ORIGINAL INVESTIGATION

Medication management ability in older patients: time for a reappraisal

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Background. Adhering to drug regimens is a complex and multidimensional task. Elderly patients usually take an average of seven drugs but most fail to adhere to the prescribed regimen. Several performance-based instruments have been developed to assess a patient's capacity to manage drugs but with inconsistent results.

Aims. The aim of the study was to assess the prevalence of impaired medical management capacity in a sample of the oldest old hospitalized elderly patients and the main clinical factors associated with potential unintentional non-adherence.

Methods. Forty-six consecutive patients were enrolled in the geriatric transitional care unit of Ospedale Policlinico San Martino, Genoa, Italy. All patients received an abbreviated comprehensive geriatric assessment and a hand grip assessment for sarcopenia. Patients' medication management ability was assessed by administering the DRUGS tool 48-74 hours before hospital discharge.

Results. The results showed a negative correlation between age and total medication management score. A positive correlation was detected between functional status, cognitive status, and medication management score. Hand grip strength < 9 kg correlated with a significant worsening of medical management capacity. In contrast, multiple morbidities and the mean number of drugs were not associated with the medical management score.

Conclusions. This preliminary study indicated that drug management capacity mainly relies on frailty markers, such as functional status, sarcopenia, and cognitive performance. Further studies are warranted to identify a subset of medical parameters that can accurately predict impaired medical management ability early, particularly for highly vulnerable elderly patients.

Key words: Drug management ability, Frailty, Functional decline, Oldest old patients, Sarcopenia

INTRODUCTION

The ability to appropriately manage medications is crucial to assure medical adherence, particularly in older adults with multiple morbidities and regimens with several drugs. Older adults usually take an average of seven drugs per day; however, up to 40% fail to take their medications as prescribed [1] [2].

Adhering to a drug regimen is a complex task that includes cognitive, physical, functional and socioeconomic abilities. Several instruments have been developed to assess medication management ability in patients who used their own medications or participated in a simulated medication regimen [3-6].

The DRUGS and Med MaiDe instruments [5] [6] both use a patients' own medications and show adequate intra and inter-rater reliability, Moreover, the DRUGS tool is correlated with cognitive function, responsiveness to change, and applicability in different clinical settings [7-11]. No systematic assessment of drug management ability has been implemented into routine clinical practice.

To fill this gap in knowledge, the present study assessed

the medical management ability of hospitalized elderly patients and the main clinical factors associated with potential inability to manage drugs.

SUBJECTS AND METHODS

In total, 100 consecutive patients admitted to the Ospedale Policlinico San Martino, Geriatric unit, Genoa, Italy (January-June 2017) were enrolled. Thirty patients were excluded for clinical instability, six patients died, ten patients refused to participate in the study, and eight patients withdrew from the study. Thus, 46 patients entered the study after written informed consent was obtained. The local ethics committee approved this study.

Patients were included if they were: > 65 years, suffering from moderate multiple morbidities (CIRS < 6) [12], clinically stable and the hospital discharge drug regimen included the target drug packaging (see above).- Exclusion criteria were end stage chronic disease, (CIRS > 6) and an inability to participate in the study.

Demographic variables, residence, marital status, and in-home assistance data were collected. All patients received abbreviated comprehensive geriatric assessment, including the following tools to assess clinical domains: cognitive status (Mini Mental State Examination [13], MMSE), psychological status (Geriatric Depression scale [14], GDS 15-items), functional status (Basic and Instrumental Activities of Daily Living of Lawton [15] [16], BADL and IADL), physical burden of illness (Cumulative Illness Rating Scale [12], CIRS: Illness Severity Index-SI, and Co-morbidity Index-CI). A hand-grip dynamometer (Camry; EH101 Units: kg/libbers. Maximum capacity 90 kg. Power 2X 1.5 V AAA batteries. Tolerance ± 0.5 kg) was used to assess sarcopenia.

The DRUGS tool [5] was administered 48-72 hours before hospital discharge to assess a person's ability to identify drugs, to open containers, to take out the correct number, and to appropriately verbalize the prescribed drug and dose for the following packaging types:

- pill blister packs;
- tablets;
- child resistant closure droplets;
- insulin (Apidra Solostar) pen;
- inhaler devices (e.g., Aliflus diskus inhaler; Bretaris inhaler).

STATISTICS

Data are expressed as mean ± standard deviation. The non-parametric Pearson's correlation analysis was used to determine the associations between two variables

Table I. Patients' clinical characteristics based on the abbreviated comprehensive geriatric assessment.

