MEASURING APPETITE WITH THE SIMPLIFIED NUTRITIONAL APPETITE QUESTIONNAIRE IDENTIFIES HOSPITALISED OLDER PEOPLE AT RISK OF WORSE HEALTH OUTCOMES

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Abstract

Objectives—Poor appetite is commonly reported by older people but is rarely measured. The Simplified Nutritional Appetite Questionnaire (SNAQ) was validated to predict weight loss in community dwelling older adults but has been little used in hospitals. We evaluated it in older women on admission to hospital and examined associations with healthcare outcomes.

Design—Longitudinal observational with follow-up at six months.

Setting—Female acute Medicine for Older People wards at a University hospital in England.

Participants—179 female inpatients.

Measurements—Age, weight, Body Mass Index (BMI), grip strength, SNAQ, Barthel Index Score, Mini Mental State Examination (MMSE), Geriatric Depression Scale: Short Form (GDS-SF), Malnutrition Universal Screening Tool (MUST), category of domicile and receipt of care were measured soon after admission and repeated at six month follow-up. The length of hospital stay (LOS), hospital acquired infection, readmissions and deaths by follow-up were recorded.

Results—179 female participants mean age 87 (SD 4.7) years were recruited. 42% of participants had a low SNAQ score (<14, indicating poor appetite). A low SNAQ score was

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associated with an increased risk of hospital acquired infection (OR 3.53; 95% CI: 1.48, 8.41; p=0.004) and with risk of death (HR 2.29; 95% CI: 1.12, 4.68; p = 0.023) by follow-up.

Conclusion—Poor appetite was common among the older hospitalised women studied, and was associated with higher risk of poor healthcare outcomes.

Keywords

Appetite; older; hospital; inpatient; outcome measures

Introduction

Appetite is not routinely measured in hospitalised older people despite poor appetite being commonly reported (1), and leading to inadequate dietary intake and weight loss, which are associated with worse outcomes (2). A subjective sensory experience with wide inter and intra-individual variation, appetite is challenging to measure (3). The Simplified Nutritional Appetite Questionnaire (SNAQ) is validated to predict>5% weight loss in community dwelling older people (4). It has been used in hospitalised older people in Malaysia and Australia (5-8), but its association with healthcare outcomes has been little explored. We used the SNAQ to measure appetite and its association with healthcare outcomes among older women during an acute hospital admission and six months after discharge from hospital.

Methods

Setting and Subjects

This was an observational study with a six-month-follow-up. Consecutive patients admitted to two female acute medical wards for older people (46 beds) at a University hospital serving 1.3 million people in England were recruited. All patients were eligible except those who were unable to give informed consent, tube fed, nil by mouth or on the Liverpool Care Pathway for the Dying.

Data collection

Data was collected using standardised procedures. Participants were weighed in hospital using chair scales and at home using standing balance scales. Scales were calibrated at least six-monthly. Body Mass Index (BMI) was calculated using reported usual height. Grip strength was measured using a standardised technique (9) with a Jamar dynamometer (Lafayette Instrument Company, USA) to determine maximal grip strength. Appetite was assessed using SNAQ (maximum score 20, score <14 indicates poor appetite) (4).

Level of independence in activities of daily living was assessed using the Barthel Index (10) (maximum score 100, lower scores associated with increasing dependence). Cognitive function was assessed using the Mini Mental State Examination (MMSE) (11) (maximum score 30, <25 implies cognitive impairment). Mood was assessed using the Geriatric Depression Scale: Short Form (GDS-SF) (12). MUST was recorded routinely by ward staff: a score of 0 indicates low risk, 1 medium risk and ≥2 high risk of malnutrition (13).

Demographic information including domicile and receipt of care was abstracted from the medical records at admission and assessed by questionnaire at six months.

Measurements were taken a median 3 days after admission and repeated six months after discharge. Hospital acquired infections (Clostridium Difficile, Methicillin-Resistant Staphylococcus Aureus, Extended spectrum beta-lactamase (ESBL)-producing Enterobacteriaceae, chest infection, urinary tract infection, diarrhoea and vomiting, and pressure sores), LOS, readmission rates, and mortality over these six months were obtained from the hospital administration system.

