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Physical Function Does Not Predict Care Assessment Need Score in Older Veterans

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Abstract

Objective—The Veterans Health Administration’s Care Assessment Need (CAN) score is a statistical model, aimed to predict high-risk patients. We were interested in determining if a relationship existed between physical function and CAN scores.

Method—Seventy-four older (71 ± 1 years) male Veterans underwent assessment of CAN score and subjective (Short Form-36 [SF-36]) and objective (self-selected walking speed, four square step test, short physical performance battery) assessment of physical function.

Results—Approximately 25% of participants self-reported limitations performing lower intensity activities, while 70% to 90% reported limitations with more strenuous activities. When compared with cut points indicative of functional limitations, 35% to 65% of participants had limitations for each of the objective measures. Any measure of subjective or objective physical function did not predict CAN score.

Conclusion—These data indicate that the addition of a physical function assessment may complement the CAN score in the identification of high-risk patients.

Keywords

Veteran; aging; disability; subjective physical function; mobility function; gait speed; SPPB; activities of daily living

Introduction

The Care Assessment Need (CAN) score is a statistical model, which indicates how a given patient compares with other patients receiving care through the Veterans Health Administration (VHA; Wang et al., 2013). The goal of the CAN score is to predict high-risk

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Veterans who could benefit from health care professionals working together to ensure patients get the right care at the appropriate time by estimating the probability of hospital admission or death. Identifying patients who are in need of care coordination can reduce distress to patients and lower the risk of hospitalization and medical costs (Darkins et al., 2008). However, research suggests that it is difficult for clinicians to predict high-risk patients (Allaudeen, Schnipper, Orav, Wachter, & Vidyarthi, 2011). Scores are determined using demographic (e.g., age, gender), clinical (e.g., medical conditions, medications, vital signs, and laboratory tests), health care utilization (e.g., number of visits to various routine and emergency care departments), and social (e.g., marital status and service connection) data.

Dysmobility is the current leading cause of long-term care admissions and both subjective (Fan et al., 2002; Inouye et al., 1998) and objective (Studenski et al., 2011; Wegrzynowska-Teodorczyk et al., 2013) measures of physical function are strong predictors of hospitalization and death. Evaluation of other predictive models suggest that the addition of physical function (e.g., self-assessment of activities of daily living [ADL: that is, things that people normally do, including feeding ourselves, bathing, dressing, etc.] dependence) to the model can improve discrimination when examining the risk of hospitalizations (Coleman, Min, Chomiak, & Kramer, 2004; Smith et al., 1996). However, physical function is not a current component of the CAN score as it is typically unavailable from electronic records (Wang et al., 2013). Physical function may be a particularly important component of the patient assessment in Veterans as the prevalence of disability is higher in Veterans than the general population (Gizlice, 2002).

We were interested in determining if a relationship existed between physical function and CAN scores. This information may be necessary to determine if low physical function is accounted for in the CAN score or whether direct measures of physical function also should be assessed. This addition of physical function would seek to optimize patient care by aiding to identify those at risk for dysmobility, hospitalization, and death. We hypothesize that subjective and objective physical function will not relate to the CAN score in a cohort of older Veterans and, thus, should be assessed in addition to the CAN score as part of routine care.

Method

Recruitment and Screening

Veterans were enrolled into the Gerofit clinical demonstration program from the Baltimore area from January 2014 through March 2016. Subjects signed a research consent form that was approved by the University of Maryland institutional review board (IRB). Gerofit is an exercise and health promotion program for older Veterans established in 1986 in Durham, NC (Morey, Crowley, Robbins, Cowper, & Sullivan, 1994). Participants were 65 years old and medically stable, with a VA primary care physician's (PCP) approval to initiate an exercise program. The VA's Computerized Patient Record System (CPRS) was reviewed by study staff to classify the presence or absence of medical conditions and medications associated with chronic disease, in relation to safe exercise prescription. Exclusion criteria were reviewed in the medical chart by study staff at the time of enrollment and included the

inability to perform ADL and function independently without assistance, cognitive impairment, unstable angina, proliferative diabetic retinopathy, oxygen dependency, unwilling to commute and/or unable to provide their own transportation to Gerofit, volatile behavioral issues or unable to work successfully in a group setting, uncontrolled incontinence, open wounds, active substance abuse, and homelessness. Three hundred forty-nine Veterans (97% male) were referred for enrollment into the Gerofit program. One hundred sixty-six participants were approved to begin an exercise program by their PCP, received eligibility clearance by the Gerofit team to join the program, and presented for their baseline functional testing and enrollment visit. We did not begin pulling CAN scores until approximately half way through enrollment of the 166 participants; thus, 74 patients had available CAN scores (all male).