Assessment tool	Mean ± SD
MMSE	20.38 ± 0.35
CIRS	4.15 ± 0.27
CIRS severity	1.98 ± 0.05
IADL	2.62 ± 0.35
BADL	3.13 ± 0.33
GDS	7.20 ± 0.52
Mean drugs	6.17 ± 0.42
Hand-grip (kg)	9.76 ± 0.90

(Fig. 1). The non-parametric t-test (Mann-Whitney test) was used to estimate differences between two variables. The non-parametric Kruskal-Wallis analysis was used to estimate differences among three or more variables. A p-value < 0.05 was considered significant. Graph Pad version 5.0 b software (Graph Pad Software, La Jolla, CA, USA) was used to perform the statistical analysis.

RESULTS

Mean patient (30 females and 16 males) age was 86.64 ± 1.01 years.

A total of 71% of patients lived alone at home and 29% received home assistance.

Most patients' clinical phenotype (Tab. I) was frail, characterized by severe sarcopenia and functional decline.

All patients failed to manage their medication, fulfilling only the first task (e.g., ability to identify drugs) of the four requested for each drug package: (Aliflus diskus: 1.37 ± 0.19; Bretaris: 1.11 ± 0.19; Apidar Solostar: 1.60 ± 0.16; pill blister pack: 2.35 ± 014; tablets 1.33 ± 0.17; child resistant closure droplets: 1.42 ± 0.16).

A negative correlation was observed between age and the DRUGS score (n = 46; r = −0.43, p < 0.001).

In addition, a positive correlation was detected between DRUGS, the BADL (n = 46, r = 0.70, p < 0.0001), the IADL (n = 46; r = 0.65, p < 0.001), the MMSE (n = 46; r = 0.58, p < 0.0001), and hand-grip strength (n = 46; r = 0.42, p < 0.005). Worsening of the DRUGS score was associated with the severity of cognitive deficit (moderate dementia: MMSE 19-11 points) (KW 12.84 p < 0.01) and (severe dementia: MMSE ≤ 10 points) (KW 29.91 p < 0.001), respectively.

Similarly, a moderate functional decline (BADL < 4/6 points) was associated with worsening of the DRUGS score (U 497: p < 0.01).

Handgrip strength < 9 kg correlated with worsening of the DRUGS score (U 338; p < 0.005).
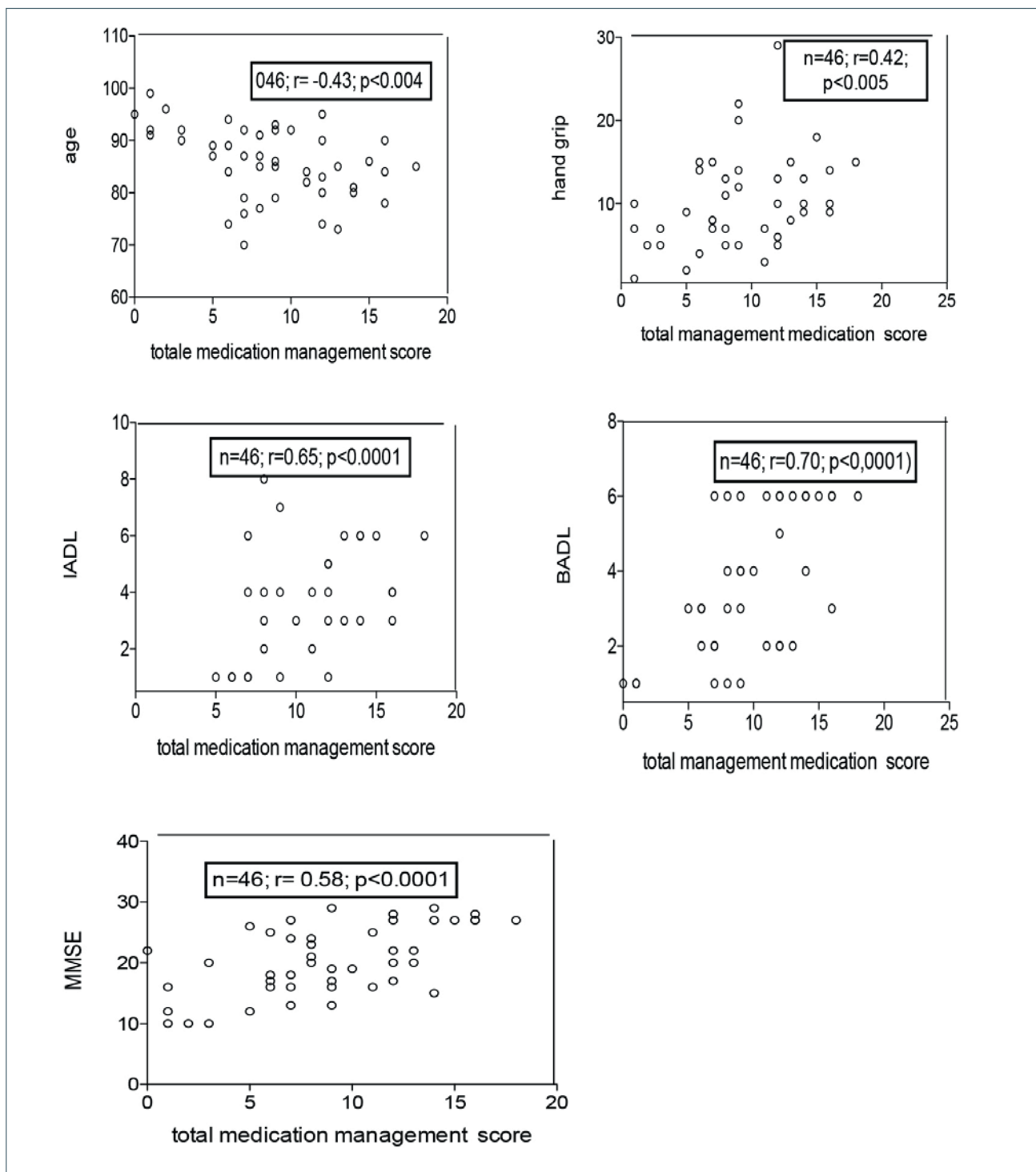
Figure 1. Pearson's correlation analysis between the DRUGs score and age, sarcopenia (hand-grip strength measured in kg), functional status (Basic and Instrumental Activities of Daily Living of Lawton, BADL and IADL), and cognitive status (Mini Mental State Examination, MMSE).