Statistical analysis

Data were double entered and analysed using Stata (Stata Corp. College Station, TX, USA), release 13. Variables were assessed for normality and log transformed where appropriate. Differences between participants' characteristics at admission and at follow-up were assessed using paired t-tests, Wilcoxon signed ranks tests, chi-squared tests or Fisher's exact tests, as appropriate. The relationships between having poor appetite on admission to hospital (SNAQ <14) and healthcare outcomes were assessed using logistic regression, linear regression or Cox's proportional hazards models. Models were adjusted for LOS and number of co-morbidities.

Results

577 female patients were approached and 179(31%) recruited to the study, the most common reasons for declining were 'not interested', 'too much' or 'feel too unwell'. One of the 179 only completed 3 of the 4 SNAQ questions and was excluded from these analyses. 140(79%) of the remaining 178 were reassessed approximately six months after discharge from hospital (mean (SD) 5.9(0.5) months). Data were not collected on 38(21%) participants: 33(18%) had died, 3(2%) declined and 2(1%) were uncontactable.

The mean age of participants at admission was 86.6(SD 4.7) years. Admission diagnoses included shortness of breath 34(19%), falls 31(17%), chest pain 14(8%) and collapse 11(6%). Participants had a median of two co-morbidities, most commonly atrial fibrillation 15(8%), heart failure 14(8%), renal failure 13(7%), anaemia 13(7%), urinary tract infection 12(7%), falls 9(5%) and reduced mobility 9(5%). The mean LOS was 14.6(SD 2.0) days and 36(20%) of participants had a hospital acquired infection. At follow-up 79(49%) of participants had had a further hospital admission. The participants were significantly lighter at follow-up than admission (mean 62.4kg vs. 59.5kg), with a lower BMI (24.8kg/m2 vs. 23.8kg/m2), both p<0.001. 41% had lost >5% of their bodyweight by six month follow-up. At follow-up participants had a higher median Barthel score (p<0.001) for activities of daily living but a greater proportion were living in a care home or receiving care at home (Table 1).

Poor appetite (SNAQ score<14) was recorded in 42% of participants at admission and 38% at follow-up. Of participants who had poor appetite at admission 52% still had poor appetite at follow-up. Of those with satisfactory appetite at admission 30% had poor appetite at follow-up.

Poor appetite at admission was associated with admission clinical characteristics including lower weight and BMI, lower grip strength, lower Barthel Index score, higher GDS-SF score, and higher MUST score (Table 2).

Poor appetite at admission was associated with worse healthcare outcomes (Table 3). These were increased risk of contracting a hospital acquired infection (OR 3.53; 95% CI 1.48, 8.41; p=0.004) and of death by follow-up (HR 2.29; 95% CI 1.12, 4.68; p = 0.023). Lower grip strength at follow-up was also associated with poor appetite but this was attenuated by adjustment for LOS, time to follow-up and number of co-morbidities (regression coefficient −1.83; 95% CI −4.01, 0.34; p = 0.098). Poor appetite at admission was not associated with >5% weight loss at follow-up.

Discussion

This study used the SNAQ to assess appetite and its associations in acutely unwell older women soon after admission to hospital and at six months after discharge. Poor appetite was common in this population, occurring in 42% at admission and 38% at six-month-follow-up. On admission women with poor appetite were significantly lighter, had lower grip strength and were less independent in activities of daily living than women with adequate appetite. Six months after discharge from hospital half still had poor appetite. Importantly, poor appetite on admission was associated with worse outcomes: a three-fold increased risk of a hospital acquired infection and a two-fold increase in mortality at six-month-follow-up. Low SNAQ at admission was not associated with subsequent weight loss, receipt of care or admission to a care home.

SNAQ has been used to measure the prevalence of poor appetite in hospitalised older people in several countries. Poor appetite was found to be common, ranging from 31%-75%, although there were differences in the way SNAQ was used. The paper describing the development of SNAQ states that a cut off of <14 should be used for older people (age >60 years) and 14 for other age groups (4). However, the tool is printed with instructions to use 14 as the demarcation and therefore several studies have used this value. The authors have subsequently reiterated using <14 as the cut off for older patients (14, 15), therefore we used <14 in this study. Had we used 14 our prevalence of poor appetite in hospital would be 53%. Mudge et al. used SNAQ to measure appetite in 134 acute medical admissions of mixed gender, mean age 80 years, in Australia (6). They reported a prevalence of poor appetite of 51% using SNAQ 14. A recent Australian study of 71 patients, 52 female, mean age 82 years, who had hip fracture surgery also highlighted poor appetite as a common issue with 75% having SNAQ 14 (7). A study of 31 older adults admitted to a vascular ward in Australia, median age 78 years, found 31% had poor appetite (SNAQ 14) soon after admission (16). The SNAQ tool has also been used in Malaysia to measure appetite in 110 medical inpatients, aged 60-86 years (5). SNAQ classified 61% as having poor appetite (SNAQ 14) with women more likely to have poor appetite than men. This is important for the interpretation of our results as we included only women.