CAN Score

CAN scores were automatically generated by the VA using the terms outlined in the predictive model proposed by Wang et al. (Wang et al., 2013). Data used to generate the scores were obtained from the VA's Corporate Data Warehouse (CDW) with the exception of socioeconomic status index, which was derived from the American Community Survey provided by the U.S. Census Bureau, and Rank and Service Branch, derived from the VA Department of Defense Identity Repository. The CAN score was calculated by a weekly scan of the patient's electronic health record to derive 36 data elements that include vital signs, recent clinic visits, recent emergency room and urgent care visits, medications, labs, and number and type of illnesses. These 36 parameters were then applied to Statistical models to provide up-to-date estimates of how likely it is that a patient will be admitted or die. The most recent CAN score (within 1 week of study enrollment) was pulled for each participant from the Veterans Integrated Service Network Support Services Center website the day of research testing. Scores ranged from 0 (*lowest risk*) to 99 (*highest risk*). A cut point 95 was used to represent those that were high risk for hospitalizations and/or death (Fihn & Box, 2013).

Subjective Functional Assessment

By answering specific questions related to physical function on the SF-36 Quality-of-Life Questionnaire (Ware & Sherbourne, 1992), participants reported how they believed their current health limited their ability to perform tasks of varying intensity. Participants rated these questions using the following 3-point scale: *limited a lot*, *limited a little*, or *not limited at all*.

Objective Functional Tests

Participants completed the following functional assessments using standard guidelines: (a) 6-min walk distance (6MWD; ATS Committee on Proficiency Standards for Clinical Pulmonary Function Laboratories, 2002), (b) 8-ft up and go (UG), (c) 30-s chair stands, (d) 10-m self-selected walking speed (SSWS), (e) four square step test (FSST), and (f) short physical performance battery (SPPB; Guralnik et al., 1994). Standardized instructions, provided by a trained research exercise physiologist, and equipment were provided for each test. In addition to calculating mean scores, these functional outcomes were compared with cutoff values indicating mobility risk to categorize the presence or absence of limitations

using the following cut points: (a) SSWS <1.2 m/s (Blanke & Hageman, 1989), (b) FSST >15 s (Dite & Temple, 2002), and (c) SPPB <10 (Veronese et al., 2014). As cutoff values are not available for 6MWD, timed chair stands, and the UG, individual values were compared with age-matched normative values (normative range declining with age from 631 to 403 yards for 6MWD, 4.8 to 6.2 s for the UG, and 15 to 10 for chair stands; Rikli & Jones, 2013) to categorize each participant as at or above versus below the norm.

Statistics

Standard methods were used to compute means and standard error of the mean (SEM). Student's *t* tests were used to compare differences in CAN score by physical function category (at or above vs. below normative cut points and mobility limitations present vs. absent). Pearson correlation coefficients were calculated to determine if relationships between continuous variables existed. Stepwise linear regression predicting CAN score from models including continuous functional measures also was used. Data were analyzed using SPSS Version 20. All tests were two-tailed, and *p* values <.05 were considered statistically significant.

Results

Participants were 66% African American and 34% Caucasian. They were 71 ± 1 (range = 65–94) years old and obese (body mass index [BMI] = 32 ± 1 kg/m², range = 22–53 kg/m²), on average. The majority had multiple medical conditions (15 ± 1 medical problems and 10 ± 1 medications listed in their medical record; Table 1).

Average CAN score was 67 ± 3 (range = 10–97). Eight percent were considered at high risk for hospitalizations and/or death by CAN score. Although CAN scores were not different between those with versus without cardiovascular disease (CVD) and serious mental illness, CAN scores of those with type 2 diabetes mellitus, chronic kidney disease, pulmonary and musculoskeletal conditions, and posttraumatic stress disorder were 20% to 25% higher than those without (*ps* < .05; Table 1).

