PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Malnutrition and its association with readmission and death within 7 days and within 8 to 180 days post-discharge in older patients: a prospective observational study
AUTHORS	Sharma, Yogesh; Miller, Michelle; Kaambwa, Billingsley; Shahi, Rashmi; Hakendorf, Paul; Horwood, Chris; Thompson, Campbell

VERSION 1 – REVIEW

REVIEWER	Heather Yeo NYP-Weill Cornell Medicine USA No Competing Interest
REVIEW RETURNED	08-Aug-2017

GENERAL COMMENTS	Agarwal, Ekta, et al. "Malnutrition and poor food intake are associated with prolonged hospital stay, frequent readmissions, and greater in-hospital mortality: results from the Nutrition Care Day Survey 2010." Clinical Nutrition 32.5 (2013): 737-745002E Lobo, Támer G., López MD Ruiz, and de la Cruz AJ Pérez. "Hospital malnutrition: relation between the hospital length of stay and the rate of early readmissions." Medicina clinica 132.10 (2009): 377-384. Lim, Su Lin, et al. "Malnutrition and its impact on cost of hospitalization, length of stay, readmission and 3-year mortality." Clinical nutrition 31.3 (2012): 345-350. Stratton, Rebecca J., et al. "'Malnutrition Universal Screening Tool'predicts mortality and length of hospital stay in acutely ill elderly." British Journal of Nutrition 95.2 (2006): 325-330. Herrmann, FranÇois R., et al. "Serum albumin level on admission as a predictor of death, length of stay, and readmission." Archives of Internal Medicine 152.1 (1992): 125-130. Overall an important topic, but the findings are not novel nor is the population larger than previous data. There is not clear new contribution to the literature. In addition, this is a small sample of admissions for many different reasons, it doesn't really talk about other issues that go along with malnutrition (eg. Cancer or other diagnoses that may be the cause of malnutrition in the first place). More details on the malnutrition might make this more interesting.

REVIEWER	Dr. Sami Hamdan Alzahrani Family and Community Medicine Department, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia
REVIEW RETURNED	25-Aug-2017

GENERAL COMMENTS	Thank you for asking me to review this manuscript for BMJ open. This is a very important, interesting and carefully written research paper on the relationship between malnutrition and readmission (early or delayed) or death rate among elderly patients. It covers an important and still under investigated research focus (malnutrition and readmission patterns during 0-7 days and up to 180 days post-discharge). This paper takes an important step forward in the covered research field, advances understanding of the topic and can contribute new knowledge to what is already known. Hence, I am very thankful for reviewing this paper and I find it very stimulating while taking a step forward in the covered research field. Thus, I really would like to see it published after the revisions indicated in my comments to the authors. ABSTRACT Objective The relationship between admission nutritional status and clinical outcomes following hospital discharge is not well established. This study investigated whether older patients' nutritional status at admission predicts unplanned readmission or death in the very early or late periods following hospital discharge. Design, setting and participants The study prospectively recruited 297 patients ≥ 60 years old who were presenting to the General Medicine Department of a tertiary care hospital in Australia. Nutritional status was assessed at admission by using the Patient Generated Subjective Global Assessment (PG-SGA) tool, and patients were classified as either nourished (PG-SGA class A) or malnourished (PG-SGA classes B and C). A multivariate logistic regression model was used to adjust for other covariates known to influence clinical outcomes and to determine whether malnutrition is a predictor for early (0-7 days) or late (8-180 days) readmission or death following discharge. Outcome measures The impact of nutritional status was measured on a combined endpoint of any readmission or death within 0-7 days and between 8-180 days following hospital discharge. Results Within seven days following discharge, 29 (10.5%) patients had an unplanned readmission or death, whereas an additional 124 (50.0%) patients reached this combined endpoint within 8-180 days post-discharge. Malnutrition was associated with a significantly higher risk of combined endpoint of readmissions or death, both within seven days (OR 4.57, 95% CI 1.69-12.27, $p < 0.001$) and within 8-180 days (OR

