of them, the Charlson Comorbidity Index (CCI), contains 19 conditions, each of which is given a severity weighting of 1-6

Table 1— Items, weighting, and scoring mechanisms for the Charlson Comorbidity Index and the Functional Comorbidity Index.

	Functional Comorbidity Index	Charlson Comorbidity Index
Items	1. Arthritis	1. Myocardial infarct
	2. Osteoporosis	2. Congestive heart failure
	3. Asthma	3. Peripheral vascular disease
	4. COPD, ARDS	4. Cerebrovascular disease
	5. Angina	5. Dementia
	6. Congestive hearth failure	6. Chronic pulmonary disease
	7. Heart attack	7. Connective tissue disease
	8. Neurological disease	8. Ulcer disease
	9. Stroke	9. Stroke
	10. Diabetes	10. Diabetes
	11. Peripheral vascular disease	11. Hemiplegia
	12. Upper GI disease	12. Renal disease
	13. Depression	13. Severe Diabetes
	14. Anxiety and panic disorders	14. Any tumor
	15. Visual impairment	15. Leukemia
	16. Hearing impairment	16. Lymphoma
	17. Degenerative disk disease	17. Liver disease
	18. Obesity (BMI>30 kg/m^2)	18. Metastatic solid tumor
		19. AIDS
Weights	One point is given for every "yes"	Items 1-10, weight=1
		Items 11-16, weight=2
		Items 17, weight=3
		Items 18 and 19, weight=6
Score	Sum of "yes" answers	Sum of weighted items

(27). Severity weights are based on the adjusted relative risks from the Cox proportional hazards regression model used in the development of the index. The CCI score consists of the sum of the weighted items.

As a second index, the functional Comorbidity Index (FCI) was designed with physical function as the outcome of interest (Table 1). The FCI contains diagnoses not commonly found on indices designed to predict mortality, such as arthritis and depression, and FCI score explains more variance in physical function outcomes than indices designed to predict mortality. The FCI is an 18-item list of diagnoses, each of which is given 1 point if present, and the final score is the sum of the items (28). Two tests last for 5 minutes approximately.

2. *Disabilities* were assessed by a questionnaire used in National Health and Nutrition Examination Survey (NHANES), 1999–2002 (29). Patients were asked 19 questions of the Physical Functioning Questionnaire designed to measure their disability status (Table 2). These questions were phrased to assess the individual's level of difficulty in performing the task without using any special equipment. According to the consensus the 19 questions were classified into five major domains: ADL, IADL, leisure and social activities (LSA), lower limb mobility (LLM), and general physical activities (GPA). A subject's answer to a given question was coded as "no difficulty," "some difficulty," "much difficulty," or "unable to do." Difficulty in performing one or more activities within a given domain was defined as a disability. Total maximum score is 57 for the totally disabled. The functional states of disabled patients were evaluated without use of assistive devices. These patients were also recorded as cane users after data entries. This test lasts for 5 minutes approximately.
3. *Cognitive assessment* was made by using Turkish version of Mini Mental State Examination for illiterate patients (SMMSE-E) (30). SMMSE-E is a brief bedside screening test for cognitive function in the elderly. The items cover orientation, immediate and delayed recall, attention and

Table 2— Self-reported disability

Domains Components
Activities of daily living
Difficulty in eating: Using fork, knife, and drinking from a cup
Difficulty dressing yourself
Difficulty walking between rooms on the same floor
Difficulty getting in and out of bed
Instrumental activities of daily living
Difficulty managing money
Difficulty with house chores
Difficulty with preparing meals
General physical activities
Difficulty in stooping, crouching, kneeling
Difficulty in lifting or carrying
Difficulty in standing up from an armless chair
Difficulty in standing for long periods
Difficulty in sitting for long periods
Difficulty in reaching up over head
Difficulty grasping/holding small objects
Lower limb mobility
Difficulty walking for a quarter mile = 400m
Difficulty walking up ten steps
Leisure and social activities
Difficulty going out to movies and events
Difficulty attending social events
Difficulty with leisure activities at home

calculation, naming, speaking, following the verbal command, and drawing. a) Orientation in 10 questions for a maximum score of 10, b) recording memory for 3 words for a maximum score of 3, c) attention and calculation for a maximum score of 5: Counting the 5 days back from Sunday and Saturday, d) recall of 3 words for a maximum score of 3, e) language abilities for a maximum score of 9: Naming, repeating a sentence heard, making a 3-step verbal command, imitating a blink command, asking a meaningful sentence about home, and drawing two centrally overlapping squares. The maximum score is 30. Cut-off levels were 24 for cognitive decline, and 15 for dementia. Administration of the test requires 10 minutes. SMMSE-E is practical to use routinely for the elderly and serially for people with dementia.

