

POOR APPETITE IS ASSOCIATED WITH SIX MONTH MORTALITY IN HOSPITALISED OLDER MEN AND WOMEN

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Abstract: *Objectives:* Appetite loss is common in hospitalised older individuals but not routinely assessed. Poor appetite in hospital has previously been identified as predictive of greater mortality in the six months following discharge in a single study of female patients. The present study aimed to assess this association in a larger sample including both hospitalised men and women. *Design:* Longitudinal observational study with six month follow up. *Setting:* Acute hospital wards in a single large hospital in England. *Participants:* Older inpatients aged over 70 years. *Measurements:* Appetite was assessed using the Simplified Nutritional Appetite Questionnaire (SNAQ) during hospital stay. Deaths during six month follow-up period were recorded. Association between SNAQ score during hospital admission and death 6 months post-discharge was assessed using binary logistic regression in unadjusted and adjusted analysis. *Results:* 296 participants (43% female, mean age 83 years (SD 6.9)) were included in this study. Prevalence of poor appetite (SNAQ score <14) was 41%. In unadjusted analysis a SNAQ score of <14 was associated with a 2.47 increase in odds of mortality at six months (OR 2.47 (95% CI 1.27,4.82)). This association remained after adjusting for number of comorbidities (Charlson index), length of stay and gender (OR 2.62 (95% CI 1.30, 5.27)). In unadjusted continuous analysis, every one point decrease in SNAQ score led to a 1.20 fold increase in odds of mortality at six months (OR 1.20 (95% CI 1.06-1.36)). This association remained in adjusted analysis (OR 1.22 (95% CI 1.07-1.39)). *Conclusion:* Poor appetite is common in hospitalised older people. We have confirmed the association, previously reported in older women, between poor appetite during hospital stay and greater mortality at six months post-discharge but in a larger study including older men and women. Further research is needed to understand the mechanisms of poor appetite, which lead to increased mortality.

Key words: Appetite, older people, mortality, nutrition, hospitalised.

Introduction

Appetite loss amongst older individuals is common. Often this is related to medical conditions and their treatment, but can also be as a result of multifactorial age-related effects (1): the anorexia of ageing (2). The anorexia of ageing has been identified as a key determinant of frailty, sarcopenia and disability but remains under recognised (3, 4). Appetite loss has been shown to be present in over 20% of community dwelling older people (5, 6), rising in acute care with estimates ranging between 30% and 60% (7-12). Older individuals with poor appetite during hospital admission have greater rates of nosocomial infection and an altered eating pattern, particularly with a reduction in dietary protein intake (7, 10). There is also evidence of functional impact post-hospital discharge, such as reduction in muscle strength (9), which may reflect lower dietary protein intake.

We have previously reported findings from a longitudinal study that poor appetite in 179 hospitalised older women was predictive of mortality over six months (10). Appetite was assessed using the Simplified Nutritional Appetite Questionnaire (SNAQ) (13). A SNAQ score of <14 (indicative

of poor appetite) was associated with over twice as many deaths in the six month period post hospital discharge (10). However, the findings of this single study were limited by an all-female population and small sample size. In the present study we address these limitations; we report on the association between poor appetite in hospitalised older people and mortality at six months post hospital discharge in a larger sample that included both men and women.

Methods

Study population

Data from two studies of hospital patients (carried out between 2014 and 2017 in the same hospital departments), that evaluated the impact of volunteer assistance at mealtimes (14) and with mobility (15), were combined. These studies had comparable minimum data sets and data collection methods; full details of the studies can be found in reports by Howson et al (14), and Lim et al (15). In both studies, participants were aged over 70 years and had been admitted (non-electively) to acute wards within one large hospital in England.

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Table 1
 Population Characteristics

Variable	Median (IQR)		
	Total (n=296)	Males (n=169)	Females (n=127)
Age*	82.7 (6.9)	82.5 (6.7)	82.9 (7.3)
Usual residence prior to admission\$			
Own home	278 (93.9)	161 (95.3)	117 (92.1)
Sheltered accommodation	9 (3.0)	4 (2.4)	5 (3.9)
Care home	9 (3.0)	4 (2.4)	5 (3.9)
Barthel Index	84 (68,97)	88 (70,100)	79 (63,92)
Charlson Index	6 (4,7)	6 (5,8)	5 (4,8)
Number of medications	8 (6,11)	8 (6,11)	8 (6,11)
FRAIL scale	2 (1,3)	2 (1,3)	2 (1,3)
Grip strength (kg)	20 (14,26)	24 (19, 30)	14 (10,18)
Simplified Nutritional Appetite Questionnaire*	13.8 (2.6)	14.1 (2.5)	13.5 (2.6)
Body Mass Index	25 (21,28)	25 (22,27)	25 (21,29)
Malnutrition Universal Screening Tool\$			
Low risk	228 (80.0)	129 (79.6)	99 (77.95)
Medium risk	28 (9.8)	16 (9.9)	12 (9.45)
High Risk	29 (10.18)	17 (10.49)	12 (9.45)
Length of stay (days)	12 (6,21)	12 (6,20)	12.5 (6,22)
Deceased at 6 month follow up\$	42 (14)	31 (18)	11 (8.6)