	1.98, 95% CI 1.19-3.28, p = 0.007) following discharge, and this risk remained significant even after adjustment for other covariates. Conclusions Malnutrition in older patients at the time of hospital admission is a significant predictor of readmission or death, both in the very early and in the late periods following hospital discharge. Nutritional state should be included in future risk-prediction models. Strength and limitations of this study The research was a large prospective observational study evaluating the association between nutritional status and readmission or death in medical inpatients ≥ 60 years old. • A dietician used a comprehensive and valid nutritional assessment tool to confirm the malnutrition diagnosis. • Readmissions presenting to all other hospitals were captured. • The single-centre study included only older medical patients. INTRODUCTION Recent decades have witnessed a vast improvement in life expectancy, leading to an increasing number of older patients with multiple chronic problems. While the number of beds for acute patients has declined, unplanned hospital admissions have increased, particularly among the elderly.[1] Older patients with multiple comorbid illnesses experience poor clinical outcomes after hospital discharge, including recurrent unplanned readmissions and mortality.[2] Adverse outcomes following discharge may be indicative of unresolved acute illness, ongoing chronic illness and the development of new medical problems or gaps in outpatient care.[3-5] Although adverse outcomes following discharge are not totally preventable, studies suggest that targeted intervention, such as improved discharge planning with a focus on transitional care services, may provide beneficial results.[6] The likelihood of an unplanned admission is highest in the immediate post-discharge period.[7] There may be advantages in predicting readmissions that occur shortly after discharge. However, most studies have only assessed readmission patterns within 30 days of discharge, and few studies have examined readmission patterns up to 180 days post-discharge. Grahams et al. have suggested that different risk factors may be responsible for very early and late readmissions and that each type of readmission needs differently targeted interventions that can only be implemented in advance if predictive factors are identified.[8] Readmission and mortality risk prediction is a complex endeavour and remains poorly understood. A recent meta-analysis of 26 readmission risk-prediction models for medical patients tested in a variety of populations and settings was used for comparing different hospitals and the appropriate applications of transitional care services; the analysis found these models had a poor predictive ability and suggested a need for high-quality data sources that include clinically relevant variables.[9] None of the studies included in this meta-analysis considered patients’

	nutritional status during index admission as a determinant of readmissions. Studies suggest that up to 30% of hospitalised patients may be malnourished at the time of admission and that malnutrition has a negative impact on convalescence and reduces resistance to future infections and diseases, causing poor clinical outcomes.[10-12] However, few studies have assessed the association between nutritional status at admission and clinical outcomes in the very early and the late periods following hospital discharge. Furthermore, most of these studies are retrospective, and the use of a comprehensive nutritional assessment tool, like the Patient Generated Subjective Global Assessment (PG-SGA), to diagnose malnutrition is rare. Therefore, this study was designed to determine whether nutritional status at admission, as diagnosed by a qualified dietitian using PG-SGA, influences a combined clinical outcome of readmission or mortality within seven days and between 8-180 days following hospital discharge and whether malnutrition could be used as one of the predictors of early and late readmissions and death. METHODS Study design and population This prospective cohort study included patients ≥ 60 years of age admitted to the Department of General Medicine of a large tertiary care hospital in Australia (Flinders Medical Centre, 520 beds) between August 2014 and March 2016. The exclusion criteria were refusal or inability to give informed consent, patients referred to palliative care and non-English-speaking patients, who were excluded due to a lack of funds to hire an interpreter. Ethical approval was obtained from Southern Adelaide Human Research Committee (SAC HREC; approval number 273.14-HREC/14/SAC/282) on 21 July 2014. This observational cohort study did not perform s sample size calculation and limited the sample size to the resources available. Outcomes The study's primary outcome was a combined endpoint of either the first unplanned readmission to any of the acute-care hospitals in the state of South Australia or death within 0-7 days and between 8-180 days after hospital discharge. In this study, unplanned readmission was defined as any unscheduled hospitalisation to any hospital in the state of South Australia that was not for a planned investigation (e.g. elective endoscopy) or non-emergent treatment (e.g. planned drug infusion). The primary endpoint of readmissions or deaths were recorded from a central computer database, which captures these events for all state hospitals. Nutritional status assessment After obtaining written informed consent from patients, a member of the research team performed nutritional screening using the Malnutrition Universal Screening Tool (MUST), and all patients

