# Hand grip strength alone is not an accurate indicator of malnutrition in older patients before, during or after admission to surgical wards

**Angela Byrnes**[1,2], Adrienne Young[2,3], Merrilyn Banks[1,2,3], Alison Mudge[2,3], Judy Bauer[1]

[1]University of Queensland, St Lucia QLD 4072, Australia | [2]Royal Brisbane and Women's Hospital, Herston QLD 4006, Australia | [3]Queensland University of Technology, Kelvin Grove QLD 4059, Australia

Contact: a.byrnes@uq.edu.au

## Rationale

Hand grip strength (HGS) has been proposed as a surrogate measure of nutritional status that may be more sensitive to changes in muscle function secondary to declining nutritional status than muscle mass or other body composition measures. In combination with other characteristics, HGS is recommended by the American Society for Parenteral and Enteral Nutrition and the Academy of Nutrition and Dietetics in identifying adult malnutrition.

## Aim

This study aimed to determine the accuracy of HGS as an indicator of malnutrition at different time points in an older (≥65 years) population.

## Methods

Patients ≥65 years were recruited from the surgical pre-admission clinics and two general surgical wards at a large tertiary teaching hospital. Measures were undertaken at the pre-admission appointment, during acute admission (day 4-6), and/or at post-discharge follow up appointment. HGS was measured using a single Jamar® hydraulic hand dynamometer following the standardised positioning and instruction prescribed by the American Society of Hand Therapists, and recorded as the mean of 3 trials. Impaired HGS was defined as a value below the lower limit of the 95% CI of the mean from age-, gender- and side-specific normative data.[1,2]

Nutritional status was assessed by a trained dietitian using the Patient-Generated Subjective Global Assessment (PG-SGA), with malnutrition defined as a global rating of SGA-B or –C. Dichotomised HGS and PG-SGA measures were used to determine diagnostic accuracy. Mean HGS of malnourished and not malnourished patients was compared at each time point by independent samples t-test, with standardised HGS calculated by converting observed HGS to a percent of the lower limit of the 95% CI of the mean.

### References

1. Bohannon, R.W., et al., Reference values for adult grip strength measured with a Jamar dynamometer: a descriptive meta-analysis. *Physiotherapy*, 2006. 92(1): p. 11-15.
2. Bohannon, R.W., et al., Average grip strength: a meta-analysis of data obtained with a Jamar dynamometer from individuals 75 years or more of age. *Journal of geriatric physical therapy*, 2007. 30(1): p. 28.
3. Šimundić, A.M., Measures of Diagnostic Accuracy: Basic Definitions. *Journal of the International Federation of Clinical Chemistry and Laboratory Medicine*, 2009. 19(4): p. 203-211.

## Results

A total of 99 patients (mean age 73.5 (SD 6.4) years, 60% male) were recruited, corresponding to 30 pre-admission, 74 acute and 36 post-discharge measures. Impaired HGS was not able to accurately identify malnutrition in pre-admission, acute or post-discharge patients (Table 1). When mean standardised HGS was compared between malnourished and not malnourished groups, a difference was observed at post-discharge follow up only (96.0% (SD 8.6%) vs 108.2% (SD 20.7%), *p*=.017).

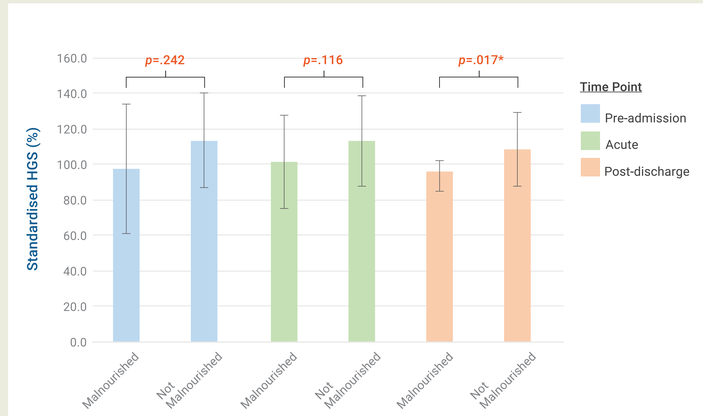
Table 1. Ability of hand grip strength to predict malnutrition as measured by the Patient-Generated Subjective Global Assessment

| Time point PG-SGA | Sensitivity (95% CI) | Specificity (95% CI) | PPV (95% CI) | NPV (95% CI) | AUC | AUC interpretation |
|---|---|---|---|---|---|---|
| **Pre-admission** | 60% (15% - 95%) | 68% (47% - 85%) | 27% (6% - 61%) | 89% (67% - 99%) | 0.360 | Test not useful |
| **Acute** | 50% (23% - 77%) | 68% (55% - 80%) | 27% (12% - 48%) | 85% (72% - 94%) | 0.408 | Test not useful |
| **Post-discharge** | 60% (26% - 88%) | 62% (41% - 80%) | 38% (15% - 65%) | 80% (56% - 94%) | 0.392 | Test not useful |

Abbreviations: PPV, positive predictive value; NPV, negative predictive value; AUC, area under the receiver operating characteristic curve.

AUC interpretation based on the following cut points: 0.8-1.0=Excellent/very good; 0.6-0.8=Good/sufficient; 0.5-0.6=Poor; <0.5=Test not useful[3]

Figure 1. Mean (SD) standardised (percent of the lower limit of the 95% confidence interval of the mean from age-, gender- and side-specific normative data) hand grip strength in malnourished and not malnourished patients at different time points




* Difference significant (*p*<.05)

## Conclusion

As a standalone measure, HGS was not found to be a suitable surrogate measure of nutritional status before, during or after admission to surgical wards in an older population. As such, assessment of nutritional status via validated tool by an appropriately trained clinician remains the preferred method.

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