We found poor appetite was associated with hospital acquired infection and mortality but not weight loss. SNAQ was developed to predict >5% weight loss over six months in

community dwelling older adults. Our study did not find the same association, which may indicate that it is not as predictive of weight loss in acutely unwell hospitalised older people in whom poor appetite and weight loss are common. Two hospital based studies have reported on other outcomes associated with low SNAQ. In the study by Mudge et al. nutritional intake was assessed by measuring plate waste, and in a multivariate model poor appetite was the strongest predictor of inadequate nutritional intake (6). Dent et al. measured appetite in 172 patients, aged >70 years, recently admitted to a Geriatric Evaluation Management Unit in Australia (8). 63% had poor appetite (SNAQ 14). They reported that SNAQ had no association with LOS, change in Barthel Index or discharge destination. However, they did not assess the incidence of hospital acquired infection and there was no follow-up. We have found no other studies that assessed associations between low SNAQ in hospitalised older people and risk of hospital acquired infection and mortality.

This study has strengths and limitations. We recruited consecutive admissions of older general medical patients and collected repeat data six months after discharge from hospital. However, we could only recruit 31% of eligible patients and had to exclude patients with dementia or delirium. We only included women for logistical reasons, and one study has reported gender differences in poor appetite (5). We were only able to use reported height, limiting the accuracy of our BMI calculation. We used different scales in hospital and at follow up, but all scales were calibrated before use and six-monthly. Finally, our participants were mainly Caucasian and the findings from this small study may not be generalizable to older people of other ethnicities.

Conclusions

We have shown that SNAQ identified acutely unwell hospitalised older women at risk of worse outcomes, including an increased rate of hospital acquired infection and increased mortality at six-month-follow-up. It was a simple and brief questionnaire to administer in both the hospital setting and participants' homes, and only one of 179 older unwell female patients was unable to complete it. Thus it has an advantage over the MUST nutritional screening tool which relies on measuring height (difficult in older people), weight loss (subject to recall bias and calculation error), and an acute disease score which is less useful in community dwelling people. The SNAQ tool could be widely used by clinicians to identify patients with a poor appetite who are at risk of these poor health outcomes and could be referred to a dietician for a full dietary assessment. Further research should assess the use of the SNAQ tool among older male inpatients, those from different ethnic backgrounds and those in other acute settings.

Acknowledgements

References

1. Morley JE. Anorexia of aging: a true geriatric syndrome. J Nutr Health Aging. 2012; 16(5):422–5. [PubMed: 22555783]

2. Newman AB, Yanez D, Harris T, Duxbury A, Enright PL, Fried LP. Weight change in old age and its association with mortality. J Am Geriatr Soc. 2001; 49(10):1309–18. [PubMed: 11890489]

3. Mattes RD, Hollis J, Hayes D, Stunkard AJ. Appetite: measurement and manipulation misgivings. J Am Diet Assoc. 2005; 105(5 Suppl 1):S87–S97. [PubMed: 15867903]

4. Wilson MM, Thomas DR, Rubenstein LZ, Chibnall JT, Anderson S, Baxi A, et al. Appetite assessment: simple appetite questionnaire predicts weight loss in community-dwelling adults and nursing home residents. Am J Clin Nutr. 2005; 82(5):1074–81. [PubMed: 16280441]

5. Hanisah R, Shahar S, Lee FS. Validation of screening tools to assess appetite among geriatric patients. J Nutr Health Aging. 2012; 16(7):660–5. [PubMed: 22836710]

6. Mudge AM, Ross LJ, Young AM, Isenring EA, Banks MD. Helping understand nutritional gaps in the elderly (HUNGER): a prospective study of patient factors associated with inadequate nutritional intake in older medical inpatients. Clin Nutr. 2011; 30(3):320–5. [PubMed: 21262553]

7. Villani AM, Miller MD, Cameron ID, Kurrle S, Whitehead C, Crotty M. Development and relative validity of a new field instrument for detection of geriatric cachexia: preliminary analysis in hip fracture patients. J Cachexia Sarcopenia Muscle. 2013