	were then referred to a qualified dietitian for confirmation of nutritional status by PG-SGA. The PG-SGA13 generates a numerical score while also providing an overall global rating divided into three categories: well nourished (PG-SGA A), moderately malnourished or suspected of being malnourished (PG-SGA B) or severely malnourished (PG-SGA C). For each PG-SGA component, points (0-4) are awarded depending on the impact on nutritional status. Component scores are combined to obtain total scores that range from 0-35, with scores ≥ 7 indicating a critical need for nutritional intervention and symptom management.[14] The three different dietitians who were involved in the assessment of nutritional status using the PG-SGA received training prior to the study's commencement. The PG-SGA classes were divided into two categories by combining PG-SGA classes B and C into the malnourished category for easily interpreting patients as nourished (PG-SGA class A) and malnourished (PGSGA classes B and C). Furthermore, PG-SGA scores were split into a categorical variable with a PG-SGA score of < 7, indicative of no critical need for nutrition intervention, and ≥ 7, indicating critical need for intervention. Covariates Several known variables that can influence outcomes after hospital discharge were recorded at the baseline. Sociodemographic data, number of hospitalisations during the six months before index admission and clinical information were recorded at the baseline. Comorbidity was assessed with the Charlson comorbidity index, and the total number of medications were recorded at the time of admission. Health-related quality of life (HRoL) was assessed using the EuroQoL 5 dimensions 5 level (EQ-5D 5L) questionnaire, a simple, self-administered instrument that can distinguish between 3,125 states of health.[15] A UK-specific algorithm developed using time-trade-off techniques was used to convert the EQ-5D 5L health description into a valuation ranging from -0.281 to 1.[16] A visual analogue scale (VAS) score, which provides an unweighted measure of HRoL, can also be calculated from the questionnaire. The main diagnosis of index admission was retrieved from medical records and divided into seven categories according to the system affected: (1) respiratory disease, (2) cardiovascular disease, (3) neuropsychiatric disease, (4) gastrointestinal disease, (5) falls, (6) renal disease and (7) miscellaneous diseases, including infections. The index admission's acuity was gauged from the total number of medical emergency response team calls and the number of hours spent in the intensive care unit (ICU). Length of hospital stay (LOS) was determined from the day of admission to the day of discharge. The study recorded any unplanned hospital presentations to any of the hospitals in South Australia within 0-7days and between 8-180 days after hospital discharge, as well as any recorded deaths at the same time points, using the central hospital computer database. Statistics Demographic variables were assessed for normality using a skewness and kurtosis (sk) test. Data are presented as mean (SD) or median (IQR), and student t-test and rank-sum

	tests were applied as appropriate. Categorical variables are expressed as frequency and percent and compared using Pearson's x2 or Fisher's exact test as appropriate. Univariate logistic regression was used to assess the association between nutritional status and the combined endpoint of unplanned readmission or death within seven days and between 8-180 days post-discharge. In a multivariate logistic regression analysis, the relationship between readmission/death and nutrition status at admission was adjusted for other variables: age, gender, Charlson index, principal diagnosis at presentation, number of medications at admission, length of hospital stay, number of medical emergency response team calls during index admission and total number of hours spent in the ICU. Variance inflation factor and tolerance values were used to detect collinearity between variables included in the model.[17] A link test was used to confirm that the linear approach to model the outcome was correct. Model fit was assessed using the Hosmer-Lemeshow goodness-of-fit test. A Kaplan Meier survival curve was plotted from time of discharge to the first onset of any of the primary outcomes to detect the proportion of patients who did not experience the primary outcome. A log-rank test was used to compare survival proportions in the nourished and malnourished groups. A two-sided $p < 0.05$ was considered to indicate statistical significance. All analysis was performed using STATA version 13.1. RESULTS This study recruited 297 patients, and nutrition status, as determined by PGSGA, was available for 277 patients. Mean age was 80.3 years (SD 8.7, range 60-97), and 178 (64.3%) of the patients were females. Patients had multiple comorbidities (mean number of comorbidities 6.2, SD 2.7, range 0-16), and the mean Charlson comorbidity index was 2.3 (SD 1.8). Median length of stay for index hospitalisation was 7.0 (IQR 3.4-14.6) days. Within seven days after discharge, 29 (10.5%) patients had an unplanned readmission or death (primary endpoint). Among the 29 patients who had a primary endpoint within seven days, 13 (44.8%) had been previously readmitted prior to the index admission. The primary endpoint occurred in 124 (50.0%) patients within 8-180 days post-discharge, and 69 (55.7%) of these patients had been admitted in the six months prior to the index admission. Patients who were malnourished at the time of index admission were significantly older ($p = 0.001$), had lower quality of life ($p = 0.03$) and stayed longer ($p = 0.02$) in the hospital as compared to the nourished patients. Respiratory illness, miscellaneous diseases including sepsis and cardiovascular diseases were the three main diagnoses during index hospitalisation, with 86 (28.9%), 67 (22.6%) and 55 (18.5%) cases, respectively. Association of malnutrition with very early and late unplanned readmissions and mortality Table 1 shows the baseline characteristics according to the occurrence of combined