*Reported as mean (standard deviation), \$Reported as frequency (percent)

Demographics and participant characterisation

Participant demographics were recorded on hospital admission including age, gender and usual residence (own home, sheltered accommodation and care home). Functional ability in activities of daily living was assessed by the Barthel Index, which gives a score of 1-100, a higher score reflecting greater functional ability (16). Medical conditions were recorded and used to calculate a Charlson co-morbidity index score, which is predictive of ten year survival (17). The number of medications on admission were also recorded. Frailty was assessed using the FRAIL scale, which categorises the states of robust, pre-frail and frail (18). Grip strength, with pre-defined cut offs of <16kg for women and <27kg for men (19), were used to identify probable sarcopenia (20). Nutritional markers included body mass index (BMI) and nutritional risk, from screening with the Malnutrition Universal Screening Tool (MUST), which categorises individuals as at low, medium or high risk of malnutrition. Length of hospital stay was recorded on discharge.

Appetite assessment

Appetite was assessed using SNAQ during hospital stay (13). This is a 4 item questionnaire with statements that cover aspects of appetite and eating, such as ‘my appetite is’ with Likert

responses such as ‘very poor, poor, average, good, very good’. The total score is out of 20 and a score of <14 in those aged >65 years is indicative of poor appetite (13).

Mortality assessment

Participants were followed up on the hospital electronic patient administration system at 6 months post discharge. All deaths up to six months were recorded as a binary outcome.

Statistical Analysis

Data from the two studies were combined and analysed using SPSS (SPSS IBM Corp version 24). The relationship between SNAQ score during hospital admission and mortality at 6 months was assessed using binary logistic regression in unadjusted and adjusted analyses. This analysis was performed using the SNAQ category of <14 to indicate poor appetite, and also with SNAQ as a continuous variable. The factors considered in the adjusted model were based on our previous study (10), and included length of stay, comorbidity index and gender.

Table 2
 Unadjusted and Adjusted Odds Ratios for Mortality Six Months Post Hospital Discharge

Variable	Unadjusted OR (95% CI)	P	Adjusted OR (95% CI)	P	Adjusted OR (95% CI)	P
SNAQ (per point decrease in score)	1.20 (1.06, 1.36)	.004	1.22 (1.07, 1.39)	.002		
SNAQ score <14	2.47 (1.27, 4.82)	.008			2.62 (1.30, 5.27)	.007
Charlson (per point increase)	1.25 (1.10, 1.44)	.001	1.23 (1.065, 1.42)	.005	1.22 (1.06, 1.41)	.006
Length of stay (per day increase)	1.02 (1.01, 1.04)	.012	1.02 (1.00, 1.04)	.021	1.02 (1.00, 1.04)	.019
Female gender	.42 (.20, .88)	.021	.41 (.19, .84)	.023	.423 (.20, .91)	.028

Results

301 participants were included in the two studies and SNAQ data was available for 296 (98%). The sample included individuals predominantly admitted from their own home (94%), with a mean age of 83 years (SD 6.9); 43% were female. The characteristics of the participants are summarised in Table 1. Participants were mostly pre-frail (median FRAIL scale 2 (IQR 1,3)), multi-morbid population (median Charlson index 6 (IQR 4,7)) with polypharmacy (median medications 8 (IQR 6,11)) and probable sarcopenia (median grip strength 14kg (IQR 10,18) for women, 24 kg (IQR 21,29) for men) with low level functional dependency (median Barthel index 84 (IQR 68,97)). They were considered at low nutritional risk (80%) and had a median BMI of 25 (IQR 21,28).

The prevalence of poor appetite (SNAQ <14) amongst these hospitalised older people was 41%, and of those with poor appetite 49% were female.

At 6 month follow up 42 patients (14%) were deceased, 11 of whom (26%) were female.