8. Dent E, Chapman I, Piantadosi C, Visvanathan R. Nutritional screening tools and anthropometric measures associate with hospital discharge outcomes in older people. Australasian journal on ageing. 2014

9. Roberts HC, Denison HJ, Martin HJ, Patel HP, Syddall H, Cooper C, et al. A review of the measurement of grip strength in clinical and epidemiological studies: towards a standardised approach. Age Ageing. 2011; 40(4):423–9. [PubMed: 21624928]

10. Mahoney FI, Barthel DW. Functional Evaluation: The Barthel Index. Md State Med J. 1965; 14:61–5. [PubMed: 14258950]

11. Folstein MF, Folstein SE, McHugh PR. «Mini-mental state». A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975; 12(3):189–98. [PubMed: 1202204]

12. Herrmann N, Mittmann N, Silver I, Shulman KI, Busto UE, Shear N, et al. A validation study of the Geriatric Depression Scale short form. Int J Geriatr Psychiatry. 1996; 11(5):457–60.

13. BAPEN. Malnutrition Universal Screening Tool 2014. updated 2014; cited 2012 1/7/2012Available from: http://www.bapen.org.uk/pdfs/must/must_full.pdf

14. Rolland Y, Perrin A, Gardette V, Filhol N, Vellas B. Screening older people at risk of malnutrition or malnourished using the Simplified Nutritional Appetite Questionnaire (SNAQ): a comparison with the Mini-Nutritional Assessment (MNA) tool. J Am Med Dir Assoc. 2012; 13(1):31–4. [PubMed: 21700503]

15. Morley , JE. Handbook of Clinical Nutrition and Aging. 2009. Update on Nutritional Assessment; p. 65

16. Liang L, Thomas J, Miller M, Puckridge P. Nutritional issues in older adults with wounds in a clinical setting. J Multidiscip Healthc. 2008; 1:63–71. [PubMed: 21197335]

Table 1

Participant characteristics

	Admission			Follow-up			p-value[2]
	N	**Mean**	**SD**	**N**	**Mean**	**SD**	
Age (yrs)	178	86.6	4.7	140	86.7	4.8	
Weight (kg)[1]	172	62.4	1.3	99	59.5	1.3	<0.001
BMI (kg/m^2)[1]	172	24.8	1.3	99	23.8	1.3	<0.001
Grip strength (kg)	173	13.0	5.2	112	13.5	5.7	0.120
LOS[1]	178	14.6	2.0				
	N	**Median**	**IQR**	**N**	**Median**	**IQR**	
SNAQ score	178	14	13-16	113	14	13-16	0.406
Barthel score	177	68	42-93	115	82	66-95	<0.001
MMSE score	178	25	23-28	114	27	23-28	0.050
GDS-SF score	165	4	2-6	110	4	2-6	0.101
	N	**N**	**%**				
MUST	155						
Low risk		106	68.4				
Medium risk		25	16.1				
High risk		24	15.5				
	N	**N**	**%**	**N**	**N**	**%**	
Hospital acquired infection	178	36	20.2				
Readmitted by follow up				163	79	48.5	
Died by follow up				173	33	19.1	
SNAQ <14	178	74	41.6	113	43	38.1	0.551
Weight loss >5% by follow up				95	39	41.1	
Category of domicile	178			138			<0.001
Private home alone		98	55.1		65	47.1	
Private home with others		43	24.2		28	20.3	
Sheltered accommodation		28	15.7		23	16.7	
Rest or nursing home		9	5.1		22	15.9	
Moved into care home				138	16	11.6	
	N	**N**	**%**	**N**	**N**	**%**	
Prior care[3]	170	92	54.1	140	99	70.7	0.160

N: number; SD: standard deviation; yrs: years; kg: Kilograms; BMI: Body Mass Index; LOS: length of stay; m2: metres squared; IQR: Interquartile range; SNAQ: Simplified Nutritional Appetite Questionnaire; MMSE: Mini Mental State Examination; GDS-SF: Geriatric Depression Scale: Short Form; %: percentage; MUST: Malnutrition Universal Screening Tool;

[1] Geometric mean and SD;

[2] p-value for the difference between admission and follow-up using paired samples (n ranged from 95 to 138);

[3] Prior care categories: community nursing; sitting service; meal provision; personal care; help with shopping; help with cleaning; help with gardening/DIY.