	endpoint of readmission or death within 0-7 days and 8-180 days of discharge, respectively. Malnutrition risk, as determined by the MUST score, and the classification of patients as being malnourished per PG-SGA class were significantly higher in subjects who developed the combined endpoint both within 0-7 days (83% vs 51%) and 8-180 (60% vs 43%) days post-discharge ($p < 0.05$). Similarly, a significantly higher proportion of patients who were in critical need of nutrition therapy (as indicated by PG-SGA score of ≥ 7) at the time of index admission suffered the combined endpoint both within 0-7 days ($p = 0.002$) and 8-180 days ($p=0.02$) following hospital discharge (Table 1). Malnutrition was associated with a higher risk of combined endpoint of readmissions and death within seven days after discharge (OR 4.57, 95% CI 1.69-12.27, $p < 0.001$). After adjusting for covariates, including age, gender, Charlson index, LOS, number of medications, principal diagnosis at current admission and hours spent in the ICU during index admission, the association was even stronger for the combined endpoint (OR 5.01, 95% CI 1.69-14.75, $p = 0.009$; Table 2). Similarly, between 8-180 days post-discharge, malnourished patients had higher odds to have a combined endpoint of readmission and death (OR 1.98, 95% CI 1.19-3.28, $p = 0.007$), and this remained significant even after adjustment for the above covariates (OR 1.97, 95% CI 1.12-3.47, $p = 0.002$; Table 2). The p-value for the Hosmer-Lemeshow goodness-of-fit was > 0.05 for both the adjusted models, indicating a good fit. The variance inflation factors and tolerance were near 1.00 for all variables, excluding significant collinearity. The link test confirmed that the linear approach to model the outcomes was correct. The Kaplan Meier survival curve (Figure 1) shows that the nourished group had significantly fewer readmissions and deaths at 180 days than the malnourished group (log rank $chi2 = 0.11$, $p < 0.001$). DISCUSSION The present study's results indicate that malnutrition at admission, as determined by the PG-SGA, was a significant predictor of a combined endpoint of readmission or mortality in older general-medical patients, during both the early and late periods after hospital discharge. Malnutrition was associated with an almost four-fold increased risk of readmission or mortality within seven days after discharge, and the risk almost doubled between 8-180 days after discharge. Malnutrition remained a significant predictor even after adjustment for other covariates that could have influenced the clinical outcome. One appealing explanation for these results is that the acute condition responsible for the index admission weakens the patient's overall health, and malnutrition further compounds this problem with a consequent higher risk of complications or the exacerbations of previously