4. *Socio-economics:* Education level (illiterate, literate, elementary school graduate, high school graduate), job state (unemployed, retired, housewife, official, worker), monthly income (TL), marital status (married, widowed, divorced, unmarried), number of children, social security system (having green card or social security institution), were assessed. This evaluation lasts approximately 5 minutes.
5. *Environmental resources*: The nutritional status was appraised using Mini Nutrition Assessment (MNA). The MNA is composed of 18 questions; each assigned a weighted score ranging from 1 to 3 points and has a total score of 30 points. MNA comprises (31):
   a. Anthropometric parameters (Body Mass Index-BMI-, mid-arm and calf circumferences, recent weight loss),
   b. Global clinical evaluation (autonomy status-institutionalization, medication, comorbidities, mobility, neuropsychological problems, pressure ulcers),
   c. Semi-quantitative diet intake evaluation (number of daily meals, protein intake, fruit and vegetable intake, decreased food intake, fluid intake, ability to eat alone), and

d. Subjective evaluation (patients' self-perception of health and nutritional status). According to the total score, patients are categorized as normal, at nutritional risk and undernourished. Individuals having a total MNA score <17 were considered malnourished, 17-23. 5 were moderately malnourished or at risk of malnutrition and 24 or higher were well-nourished. Administration of the test requires 10 minutes.

Self-reported numbers of chronically used drugs were elicited from each participant. The presence of physical, emotional, and financial abuse were recorded as "yes" or "no" answers.

6. *Spiritual history* was taken with open-ended questions including wishes and goals, presence of support groups of spouses, family, and friends, participation of religious and social activities. Upon completion, the answers were categorized. Wishes and dreams were categorized as none, health, children's future, pilgrimage to Mecca, and death after open-ended questions. Similarly, goals and expectations were classified as none, health, peace, care, and death. This interview lasts for 5 minutes approximately.

Total sample size was determined by the researchers (25 elderly and 15 middle-aged patients for each experienced assessor, named with initials: FFA, EC, MU, and DK). Seventeen elderly and six middle-aged patients were removed from statistical analyses due to the exclusion criteria. The two cluster sizes were determined in such a manner that the elderly to middle-aged (control) ratio would be 1.5.

Sequence Generation. Chronologic age was used to generate the random allocation sequence, including stratification (middle aged: 45-64 years old, and older: 65+ years old).

Allocation Concealment. Allocation was based on clusters and the sequence was concealed until interventions were assigned.

Implementation. The first four authors (FFA, EC, MU, and DK) generated the allocation sequence, enrolled the participants, and assigned the participants to their groups. No patient reported fatigue or unwillingness throughout the CGA.

Statistical Methods

Results of this study were analyzed with SPSS (Statistical package for the Social Sciences, SPSS Base 15, 0 Application Guide, by SPSS Inc. Chicago, IL). Pearson's Chi-square test was applied to determine the significance of differences in age and gender profiles of the elderly. Pearson correlation analysis was performed to determine the significance of relationships of MNA and SMMSE-E scores with each of the functional, comorbidity, socio-economics, and spiritual parameters. In addition to parametric ANOVA, Levene's test for equality of variances and Bonferroni adjustments, NPar MWU Yates continuity correction for two group comparisons and NPar Kruskal-Wallis for three subgroup comparisons according to the SSMSE-E and MNA classes were made. A 5% probability level (within 95% confidence interval) was designated as the level of statistical significance but higher levels of significance were also reported.

Ethical Issues

After the Institutional Review Board's approval, this study was initiated in June 2007 and was completed in January 2009.

Totally 100 elderly and 60 middle-aged patients were evaluated by the researchers. After the recorded ICD-10 codes in health information and management software system used by the hospital were checked, seventeen elderly and six middle-aged patients were dropped out because of missing medical data. Finally, 83/100 elderly and 54/60 middle-aged were entered into the statistical program by a bio-statistician.

