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Malnutrition in Geriatric Rehabilitation: Prevalence, Patient Outcomes, and Criterion Validity of the Scored Patient-Generated Subjective Global Assessment and the Mini Nutritional Assessment

Skye Marshall, APD*; Adrienne Young, PhD, APD*; Judith Bauer, PhD, APD*; Elizabeth Isenring, PhD, APD*

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*APD=Accredited Practising Dietitian (certified in Australia).

ABSTRACT

Background Accurate identification and management of malnutrition is essential so that patient outcomes can be improved and resources used efficaciously.

Objectives In malnourished older adults admitted to rehabilitation: 1) report the prevalence, health and aged care use, and mortality of malnourished older adults; 2) determine and compare the criterion (concurrent and predictive) validity of the Scored Patient-Generated Subjective Global Assessment (PG-SGA) and the Mini Nutritional Assessment (MNA) in diagnosing malnutrition; and 3) identify the Scored PG-SGA score cut-off value associated with malnutrition.

Design Observational, prospective cohort.

Participants/setting Participants were 57 older adults (65 years and older; mean ±standard deviation age=79.1±7.3 years) from two rural rehabilitation units in New South Wales, Australia.

Measurements/statistical analysis Scored PG-SGA; MNA; and the *International Statistical Classification of Diseases and Health Related Problems, 10th revision, Australian Modification* (ICD-10-AM) classification of malnutrition were compared to establish concurrent validity and report malnutrition prevalence. Length of stay, discharge location, rehospitalization, admission to a residential aged care facility, and mortality were measured to report health-related outcomes and to establish predictive validity.

Results Malnutrition prevalence varied according to assessment tool (ICD-10-AM: 46%; Scored PG-SGA: 53%; MNA: 28%). Using the ICD-10-AM as the reference standard, the Scored PG-SGA ratings (sensitivity 100%, specificity 87%) and score (sensitivity 92%, specificity 84%, ROC AUC [receiver operating characteristics area under the curve]=0.910±0.038) showed strong concurrent validity, and the MNA had moderate concurrent validity (sensitivity 58%, specificity 97%, receiver operating characteristics area under the curve=0.854±0.052). The Scored PG-SGA rating, Scored PG-SGA score, and MNA showed good predictive validity. Malnutrition can increase the risk of longer rehospitalization length of stay, admission to a residential aged care facility, and discharge to hospital or residential aged care facility instead of home.

Conclusions Malnutrition prevalence in the geriatric rural rehabilitation population is high, and is associated with increased health and aged care use. The Scored PG-SGA ratings and score are suitable for nutrition assessment in geriatric rehabilitation. The MNA may be suitable for nutrition assessment in geriatric rehabilitation, but care should be taken to ensure all malnourished patients are identified. Additional examination of the criterion validity of the Scored PG-SGA and MNA will lend confidence to these findings.
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THE PHYSIOLOGICAL AND PSYCHOSOCIAL CONSEQUENCES of malnutrition are significant and diverse. In health care facilities, malnutrition increases morbidity, mortality, and incidence of complications. Overall, this leads to increased treatment costs and length of stay.[1,2] Common symptoms of malnutrition, such as confusion, fatigue,

and weakness, are often attributed to other conditions, leading to frequent misdiagnosis and under-recognition of malnutrition.[3] There is strong evidence showing malnutrition is under-recognized and under-diagnosed in the rehabilitation setting, despite a high prevalence (30% to 50%).[4] In addition, the prevalence of malnutrition in rural rehabilitation facilities, as opposed to metropolitan facilities, has not been reported.[4]