	stable comorbidities.[18] The post-discharge period is a fragile period, referred to as 'post-hospital syndrome'.[19] This syndrome has been described as a period of vulnerability due to impaired physiological systems, depleted reserves and lower body resistance against health threats, on top of the recent acute illness responsible for the index admission. The current study's results introduce another dimension to this theory: impaired nutritional status may play a significant role in the post-discharge period beyond seven days. The acute illness and the stress of the index admission may exacerbate the malnutrition, possibly inducing a relapse or predisposing the patient to new acute illnesses that increase the risk of readmission or mortality.[20] The present study's results are in line with Mogensen et al., who found that malnourished patients who survived intensive care admission had higher 90-day mortality (OR 3.72, 95% CI 1.2-6.3) and that malnutrition was a significant predictor of their 30-day unplanned hospital readmission.[21] Studies in heart-failure patients have suggested that malnutrition may contribute to the progression of the underlying heart disease, due to low-grade inflammation leading to poor outcomes, and was a significant predictor of readmissions.[22] Older general-medical patients are known to have substantial long-term morbidity and mortality. Known risk factors for adverse events following discharge include multiple comorbidity, severity of index admission and institutional care rather than domiciliary care.[2, 23] Hospital readmissions represent a multifaceted problem that require a better understanding.[18] Presumably, there are other unknown factors that influence patient outcomes after discharge. The present study illustrates that early and late post-discharge patient outcomes appear to be associated with the presence of malnutrition during admission. While causation cannot be inferred from an observational study, the malnutrition post-discharge outcome has biological plausibility. To date, no study has included nutritional status in the development of a predictive tool for readmissions, and this area needs further research. Studies do suggest that nutritional intervention initiated early during hospitalisation, by providing high-energy protein supplements with a continuation post-hospital discharge, does have a favourable impact on nutritional parameters and reduces the length of hospital stays; however, its impact on mortality and readmissions is unclear, and such an intervention may be too late for some.[24, 25] While the ideal intervention to improve nutritional status in hospitalised patients has yet to be identified, the solution may lie in recognising and managing malnutrition in the community before any hospital admission.[26] LIMITATIONS This study has several limitations. First, it is a single-centre study in a tertiary care hospital. The case mix of patients discharged from this hospital may differ from that of other hospitals; thus, the results may not be generalisable, particularly to community hospitals, although it is likely to be similar to other academic hospitals in Australia. The study was unable to adjust its analysis for functional status or other factors, such as appropriateness of

	drugs, clinical stability at discharge or social factors that might influence readmission. This study involved older general-medical patients who frequently suffer from multiple comorbidities, and our results may not be applicable to relatively younger sub-speciality patients with single organ system involvement. One of the study's strengths is that it was a prospective study and that the malnutrition diagnosis was confirmed by a dietitian using a comprehensive nutrition assessment tool. The study also assessed all readmissions in all state hospitals, unlike some other studies that were only able to capture readmissions to a single hospital. IMPLICATIONS This study has several implications. Transitions of care should focus not only on the acute condition but also on the patient's nutritional status, because the latter may increase the risk of readmission or death. There is a need for future well-designed studies to examine the beneficial effects of an intervention targeting malnutrition and whether this intervention prevents readmissions and mortality. In the interim, nutritional intervention should be most effective if begun early during admission, and it should be continued in the community following discharge by referral to either a community dietitian or a follow-up at an outpatient dietetic clinic. Overall, public health policies to optimise the nutrition of those over 60 years of age may result in a reduction in healthcare utilisation. CONCLUSION Impaired nutritional status at admission predicts poor clinical outcomes in both early and late post-discharge periods, as determined by readmissions and mortality in older general-medical patients, and a targeted nutritional intervention may prove beneficial in malnourished patients.

VERSION 1 – AUTHOR RESPONSE

Reviewer 1:
We thank reviewer for the comments. We think this paper is unique as we have used PG-SGA -a highly sensitive and specific tool for diagnosis of malnutrition and have conducted this study in older general medical patients, with multiple co-morbidities including cancer and this study may aid in future development of readmission prediction tools with emphasis to include nutrition status in prediction models.

We acknowledge relatively small sample due to limited resources to avail services of the dietitian and we have added more information about malnutrition as suggested by the reviewer with a new supporting reference.

" Older patients are at a high risk of malnutrition than others and reasons for poor nutritional status in this group are multifactorial and include physiological, social and psychological factors which affect food intake and weight and this is further exacerbated by underlying medical illness."(14)
14. Kruizenga HM, Wierdsma NJ, van Bokhorst MA, et al. Screening of nutritional status in The Netherlands. Clin Nutr 2003;22:147-52.

Reviewer 2:

The under review manuscript titled “Malnutrition and its association with readmission and death within 7 days and 180 days post-discharge in older patients-a prospective study”

Comment: Thank you for asking me to review this manuscript for BMJ open. This is a very important, interesting and carefully written research paper on the relationship between malnutrition and readmission (early or delayed) or death rate among elderly patients. It covers an important and still under investigated research focus (malnutrition and readmission patterns during 0- 7 days and up to 180 days post-discharge). This paper takes an important step forward in the covered research field, advances understanding of the topic and can contribute new knowledge to what is already known.
I do have some concerns about this paper. The comments/ suggestions are given below:

TITLE

The title is nice, but there is need to replace hyphen with colon

Malnutrition and its association with readmission and death within 7 days and 180 days post-discharge in older patients: a prospective study. (within 7 days and 180 days) may be changed to (within 7 to 180 days)

Response: We have made changes in the title as suggested by the reviewer so that the title is more clear now.