Approximately, 25% of participants reported that their health limited their ability to perform lower intensity ADL (e.g., bathing/dressing and walking one block), while 70% to 90% reported limitations with more strenuous activities (e.g., walking several flights of stairs and performing vigorous activities; Figure 1). Functional levels were below norms (6MWD, chair stands, and UG) in 65% to 90% of participants and cut point mobility limitation values (SSWS, FSST, and SPPB) in 35% to 65% of participants (Table 2). CAN scores did not differ between those with mobility limitations by normative values or cut points (Table 2). CAN scores were not associated with any subjective (data not shown) or objective functional or mobility measures (Table 2). Furthermore, CAN scores were not predicted by subjective ($R = .32$, $p = .54$) or objective ($R = .19$, $p = .67$) functional measures.

Discussion

We observed no relationship between CAN scores and physical function and CAN score was similar between those with and without mobility limitations. These data suggest that CAN

scores, which are highly predictive of hospitalization and mortality, do not currently account for physical function and may predict risk through a different mechanism than physical function in older Veterans. Furthermore, a high CAN score may not trigger the need for consultation to address functional limitation.

In older patients, preadmission functional status (i.e., need for assistance in ADL and use of a walking device) aids in predicting those at risk for functional decline after hospitalization (Hoogerduijn et al., 2012). Furthermore, an examination of hospitalized older patients finds that high UG score is an independent predictor of adverse outcomes (i.e., nonindependent living and death; Wong & Miller, 2008). In our study, Veterans were at high risk for dysmobility, with 44% and 36% at or below the threshold for mobility limitations based upon an SPPB of <10 and an SSWS of <1.2 m/s. The mean SSWS of 1.1 m/s was associated with a 5-year mortality rate of 10% in older, generally healthy adults (Studenski et al., 2011). Another analysis indicates that those with a walking speed of greater than 0.82 m/s are 1.23 times less likely to die than those who walked slower (Stanaway et al., 2011). The mean CAN score of 67 indicated that these participants, overall, have a 1.7% probability of death in the next year (Wang et al., 2013). Based on walking speed assessment, it appears that the CAN score alone, without also considering physical function, may underestimate risk of negative health outcomes and result in a misclassification of individuals at risk for negative health events, particularly those at risk due to mobility limitations.

To the best of our knowledge, no studies have examined whether subjective or objective measures of physical function are better predictors of hospitalizations and mortality; however, previous studies suggest that objective measures of physical performance are better able to identify functional limitations than self-reported measures (Brach, VanSwearingen, Newman, & Kriska, 2002; Thomas, Marren, Banks, & Morley, 2007). Despite these findings, screening evaluations of physical function in older adults are mostly limited to self-report measures due to time and space constraints and the need to train clinical staff to perform and interpret the tests appropriately. Systematic reviews are available to help clinicians choose the best patient-reported outcome questionnaire to measure physical activity (Forsen et al., 2010; Williams et al., 2012). Studies also suggest that objective measures of physical function can be effectively and efficiently integrated into routine clinic operations (Studenski et al., 2003; Wilkins, Roe, & Morris, 2010). SSWS may represent the functional test that is most suitable to be implemented as part of a clinical assessment as it is relatively easy to perform in terms of the cost, time, equipment, and space required and is associated with poor health outcomes in older adults (Viccaro, Perera, & Studenski, 2011; Wrisley & Kumar, 2010).

Strengths of this study include the successful integration of subjective and objective assessments of physical function into clinical care and the inclusion of patients who seek care at the VHA as they represent a unique population of individuals who typically experience a larger number of comorbid conditions, have poorer health and health behaviors, and are more likely to experience mobility limitations (Agha, Lofgren, VanRuiswyk, & Layde, 2000; Gizlice, 2002; Kazis et al., 1998). However, the results of this study should be interpreted in light of a few limitations, including the relatively small sample size and sample restriction to ADL independent Veterans deemed physically able to participate in an

exercise program. Furthermore, we did not assess future survival or hospitalization outcomes, and thus cannot determine whether physical function measures add anything beyond the CAN score in the prediction of hospitalization and/or survival.