RESULTS

Eighty-three elderly patients (mean age: 71.98 ±5.89, 55 females and 28 males) were compared with 54 middle-aged patients (mean age: 44.07 ±10.7, 30 females and 24 males). All patients were living at home with their families.

The demographic and socio-economic characteristics of the groups are summarized in Table 3. Among them, some parameters including education, job, number of children, monthly income (TL), and number of cane users were different between groups ($p<0.05$).

Most items of functional capacity (ADL, GPA, LLM, LSA) were lower in the elderly than the middle-aged ($p<0.05$) patients. Scores for these items were also lower in the elderly (75 plus years of age) than the middle-aged (65-74 years of age) ($p<0.05$). Functional capacities were similar in male and female elderly patients. While 28/83 (34%) of the elderly used a cane in daily living, only 2/54 (4%) of middle-aged patients used a cane ($p=0.002$).

The scores of nutritional assessment and MNA (malnourished, risk of malnutrition and good nutrition) were worse in the elderly than the middle-aged ($p<0.05$). Only 37/83 (44.6%) of elderly vs. 34/54 (63%) of middle-aged patients had a good nutrition level.

Table 3— The Demographic and Socio-economic Characteristics of the Groups

		Elderly nb (%) n = 83	Middle-Aged nb (%) n = 54	p
Education	Literate	40/83 (48.2)	8/54 (14.8)	0.000‡
	Literate	18/83 (21.7)	–	
	Elementary	19 /83 (22.9)	28/54 (51.9)	
	High school	6/83 (7.0)	18/54 (33.3)	
Job	Unemployed	2/83 (2.4)	2/54 (3.7)	0.002†
	Retired	19/83 (22.9)	4/54 (7.4)	
	Housewife	55/83 (66.3)	28/54 (51.8)	
	Official	1/83 (1.2)	6/54 (11.1)	
	Worker	6/83 (7.2)	14/54 (25.9)	
Marital state	Married	49/83 (59.0)	44/54 (81.5)	0.3
	Widowed	30/83 (36.1)	2/54 (3.7)	
	Divorced	4/83 (4.8)	–	
	Unmarried	–	8/54 (14.8)	
Social security	Green card	14/83 (17.9)	4/54 (8.3)	0.07
	Institution	64/83 (82.0)	44/54 (81.5)	
Number of (mean ± SD)	Children	5.1 ± 2.4	2.5 ± 1.6	0.000‡
Income (mean ± SD)	TL/month	519.5 ± 325.2	971.6 ± 847.1	0.001†

Statistically significant differences between groups: ‡.001; †005, *.05.

Similarly, cognitive screening with SMMSE-E showed lower cognitive scores and higher cognitive decline/dementia in the elderly than the middle-aged (p<0.005). Only 33/83 (40.7%) of the elderly vs. 40/54 (74.1%) of the middle-aged had a normal cognitive level.

Spiritual history was not different between groups except for lower support of spouse and friends in the elderly. Comparisons of scores in functional, cognitive and nutritional measures are detailed in Table 4.

There were statistically significant negative correlations between age and functional capacity (r=-0.52, p=0.000), ADL (r=-0.45, p=0.000), IADL (r=-0.40, p=0.000), GPA (r=-0.36, p=0.001), MNA (r=-0.26, p=0.02) in the elderly.

Scores of SMMSE-E were related with MNA (r=0.47, p=0.000), monthly income (r=0.28, p=0.03), functional capacity (r=0.41, p=0.000), and subgroups of functional capacity including ADL (r=0.38, p=0.000), IADL (r=0.48, p=0.000), GPA (r=0.40, p=0.000) in the elderly. SMMSE-E did not correlate with age (r=-0.2, p=0.08). Scores of SSMSE-E were the major determinants of function, nutrition, and monthly income in the regression analysis.

Scores of MNA were related with age (r=-0.26, p=0.02), SMMSE-E (r=0.47, p=0.000), BMI (r=0.4, p=0.02), functional capacity (r=0.49, p=0.000), and subgroups of functional capacity including ADL (r=0.23, p=0.03), IADL (r=0.36, p=0.001), and GPA (r=0.39, p=0.000) in the elderly. The components of spiritual history are shown in Table 5.

Discussion

Comprehensive Geriatric Assessment, the heart and soul of geriatrics, is a proven modality to decrease mortality and to increase the cognition and functional status of frail older patients with complex medical problems and multiple comorbidities (3,6).