Table 2

Correlates of poor appetite (SNAQ <14) at admission (admission characteristics)

	N	Regression coefficient	95% CI	p-value
Age (yrs)	178	−0.06	(−1.46, 1.35)	0.937
Weight (FY z-score)	172	−0.37	(−0.66, −0.08)	0.014
BMI (FY z-score)	172	−0.40	(−0.69, −0.10)	0.008
Max grip (kg)	173	−2.27	(−3.81, −0.72)	0.004
Barthel (FY z-score)	177	−0.56	(−0.87, −0.24)	0.001
MMSE (FY z-score)	178	−0.15	(−0.46, 0.16)	0.341
GDS-SF (FY z-score)	165	0.42	(0.13, 0.72)	0.005
	N	Odds ratio	95% CI	p-value
MUST	155	2.11	(1.08, 4.14)	0.030
Category of domicile	178	1.39	(0.79, 2.45)	0.259
Prior care[1]	170	1.68	(0.90, 3.14)	0.103

N: Number; %: percentage; CI: Confidence Interval; yrs: years; FY z-score: Fisher-Yates z-score; BMI: body mass index; Max: maximum; MMSE: Mini Mental State Examination; GDS-SF: Geriatric Depression Scale: Short Form; MUST: Malnutrition Universal Screening Tool;

[1]Prior care categories: community nursing; sitting service; meal provision; personal care; help with shopping; help with cleaning; help with gardening/DIY.

Table 3

Poor appetite (SNAQ<14) at admission as an explanatory variable for various outcomes

		Unadjusted				Adjusted		
	N	Odds ratio	95% CI	p-value	N	Odds ratio[1]	95% CI	p-value
Hospital acquired infection	178	3.68	(1.70, 7.98)	0.001	178	3.53	(1.48, 8.41)	0.004
	N	Odds ratio	95% CI	p-value	N	Odds ratio[2]	95% CI	p-value
Moved into a rest or nursing home by follow-up	138	1.33	(0.46, 3.82)	0.595	138	0.87	(0.27, 2.80)	0.821
Receiving care at follow-up	140	0.93	(0.44, 1.97)	0.855	140	0.90	(0.42, 1.94)	0.795
Weight loss>5% by follow-up	95	1.19	(0.52, 2.74)	0.675	95	1.11	(0.47, 2.63)	0.805
	N	Regression coefficient	95% CI	p-value	N	Regression coefficient[3]	95% CI	p-value
LOS in hospital (z-score)	178	0.28	(−0.02, 0.57)	0.069	178	0.26	(−0.03, 0.54)	0.075
	N	Regression coefficient	95% CI	p-value	N	Regression coefficient[2]	95% CI	p-value
Max grip at follow-up (kg)	112	−2.23	(−4.40, −0.06)	0.045	112	−1.83	(−4.01, 0.34)	0.098
Weight at follow-up (FY z-score)	99	−0.29	(−0.68, 0.10)	0.148	99	−0.29	(−0.70, 0.11)	0.152
BMI at follow-up (FY z-score)	99	−0.31	(−0.69, 0.08)	0.123	99	−0.29	(−0.70, 0.11)	0.151
Barthel at follow-up (FY z-score)	115	−0.49	(−0.94, −0.05)	0.029	115	−0.33	(−0.76, 0.10)	0.126
MMSE at follow-up (FY z-score)	114	−0.06	(−0.45, 0.34)	0.781	114	0.00	(−0.40, 0.41)	0.987
GDS-SF at follow-up (FY z-score)	110	0.39	(0.02, 0.75)	0.038	110	0.32	(−0.06, 0.720)	0.095
	N	Hazards ratio	95% CI	p-value	N	Hazards ratio[1]	95% CI	p-value
Died by time of follow-up	173	2.34	(1.16, 4.70)	0.017	173	2.29	(1.12, 4.68)	0.023
Re-admitted by time of follow-up	163	0.97	(0.62, 1.51)	0.882	163	0.99	(0.63, 1.56)	0.966

SNAQ: Simplified Nutritional Appetite Questionnaire; N: Number; %: percentage; CI: Confidence Interval; yrs: years; FY z-score: Fisher-Yates z-score; BMI: body mass index; Max: maximum; MMSE: Mini Mental State Examination; GDS-SF: Geriatric Depression Scale: Short Form

[1] adjusted for length of stay and number of co-morbidities;

[2] adjusted for length of stay, time from discharge to follow up and number of co-morbidities;

[3] adjusted for number of co-morbidities;