While functional limitations are highly prevalent in this population of older Veterans, CAN score did not increase in the presence of functional limitations. However, it did with the presence of chronic diseases, indicating the importance of identifying these risk factors at their earliest development. Similar prevalence of functional limitations (Syddall, Martin, Harwood, Cooper, & Aihie Sayer, 2009) and chronic disease (Mallappallil, Friedman, Delano, McFarlane, & Salifu, 2014; Yazdanyar & Newman, 2009) is observed in similarly aged non-Veteran males, indicating that these data may be generalizable to the larger male population. Future studies will need to examine whether these relationships are present in older women.

Conclusion

As a modifiable factor associated with negative health events, this study outlines the importance of the physical function assessment in older adults. These data suggest that if care providers rely solely on CAN scores, a significant risk factor for future adverse health outcomes may be overlooked. Categorization of functional limitations may complement the CAN score in the identification of patients for whom a transitional care intervention, such as physical/occupational therapy, home health, or exercise rehabilitation, might be appropriate.

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Figure 1.

Veterans self-report greater limitations in how their current health affects their ability to perform tasks of increasing intensity, with ~90% reporting limitations with vigorous activities ($N = 74$).

Table 1Medical Diagnosis and Medication Usage ($N = 74$).

Medical diagnosis	Prevalence (%%)	CAN score <i>M</i> ± SEM	
Diabetes mellitus type 2	47	Absent	59 ± 4
		Present	75 ± 4 ^{**}
Cardiovascular disease	38	Absent	66 ± 5
		Present	68 ± 3
Chronic kidney disease	11	Absent	65 ± 3
		Present	81 ± 8 [*]
Pulmonary condition	16	Absent	64 ± 3
		Present	81 ± 5 ^{**}
Musculoskeletal condition	66	Absent	60 ± 5
		Present	70 ± 3 [*]
Serious mental illness	20	Absent	66 ± 3
		Present	69 ± 6
Posttraumatic stress disorder	32	Absent	62 ± 4
		Present	76 ± 4 ^{**}
Medication usage			
Hypoglycemic	35		
Hypertension	73		
Hypercholesterolemia	65		
Blood thinner	16		
Depression	28		

Note. CAN = care assessment need; SEM = standard error of the mean. Significantly different than if condition is absent:

* $p < .05$.

** $p < .01$.

Table 2

The Relationship of Physical Function and CAN Score in Older Veterans.

	<i>M</i> ± SEM (range)	CAN score versus function association	CAN score by functional status	
<i>N</i> = 74			Normative values	
6MWD (yards)	422 ± 20 (23–999)	<i>r</i> = −.08	At or above (<i>n</i> = 8)	66 ± 3
			Below (<i>n</i> = 65)	71 ± 7
30 s chair stands (#)	10.3 ± 0.5 (0.0–21.0)	<i>r</i> = .01	At or above (<i>n</i> = 15)	69 ± 3
			Below (<i>n</i> = 59)	58 ± 6
UG (sec)	9.1 ± 0.7 (3.8–33.3)	<i>r</i> = .11	Absent (<i>n</i> = 24)	66 ± 4
			Present (<i>n</i> = 48)	67 ± 3
			Mobility risk cutoff values	
SSWS (m/s)	1.1 ± 0.1 (0.6–2.4)	<i>r</i> = .01	Absent (<i>n</i> = 27)	65 ± 3
			Present (<i>n</i> = 47)	69 ± 5
FSST (sec)	17.1 ± 1.5 (7.1–69.0)	<i>r</i> = .01	Absent (<i>n</i> = 49)	65 ± 3
			Present (<i>n</i> = 25)	68 ± 5
SPPB	9.3 ± 0.3 (2.0–12.0)	<i>r</i> = −.03	Absent (<i>n</i> = 40)	68 ± 3
			Present (<i>n</i> = 32)	64 ± 5

Note. CAN = care assessment need; SEM = standard error of the mean; 6MWD = 6-min walk distance; UG = 8-ft up and go; SSWS = 10 m self-selected walking speed; FSST = four square step test; SPPB = short physical performance battery.