Cognitive component of CGA was found to be critically important as it can differentiate the elderly from the middle aged and due to determinative characteristics of cognition on function, nutrition, and monthly income in the elderly. It is well known that the prevalence of cognitive impairment and poor nutrition are higher in the elderly (5,13-17) and demented patients have a poorer functional and nutritional status despite having the same comorbidities (15). It could be expected that patients with cognitive impairment may have some difficulties in meal preparation and self-feeding as well as reduced appetite. Controversially, diet and nutritional supplements had limited or no effect (24-26) vs. considerable effect (17-23) on cognition and function in published geriatric reports.

Table 4— Scores of Comorbidity, Function, Cognition, and Nutrition

		Elderly (n=83)	Middle-Aged (n=54)	p
Comorbidity (mean ± SD)	Functional	4.3 ± 5.9	2.2 ± 2.4	0.08
	Charlson'	1.5 ± 1.3	1.6 ± 1.5	0.7
Functional Score (mean ± SD)	Capacity %	60.2 ± 23.2	79.1 ± 23.7	0.000‡
	ADL	9.3 ± 2.9	10.4 ± 2.4	0.08
	IADL	5.9 ± 2.6	7.2 ± 2.1	0.02*
	GPA	11.6 ± 4.6	15.7 ± 5.5	0.000‡
	LLM	3 ± 1.9	4.3 ± 2	0.003†
	LSA	4.9 ± 3.2	7.3 ± 2.7	0.001†
SMMSE-E (mean ± SD)	Score	22 ± 5.4	26.8 ± 3.4	0.000‡
Class of SMMSE-E Nb (%)	Dementia	11/83 (13.6)	2/54 (3.7)	0.004†
	Cognitive decline	37/83 (45.7)	12/54 (22.2)	
	Normal	33/83 (40.7)	40/54 (74.1)	
MNA (mean±SD)	Score	22.3 ±4	25 ±3.5	0.003†
Class of MNA Nb (%)	Malnourished	9/83 (10.8)	–	0.02*
	Risky	37/83 (44.6)	18/54 (33.3)	
	Good nutrition	37/83 (44.6)	34/54 (66.7)	

Statistically significant differences between groups: ‡.001; †005, *.05.

Table 5— Comparisons of Spiritual History Between Elderly and Middle Aged

		Elderly nb (%) n = 83	Middle-Aged nb (%) n = 54	p
Support groups	Spouse	41/83 (49.4)	44/54 (81.5)	0.003†
	Family	64/83 (77.1)	50/54 (92.6)	0.08
	Friends	54/83 (75.1)	50/54 (92.6)	0.005*
Abuse	Physical	7/83 (8.4)	4/54 (7.4)	0.9
	Emotional	13/83 (15.7)	16/54 (29.6)	0.1
	Financial	5/83 (6.0)	4/54 (7.4)	0.8
Participation in	Religious events	51/83 (61.4)	28/54 (51.9)	0.4
	Social events	62/83 (74.7)	46/54 (85.2)	0.3
Expectations	None	33/83 (40.7)	6/54 (11.5)	0.07
	Health	38/83 (46.9)	34/54 (65.4)	
	Peace	4/83 (4.9)	8/54 (15.4)	
	Care	3/83 (3.7)	2/54 (3.8)	
	Death	3/83 (3.7)	2/54 (3.8)	
Dreams	None	23/83 (28.4)	10/54 (18.5)	0.9
	Health	13/83 (15.7)	6/54 (11.1)	
	Children	17/83 (21.0)	20/54 (37.0)	
	Wealth	9/83 (11.1)	18/54 (33.3)	
	Pilgrimage	16/83 (19.8)	–	
	Death	3/83 (3.7)	–	

Statistically significant differences between groups: ‡.001, †005, *.05

To our knowledge this is the first study comparing elderly and middle-aged participants by CGA. Therefore, no direct comparisons with other studies could be made. Actually, we were curious about whether there was any difference in titles of CGA for elderly and middle-aged groups and which components of CGA were critical? Should we use the whole CGA lasting at least 40 minutes? Alternatively, we can select some standardized measures for our patients referred to geriatric rehabilitation such as SMMSE-E and MNA. Indeed, cognitive screening is important in assessing the rehabilitation potential (4). Inability to understand instructions or remember information may hinder the therapy.