“Malnutrition and its association with readmission and death within 7 days and within 8 to 180 days post-discharge in older patients: a prospective observational study”

INTRODUCTION

The rationale and objective of the study are well mentioned.
The sufficient and relevant references have been given in the introduction.
Lines 37-41: (However, the majority of studies have only assessed readmission patterns within 30 days of discharge and very few studies have studied readmission patterns up to 180 days post-discharge.) There are no references for those studies assessing end points at 30 to 180 days of discharge.

Response: We have added a new supporting reference as advised by the reviewer.

“Prescott HC, Sjoding MW, Iwashyna TJ. Diagnoses of early and late readmissions after hospitalization for pneumonia. A systematic review. Ann Am Thorac Soc 2014;11:1091-100.doi:10.1513/AnnalsATS.201404-142OC”

METHODS

STUDY DESIGN AND POPULATION

It’s well written.
Exclusion and inclusion criteria are given and explained. The ethical approval was taken from the relevant committee.
Page 7, Lines 3-5: (The exclusion criteria were refusal or inability to give informed consent, patients referred to palliative care and non-English speaking patients) this is a big concern in order to provide a complete vision of the problem among all community components, where sociodemographic characteristics have a big effect on nutrition status.

Response: We excluded some of the patient groups as this was an unfunded study to seek services of an interpreter and palliative patients were excluded due to limited life expectancy.

Comment: Lines 12-16: (For this observational cohort study we did not perform sample size calculation and limited our sample size to the resources available). Nevertheless, sample size had to be calculated / adjusted and insufficiency of resources led to the shortness of the sample at this number mentioned was not referenced by previous studies. (see above)

Response: We have included the sample size and reworded this as advised by the reviewer.

Comment: “The required sample size for this study, calculated on the basis of a previous study showing early readmission rate of 7.8%, was estimated at five hundred and sixty nine patients but insufficient resources led to the recruitment of only two hundred and ninety seven patients.)”

Response: By index hospitalization we mean current hospital admission and we have now clarified this in the text. We included admissions within 8-180 days as late admissions as admissions only at a specific time point of 180 days could have led to a significant number of patients who were readmitted bit earlier been missed!

NUTRITIONAL STATUS ASSESSMENT

Comment: Line 50: The Must test was not described especially its necessity as it was followed by PG-SGA. There might be a confusion that needs clarification concerning the process of nutritional assessment; one of the authors is a dietician who performed the Must test, then patient were seen by

qualified dietitians to perform PG-SGT (which is Patient generated Subjective test) and those three qualified dieticians needed training beforehand (line 19)

???, . The test is mainly a patient generated one, a subjective test, and the results generated by three different persons. How was the procedure managed, each patient was seen by the 3 dietitians, if yes what was the agreement level among them, if each dietitian was assigned a certain number of patients this should be mentioned and the inter rated difference should be addressed.
The classification of the levels of malnutrition might need some justification; the level comprises suspected malnourished besides moderate malnourished (level B) which was added to severely malnourished group (level C). This led to the great discrepancy in the numbers of malnourished and nourished.

Response: MUST is a screening tool that can be performed by any person and needs little training whereas PG-SGA is usually performed by the dietitians, who received training before the start of this study. MUST was followed by PG-SGA as sensitivity of MUST is around 70%(1) and MUST is used as a screening test in our hospital and is usually performed by the nursing staff at admission in our hospital. It was ensured by the research team that MUST has been completed and then the participant was referred to the dietitians, who received training before the start of the study in performance of PG-SGA. This has been now documented in the paper.
We have modified this section to clarify this as suggested by the reviewer.

“After obtaining written informed consent from patients, it was ensured that nutrition screening with Malnutrition Universal Screening Tool (MUST) had been completed. It is a standard policy in our hospital to screen all patients with MUST at the time of admission. MUST includes a body mass index (BMI) score, a weight loss score, and an acute disease score and classifies patients has low, moderate or high risk of malnutrition.(2) Following this, all participating patients were then referred to a qualified dietitian for confirmation of their nutrition status by PG-SGA.”

