

# Evaluating Photographs as a Replacement for the In-Person Physical Examination of the Scored Patient-Generated Subjective Global Assessment in Elderly Hospital Patients

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## ARTICLE INFORMATION

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## ABSTRACT

**Background** Undernourished patients discharged from the hospital require follow-up; however, attendance at return visits is low. Teleconsultations may allow remote follow-up of undernourished patients; however, no valid method to remotely perform physical examination, a critical component of assessing nutritional status, exists.

**Objective** This study aims to compare agreement between photographs taken by trained dietitians and in-person physical examinations conducted by trained dietitians to rate the overall physical examination section of the scored Patient Generated Subjective Global Assessment (PG-SGA).

**Design** Nested cross-sectional study.

**Participants/setting** Adults aged  $\geq 60$  years, admitted to the general medicine unit at Flinders Medical Centre between March 2015 and March 2016, were eligible. All components of the PG-SGA and photographs of muscle and fat sites were collected from 192 participants either in the hospital or at their place of residence after discharge.

**Main outcome measures** Validity of photograph-based physical examination was determined by collecting photographic and PG-SGA data from each participant at one encounter by trained dietitians. A dietitian blinded to data collection later assessed de-identified photographs on a computer.

**Statistical analyses performed** Percentage agreement, weighted kappa agreement, sensitivity, and specificity between the photographs and in-person physical examinations were calculated. All data collected were included in the analysis.

**Results** Overall, the photograph-based physical examination rating achieved a percentage agreement of 75.8% against the in-person assessment, with a weighted kappa agreement of 0.526 (95% CI: 0.416, 0.637;  $P < 0.05$ ) and a sensitivity-specificity pair of 66.9% (95% CI: 57.8%, 75.0%) and 92.4% (95% CI: 82.5%, 97.2%).

**Conclusions** Photograph-based physical examination by trained dietitians achieved a nearly acceptable percentage agreement, moderate weighted kappa, and fair sensitivity-specificity pair. Methodological refinement before field testing with other personnel may improve the agreement and accuracy of photograph-based physical examination. *J Acad Nutr Diet.* 2018; ■:■-■.

**U**NDERNOURISHED PATIENTS WHO ARE DISCHARGED from the hospital typically require follow-up appointments to monitor nutritional progress but may be too frail to ambulate or to attend outpatient clinics.<sup>1</sup> Paradoxically, these patients often require greater care and support to improve nutritional status and health outcomes.<sup>2,3</sup> A recent study found that only 15% of undernourished patients attended dietetic follow-up appointments.<sup>1</sup>

In Australia, hospital<sup>4,5</sup> and domiciliary<sup>6</sup> programs exist, allowing some dietitians to conduct follow-up home visits. However, these programs do not cover patients discharged from the hospital scheduled for an outpatient follow-up

appointment. Dietitians in America,<sup>7</sup> Canada,<sup>8</sup> and Australia<sup>9</sup> are beginning to use teleconsultations to reach absent patients in recognition of the poor attendance rates and physical impairments that make travel challenging for many patients after discharge from the hospital. However, dietitians conducting teleconsultation to follow up undernourished patients lack the ability to identify fat and/or muscle deficits that are required to make a nutritional status diagnosis. No validated method for conducting physical examinations remotely with the use of technology exists.

The importance of conducting a physical examination is highlighted by its inclusion in the malnutrition diagnostic criteria of both the International Statistical Classification of

Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM)<sup>10</sup> and the joint Academy of Nutrition and Dietetics and American Society of Parenteral and Enteral Nutrition consensus statement.<sup>11</sup> Without a physical examination, the assessment, diagnosis, and documentation of malnutrition are incomplete.<sup>10-12</sup> An incomplete assessment affects the nutrition care plan and patient outcomes and may result in greater health service utilization in the long term.

Adjunct to teleconsultation, photographs of various anatomical sites may be able to inform a malnutrition diagnosis. Current literature has explored the validity of photographs to assess health-related exposures and outcomes, including dietary intake and medical conditions.<sup>13-16</sup> In this study we propose that the same methodology may be applicable to the physical examination required to determine muscle and fat status.