Furthermore, we found differences in some parameters including socioeconomics (education, job, monthly income, number of children, spouse and friends' supports), function, cognition, and nutrition between elderly and middle-aged participants. Interestingly, nearly half of the elderly patients were illiterate, and more than half of them had nutritional impairment, in addition to a very low (mean 525 TL) monthly income. In fact, cognition, nutrition, and functional capacity were closely related parameters in the elderly (17). Age did not correlate with cognition, but correlated with nutrition and function. And as a major determinant, cognitive state correlated with monthly income, function, and nutrition. We couldn't comment on the causal interferences because of the cross sectional design of the study. Surprisingly, no differences in comorbidity scores and spiritual parameters were found between the elderly and the middle-aged. Similar comorbidity scores may be due to all participants' admitting to the hospital as inpatients or outpatients. Spiritual issues were also similar possibly due to similar regional, traditional, and religious characteristics of the patients admitted to the hospital.

Inadequate nutritional intake among community dwelling older people is associated with a wide variety of economic, social, psychological and physical factors (32,33). Results from our study indicate that 10.8% of home-living Turkish elderly patients are malnourished and 44.6% of them had malnutrition risk. These results are markedly higher than that observed in Taiwanese people (2%), Caucasian population (1%) and Finnish people (3%) (33-35). Finnish researchers reported that the nutritional status by dietary, anthropometric and laboratory methods of home-living people aged 70 years and over was good (35). On the contrary, Estonian researchers reported that the risk of malnutrition by MNA was similar (26% vs. 27.5% respectively) for the elderly people living at home and those living in the nursing home (36). Methodological diversity and socio-economic issues may explain the inconsistencies. Unfortunately, CGA measuring the other dimensions of elderly had not been applied to patients in all of these studies.

CGA is criticized for requiring intense resources and being time-consuming. However, patients should be screened for the rehabilitation potential and the screening process should be used to establish well-defined, patient-focused goals for rehabilitation (4). Yet, we did not come across any studies using all of the comprehensive measures we have applied, possibly because such a study lasts too long, is time-consuming and requires unfunded research projects. Furthermore, the spiritual history and financial issues were ignored in the geriatric literature despite their importance.

Our study has several limitations. First is the cross-sectional design which does not allow causal interferences. Secondly, we couldn't assess urinary incontinence because of our limited time and proficiency. Thirdly, we didn't evaluate pain since all of the patients referred us for pain management and rehabilitation. So, pain was not a discriminative feature between the groups. In addition, we didn't screen balance, gait, and posture since none of the patients had a history of falling and vertigo. All of our patients were living at home with their families meaning they were in a relatively good functional state for self-care and mobility compared with nursing-home-living or community-dwelling elderly patients. Despite that, more than half of our patients had cognitive and nutritional problems. We found14 /46 of 83 patients had dementia/cognitive decline by SMMSE-E and 11/45 of 83 patients had malnutrition/risk of malnutrition by MNA among elderly patients living at home with their families. Because of these high rates, we suggest that not only routinely available statistics such as age, gender, and diagnosis, but also cognition and nutrition should be screened by geriatric health professionals.

The quality of care for older patients remains far from optimal. Quality improvement efforts for older persons will likely remain piecemeal, largely confined to managed care and research setting (7). Socioeconomics and spirituality were generally ignored in geriatric studies. And there is no global consensus on performing CGA .

Based on our results, we recommend elderly patients to be screened for rehabilitation potential and routine cognitive screening for patients before they admit to geriatric rehabilitation unit. Socioeconomic characteristics (education, job, children, monthly income, spouse and friends' supports) were also added as they were critical. Social interactions with and support from spouses, families and friends should be encouraged. Financial support for disabled elderly by social funds of governments may solve at least some problems seen in everyday practice.

In conclusion, cognitive screening should be applied as a routine evaluation protocol for patients with a geriatric rehabilitation potential. Strategies to increase physical activities and to strengthen cognitive abilities in the elderly should be developed. Therefore, we suggest that cognitive exercises should be incorporated into geriatric care and rehabilitation processes. Because of the critical importance of cognition on physical function, future studies are needed to confirm the efficacy of cognitive rehabilitation in the geriatric population. Nutrition is another important issue affecting physical function. Difficulties in meal preparation, reduced appetite, comorbidities, adverse effect of pharmaceuticals, and low socioeconomic level may be responsible for malnutrition, which should be screened and treated early and appropriately in the elderly.

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