We combined PG-SGA class B and C as malnourished for ease of classification and previous studies have also combined these two classes and dichotomized PG-SGA class into a binary variable.(3)

RESULTS:

Comment: Page 10, line 36-40, better if you attached the main items your stressed regard scores of nutritional assessments in this age group. you did not refer to the patient’s sex, male and female if this factor has an effect also epidemiological factors such as Financial support and type of home care must be recommended in the study

Response: We have added this information as advised by the reviewer.
“Mean age was 80.3 years (SD 8.7, range 60-97) with 178 (64.3%) being female and the majority of patients came from home. There was no difference in nutrition status between males and females (mean PG-SGA score 9.7 (SD 5.8) vs. 9.2 (SD 5.3), p=0.44) in males and females respectively) and the nutrition status of patients who came from a nursing home was similar to those who came from home (mean PG-SGA score 9.0 (SD 4.5) vs. 9.4 (SD 5.6), p=0.70) in nursing home and patients from home, respectively).”

Comment: Line 43, why the researcher used the mean value for the number of comorbidities, what does it mean 6.2 comorbidity?

Response: This is the average number of comorbidities per patient.
Page 13, line 37 the chi2 value is written .11 while in the figure it is 11.4. Which one is correct?

Response: correct number is chi2=11.4 and this has been rectified.
The results explained about table 2 are not shown in the table. Therefore, table no 2 is a little bit difficult to understand. There is need to show the adjusted and unadjusted OR in the table.
There is need to mention the significant p-value for each parameter separately.
Response: We have split this table into two now (Table 2 and Table 3) and have shown unadjusted and adjusted odds ratios with p values as suggested by the reviewer.

DISCUSSION

Comment: It is nicely written, and the researchers have defended their results by appropriate references.
The discussion section still needs few relevant and updated references, for example (Alzahrani and Alamri BMC Geriatrics (2017) 17:136).
The limitations are well mentioned.
The derived conclusion from the results is good.

Response: We thank reviewer for suggesting the latest reference and this has been inserted in the discussion section.

REFERENCES
Comment: The format of references needs to be uniform. Few references have complete name of the journal while others have abbreviated names. In ref 5 Jama should be written as JAMA.
In reference no 7, NEJM should be written in abbreviated form or complete form with first word starting with a capital alphabet. In reference no 13, journal name needs to be written correctly.
Please check all references. Few more recent references need to be added.

Response: We have corrected the references and new references have been updated.

ENGLISH:

Comment: The manuscript has several punctuations and grammatical errors. These should be corrected.
Suggestions are sent in an additional file.

Response: We thank reviewer for the corrections and these has been rectified as suggested.

Conclusion of the review

Hence, I am very thankful for reviewing this paper and I find it very stimulating while taking a step forward in the covered research field. Thus, I really would like to see it published after the revisions indicated in my comments to the authors.

1. Sharma Y, Thompson C, Kaambwa B, et al. Validity of the Malnutrition Universal Screening Tool (MUST) in Australian hospitalized acutely unwell elderly patients. Asia Pac J Clin Nutr 2017;26:994-1000. doi: 10.6133/apjcn.022017.15 [published Online First: 2017/09/18]
2. Stratton RJ, King CL, Stroud MA, et al. 'Malnutrition Universal Screening Tool' predicts mortality and length of hospital stay in acutely ill elderly. Br J Nutr 2006;95:325-30. [published Online First: 2006/02/14]
3. Abbott J, Teleni L, McKavanagh D, et al. A novel, automated nutrition screening system as a predictor of nutritional risk in an oncology day treatment unit (ODTU). Support Care Cancer 2014;22:2107-12. doi: 10.1007/s00520-014-2210-7 [published Online First: 2014/03/22]

VERSION 2 – REVIEW

REVIEWER	Dr. Sami H. Alzahrani Family and Community Medicine Department, Faculty of Medicine, King Abdulaziz University No Competing Interest
REVIEW RETURNED	04-Oct-2017

GENERAL COMMENTS	Thank you for asking me again to review this manuscript for BMJ open. My thanks and appreciation to the authors for responding to the comments and the suggestions that were given. I recommend accepting the revised copy of this manuscript.