In unadjusted analysis, a SNAQ score of <14 was associated with a 2.47 increase in odds of mortality at six month follow up (OR 2.47 (95% CI 1.27,4.82) Table 2). This association remained after adjusting for number of comorbidities (Charlson index), length of stay and gender (OR 2.62 (95% CI 1.30, 5.27) Table 2). As age was not associated with mortality in unadjusted analysis (OR 1.01 (95% CI 0.96, 1.06)) it was not included in the adjusted model.

In unadjusted continuous analysis every one point decrease in SNAQ score lead to a 1.20 fold increase in odds of mortality at six months (OR 1.20 (95% CI 1.06, 1.36) Table 2). This association remained in adjusted analysis (OR 1.22 (95% CI 1.07, 1.39) Table 2).

Discussion

In this study we assessed the association between poor appetite during hospital stay and mortality at six months in a sample that included older men and women. Our findings confirm our previous report (10), of an association between poor appetite in hospital and greater mortality at six months post hospital discharge. However, the present report adds important new evidence, with this finding now demonstrated in a larger sample that included both older men and women,

making the results more generalizable.

In our previous report a SNAQ score of <14 was associated with over twice as many deaths in the six months post hospital discharge (Hazard Ratio 2.29) (10). In this analysis a score of <14 on the SNAQ was associated with a 2.47 fold increase in odds of mortality at six month follow up. Both studies highlight the utility of appetite assessment using the SNAQ tool, with a low score, indicative of poor appetite, linked to sizeable differences in mortality. Additionally, in this study we have used SNAQ in continuous analysis and have shown that every one point decrease in SNAQ score leads to a 1.20 fold increase in odds of mortality at 6 month follow up. This shows that even reductions in appetite above the defined cut off for a poor appetite (SNAQ <14) (13), are associated with greater mortality.

The prevalence of poor appetite in this sample was 41%, which sits within other estimates for hospitalised older individuals (7-12), and close to the previous study from older women at this UK hospital of 42% (10). These findings highlight the importance of assessing appetite in hospitalised older people as poor appetite is common. Establishing a unified approach to assessing appetite in older people in a clinical context is needed. We have demonstrated a high response rate to the simple 4-item SNAQ in this sample of hospitalised older people with a completion rate over 98%, which would indicate its utility in clinical practice.

Screening for poor appetite may be a useful approach to recognise individuals at risk of adverse health outcomes including our finding of greater mortality, who may not otherwise be identified by established nutritional screening tools (this population were predominantly categorised as low nutritional-risk), and when other measures of mortality risk such as the Charlson index, may be challenging to calculate in the clinical setting.

Further research is needed to understand the mechanisms of poor appetite which lead to worse healthcare outcomes. Weight loss and subsequent malnutrition is a recognised consequence of appetite loss (13, 21). However adverse health outcomes, such as sarcopenia and disability, have been identified in those with anorexia of ageing independent of nutritional health indices including BMI and weight loss (22, 23), this aligns with our findings of increased mortality in this population however

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we were not able to assess weight loss. Factors such as specific micronutrient deficiencies may also constitute potentially-modifiable mechanisms for poor health outcomes associated with low appetite (22).

Study limitations

This was a secondary data analysis on a combined dataset of two studies drawn from the same population, which used identical data collection methods over a three year period. This study has confirmed previously reported findings of an association between poor appetite in hospital and greater mortality but this is still limited to a population in southern England which is likely to represent a 'better functioning' set of hospitalised older people (as indicated by the Barthel index) so may underestimate prevalence of poor appetite, with implications for understanding the impact of its effects. The studies also excluded inpatients with dementia, a sub-population who may be at greater risk of anorexia. Other approaches, such as using oral intake or other proxy measures for appetite may be useful methods for studying this sub-population.

Conclusions

We have confirmed an association between poor appetite during hospital admission and greater mortality during the six months following hospital discharge in older men and women. Poor appetite was common (41%), in line with other estimates of hospitalised older individuals, and was associated with over twice the odds of mortality at six months independent of comorbidity, gender and length of hospital stay. Appetite was assessed using the SNAQ, a simple tool feasible to administer in the acute setting, which has important potential for use in clinical practice. Further research is needed to understand the mechanisms of poor appetite which lead to increased mortality.

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Ethical standards: The studies reported in this secondary data analysis were approved by the UK Health Research Authority- Southampton Mealtime Assistance Roll-out Trial: London- Chelsea Research Ethics Committee (14/LO/1363); Southampton Mobility Volunteer Study: South East Coast—Surrey Research Ethics Committee (15/LO/2091).

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