Multiple morbidities were not associated with impaired drug management.

Medication management ability for the Aliflus diskus inhaler was inversely correlated with age (n = 46; r = –0.38, p < 0.0008) but positively correlated with the BADL (n = 46; R = 0.42, p < 0.003), CIRS severity

(n = 46, r = 0.45, p < 0.0018), the CDT (n = 46, r = −0.36, p < 0.001), and the MMSE (n = 46; r = 0.38, p < 0.009). Similarly, management ability for the Bretaris inhaler was inversely correlated with age (n = 46, r = −0.34, p < 0.003) and the MMSE (n = 46, r = 0.51, p < 0.001) but positively correlated with the BADL (n = 46, r = 0.54, p < 0.005) and the IADL (n = 46, r = 0.60, p < 0.0001). In contrast, the medication management ability of child resistant closure droplets correlated with hand-grip strength (n = 46; r = 0.60, p < 0.0001) as well as the Apidra Solostar device (n = 46, r = 0.60, p < 0.0001). The medication management ability of pill blister packs correlated with sarcopenia (n = 46; r = 0.66, p < 0.0001), the IADL (n = 46; r = 0.62; p < 0.0001), and cognitive status (n = 46; R = 0.43, p < 0.0002).

DISCUSSION

Medical management is a highly integrated process that includes a defined set of mental and physical skills and has also been considered a key to successful aging [17] [18] In contrast, the need to receive assistance with medications predicts frailty [19-21].

This exploratory study indicates that the ability of elderly subjects to manage their medications mainly relies on cognitive performance, functional status, and sarcopenia [18] [19], which are recognized markers of frailty.

In particular, the present findings show that age (*oldest-old* population) was the main determinant of the inability to manage drugs.

In addition, sarcopenia was associated with an overall worsening of drug management ability and was associated with less ability to use pill blister packs, children closure droplets, and an insulin pen.

The use of inhaler devices unmasks higher integrated processing; indeed, the inability to use an inhaler was associated with cognitive deficit, visuospatial impairment, severity of comorbidities, and functional decline. Notably, drug management ability declined according to dementia severity and disability as well. Frailty hallmarks are key determinants of effective medical management performance, adherence, and compliance, with direct implications for appropriate clinical management of such a vulnerable population.

Interestingly, multiple morbidities and multiple drug regimens were not associated with drug management ability. Thus, it could be hypothesized that understanding of comorbidity clusters and/or disease severity could better help stratify older adults' higher risk of drug non-compliance. Similarly, particular types of drugs packaging and the complexity of drugs prescriptions, instead of the mere cumulative number of drugs, may primarily account for this impaired ability [21] [22].

The limitations of this study are the small size and the single hospital setting with selection bias and underpowered results. Hospital complications, such as delirium and exceedingly poor mobility, may hamper overall drug management ability. Furthermore, a patient's usual drug regimen may undergo changes with which patients may be initially unfamiliar. Even if patients verbalized their difficulty taking such a large number of medications, no systematic survey has been conducted to assess preferences and knowledge of medical management strategies.

The strengths of this study are the real-world assessment of hospitalized *oldest-old* patients, considering a frail clinical phenotype, and the performance-based analysis of a broad set of drugs types and packaging. Hypothetically, a longitudinal assessment, sample size implementation, and a multivariate analysis could add knowledge to this field. In particular, including a wider set of drugs types and a sub-analysis of specific abilities for more complex devices, such as inhalers, could help in the understanding of this true geriatric syndrome.

Further research is needed to select the most predictive clinical parameters to intercept early drug management inability and to assure appropriate drug compliance in vulnerable older patients.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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