Accurate identification, management, and monitoring of malnutrition are essential steps in the nutrition care process so that patient outcomes can be improved and resources used efficaciously.[5] Nutrition assessment is often completed through the application of a nutrition assessment tool. Unlike nutrition screening tools, nutrition assessment tools can be used to make a diagnosis of malnutrition by medical staff or a registered dietitian nutritionist.[6] However, the tool chosen should be validated for the population to which it is applied. In the rehabilitation setting, there are only two nutrition assessment tools that have been evaluated for validity. These include the Subjective Global Assessment (SGA) and the Mini Nutritional Assessment (MNA).[4] The MNA was designed specifically for an older population, and is perhaps the most widely reported nutrition assessment tool in the literature across health care settings[4,7,8]; however, both the MNA and SGA lack sensitivity to show changes in nutrition status during a short period of time, such as during hospital and rehabilitation admissions.[9] The Scored Patient-Generated SGA (PG-SGA) was adapted from the SGA and includes seven components for assessment: weight, food intake, nutrition impact symptoms, activities and function, medical condition, metabolic stress, and physical examination.[9] The questions regarding short-term weight loss and nutrition impact symptoms increase the Scored PG-SGA's sensitivity to changes in nutrition status over a short period of time.[9,10] The Scored PG-SGA provides a global rating of nutrition status for a nutritional diagnosis as well as a continuous numerical score for intervention triage.[11,12] Since its development, the Scored PG-SGA has shown to be appropriate for use in oncology, acute medical, renal, stroke, neurology, and respiratory patients, as well as the residential aged care setting.[13-18] The Scored PG-SGA has not been evaluated in the rehabilitation setting or older adult population. Therefore, in the older adult rural rehabilitation population, the aims of this study were to report the prevalence, health, aged care use, and mortality of malnourished older adults; determine and compare the criterion (concurrent and predictive) validity of the Scored PG-SGA and the MNA in diagnosing malnutrition; and identify the Scored PG-SGA score cut-off value associated with malnutrition.

MATERIALS AND METHODS

Study Sample

Participants consecutively admitted to one of two public rehabilitation units in rural[19] New South Wales, Australia, were approached to participate if they were English-speaking inpatients 65 years or older, lived in the community before admission, and had an informal caregiver. Patients were only included if they were admitted with the expectation they would return to their own homes upon discharge. This study was conducted between August 2013 and February 2014 as part of the MARRC (Malnutrition in the Australian Rural Rehabilitation Community) Study (Trial version 2.0, 9 May 2013) which has been registered at the Australian New Zealand Clinical Trials Registry (ACTRN12613000518763) and has received ethical and governance approval (North Coast NSW Human Research Ethics Committee: LNR 063, G108; School of Human Movement Studies Ethics Committee: HMS13/0731). Written informed consent was obtained from all participants and/or their guardians.

Data Collection

Outcome measurement tools, including all components of the Scored PG-SGA, were completed on behalf of the participant by the primary researcher (a trained accredited practising dietitian [Australian-certified]) and were informed by interview with the patient, their caregivers, rehabilitation staff, and consultation of medical notes.

Nutrition Assessment

Nutrition assessment using both the Scored PG-SGA and MNA was conducted by the primary researcher within a median of 2 days after admission. A higher Scored PG-SGA score indicates an increased risk for malnutrition.[9] The Scored PG-SGA also provides global ratings of well-nourished (rated A), moderately or suspected of being malnourished (rated B), or severely malnourished (rated C), which are analogous to the SGA ratings.[11] For this study, an increase or decrease of $\geq$0.5 kg within 2 weeks was considered a change in weight, any nutrition impact symptoms present within the previous 2 weeks were included, and functional impairment was considered only where it was related to nutrition status. The MNA is scored 0 to 30, where a score of $<$17 indicates malnourished, 17 to 23.5 indicates at risk of malnutrition, and 24 to 30 indicates normal nutrition status.[8]

The *International Statistical Classification of Diseases and Health Related Problems, 10th revision, Australian Modification* (6th ed [ICD-10-AM])[20] criteria are the recognized standard diagnostic criteria in Australia for the diagnosis, documentation, and diagnostic related group coding of protein-energy malnutrition (or malnutrition) (Figure 1). The ICD-10-AM classification is determined using body mass index (BMI; calculated as kg/m^2), weight history, dietary intake, and a physical assessment of fat and/or muscle wasting. These criteria are used in Australian hospitals to provide case-mix funding reimbursements, and failure to identify and document malnutrition in the health care setting can have significant detrimental impacts upon funding.[21] Therefore, the nutrition assessment method used must be in agreement with the ICD-10-AM criteria to ensure that resources are available for treatment. As there is no gold standard for diagnosing malnutrition, the criterion validity (ie, the concurrent and predictive validity) of a diagnostic tool must be established. In this study, the ICD-10-AM classification was used as the reference standard for malnutrition, as it is the agreed upon standard in the Australian health care setting, and has recently been used as the standard against which nutritional screening and assessment tools have been validated.[22,23] The Scored PG-SGA components of current weight, height, 1- or 6-month weight loss and assessment of fat stores and muscle status were used to inform the ICD-10-AM classification of malnutrition for each participant. Weight (kg) was measured by the primary researcher using Tanita