This study aims to compare percentage agreement, weighted kappa agreement, sensitivity, and specificity between use of photographs (index test) and in-person physical examination (reference test) to rate the overall physical examination section (based on muscle and fat status) of the scored Patient Generated Subjective Global Assessment (PG-SGA) for general medicine inpatients aged  $\geq 60$  years during their hospital stay or after discharge. The PG-SGA is the chosen tool because it contains all components required for malnutrition diagnosis and is a valid nutritional assessment tool to detect undernutrition in patients who have been discharged from the hospital.<sup>17,18</sup> As a first step in this study, trained dietitians were employed to perform both the in-person and photograph-based assessments. It was considered important to determine feasibility and identify appropriate alternatives to performing the assessments in cases in which patients were unable to assume the correct position according to protocol. If this first step revealed an acceptable level of validity, then the second step would be to validate the methodology of remote physical examination through photographs taken by family, friends, or other care providers.

The null hypothesis assumed is that there is no difference between use of photographs and an in-person physical examination obtained from general medicine inpatients during their hospital stay or after discharge for determining the overall classification of undernutrition according to the PG-SGA when data are collected by a trained dietitian.

## METHODS

In this nested cross-sectional study, we examined the validity of photographs compared with an in-person physical examination of the scored PG-SGA. This study was approved by the Southern Adelaide Clinical Human Research Ethics Committee (No. 273.14-HREC) and was conducted according to the Declaration of Helsinki.<sup>19</sup> All participants gave written informed consent to participate.

### Sampling

The participants were recruited from an on-going randomized controlled trial (RCT) (registered on The Australian New Zealand Clinical Trials Registry: ACTRN12614000833662), investigating the effectiveness of extended nutrition support for patients receiving acute care. Patients, who had been admitted to the Acute Medical Unit or General Medicine Unit

in Flinders Medical Centre, South Australia, between March 2015 and March 2016, were considered potentially eligible for this study. Patients aged  $\geq 60$  years were included. Patients who were receiving enteral or parenteral nutrition or palliative care and those of Aboriginal and Torres Strait Islander origin were excluded. These criteria were prespecified for the purpose of the RCT to reduce confounding and attrition associated with the high mortality rate.<sup>20,21</sup>

### Sample Description

Approximately 5,000 patients were potentially eligible during the 12-month study duration based on the estimated annual caseload of the Flinders Medical Centre General Medicine Unit.<sup>22</sup> Limited resources led to convenience sampling. In total, 192 participants gave informed consent. Seventy participants did not complete all aspects of the physical examination in person and/or by photograph for two general reasons: (1) difficulties accessing specific anatomical sites (eg, difficulty experienced by patient in leaning forward during examination and photography of lower back or scapula); or (2) participants declined photography of specific anatomical sites (eg, temples or orbital fat pads). All data collected were used in analysis; hence, n values vary across anatomical sites.

### In-Person Physical Examination

Parallel to similar studies, the in-person physical examination of muscle and fat status was considered the gold standard (ie, most accurate test) in clinical practice.<sup>16,23-25</sup> This study primarily focused on muscle and fat status. Overall fluid status and the relevant body sites (ie, ankle edema, sacral edema, and ascites) were not considered in the overall physical examination rating. Fluid status was self-reported by patients by means of telephone consultation. This exclusion minimally affected the overall physical examination rating, considering that fluid status primarily informs body weight fluctuation<sup>18,26</sup> and has the lowest impact on deriving the overall physical examination rating.<sup>12</sup>

In-person physical examinations were performed in the process of completing the scored PG-SGA by a dietitian during interaction with one participant in the hospital or at the participant's place of residence. During in-person physical examinations, access to relevant case notes, bed charts, and standard nutrition-related information allowed recording of patient age, sex, recent and remote medical history, weight, height, previous dietetic interventions, and supplement and medication use.

The severity of deficit at each anatomical site was assigned a rating of nil, mild, moderate, or severe. Physical muscle sites (temple, shoulder, clavicle, scapula, interosseous muscle, thigh, and calf) were individually palpated, visually assessed, and rated before collective consideration to derive the final rating for the overall muscle status. Likewise, physical fat sites (orbital fat pad, triceps skinfold, and fat overlying lower ribs) were individually palpated, visually assessed, and rated before collective consideration for the final overall fat status rating. Muscle status took precedence over fat status to derive the final overall physical examination rating.<sup>12</sup> Remaining sections of the scored PG-SGA were performed as described by the Academy of Nutrition and Dietetics.<sup>12</sup>

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