# ORIGINAL ARTICLE An audit to assess awareness and knowledge of nutrition in a UK spinal cord injuries centre

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Study design: A single centre survey.

**Objectives**: To test: (i) awareness of nutrition screening tools and related care plans and; (ii) nutrition knowledge of doctors, nurses and dietitians working in spinal cord injuries (SCI) centres.

**Methods**: The 14-item questionnaire was sent to 102 nurses, 17 doctors and 15 dietitians working in UK SCI centres during January–March 2010.

**Results**: Sixty-two (46.5%) questionnaires were completed and returned for analysis. The present audit demonstrated that awareness of the need for nutritional screening is good: 83% of staff reported that they are aware there is a nutrition screening tool. This audit also demonstrated areas of poor knowledge, such as calorie content of intravenous fluids, indicators of malnutrition, and choice of nutritional support in malnourished patients. All doctors, but only 38% of nurses, knew how to calculate body mass index. Surprisingly, nearly half (49%) of the participants thought that at least 20% weight loss was required to indicate malnutrition. This high-perceived cut-off point suggests that malnutrition is likely to continue to be undetected and unmanaged. The overall scores (median) showed clear differences in nutritional knowledge between groups (median: dietitians 92.8%; doctors 53.5%; nurses 35.7; P<0.01). This suggests that dietitians could have an important role in training healthcare professionals about nutrition.

**Conclusion**: This study highlights the need for further education in SCI medicine in order to improve the efficacy of feeding and nutrition therapy for SCI patients.

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## INTRODUCTION

A recent UK-based multicentre study found that up to 40% of patients admitted to the UK spinal cord injuries (SCI) centres (SCIC) were malnourished and more than half of patients reported weight loss after SCI.<sup>1</sup> Previous studies in general hospital patients have demonstrated that poor nutritional status is associated with worse clinical outcomes and that appropriate nutritional interventions can improve these outcomes.<sup>2–3</sup> Indeed, nutrition has a major role in the prevention and treatment of many leading causes of chronic disease and premature death.<sup>4–7</sup>

We reported previously that the provision of dietetic resources in SCIC is suboptimal,<sup>8</sup> and therefore that it is imperative that front line healthcare staff have sufficient knowledge in identifying patients at nutritional risk, so they can offer appropriate choices of treatment. There are currently limited data regarding the nutrition knowledge of staff working in SCIC. The objective of the present study was to determine SCIC staff's awareness and knowledge about nutrition so that it could be decided whether additional training might improve detection and treatment of malnutrition in this vulnerable group.

#### MATERIALS AND METHODS

An adapted questionnaire,<sup>9</sup> based on previous published work, was sent to medical and nursing staff in UK SCIC in order to compare the knowledge of doctors, nursing staff and dietitians.

#### Development of questionnaire

The questionnaire contained four parts, comprising demographics, awareness (attitude), knowledge and feedback (Figure 1). The questionnaires were completed anonymously, and participants were asked to complete them without conferring with colleagues.

In the first part of the questionnaire, the subjects were asked to record their occupation, grade and work place, but not their name. In the second part, the subjects were asked if they were aware whether or not a nutrition screening tool and nutritional care plan was in place. The third part of the questionnaire contained 14 multiple choice questions with a stem and five possible answers, of which only one, which was randomly positioned, was considered correct. The questions were concerned with assessment of an individual's nutritional needs, and choosing appropriate nutritional interventions. The fourth part of questionnaire consisted of two questions, which aimed to seek the subject's views on how to improve nutrition screening in the SCI centre.

#### Ethics

This study was conducted according to the guidelines laid down in the Declaration of Helsinki. Formal ethical permission to conduct the study was not required by the hospital review board, as this was considered to be a clinical audit not involving active patient participation.<sup>10</sup>

This questionnaire was approved by the local clinical audit department for phrasing and grammar of the questions. In addition a pilot study (n=3)was performed to assess the content and time required to complete the

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questionnaire; feedback from this guided the draughting of the final version of the questionnaire (Figure 1).

# Survey administration

The survey was administered to all doctors and nurses working in the NSIC 15 doctors (including Senior House Officers/Core Trainees of years 1 and 2, and Consultants) and 102 nurses (ranging from junior nurses at Band 5 to senior nurses at Band 8b) during January 2010– April 2010. One reminder was sent 8 weeks after the initial survey distribution.

# SECTION 1 – ABOUT YOU AND WHERE YOU WORK

1. What	is your profession?	Doctor 🗌 Nurse If Nu	urse, which ward do	you work on?	
2. What	is your grade?				
3. Are yo	ou aware there is a nutrit	ion screening tool on the	e wards?	Yes	No
4. Are yo	ou aware there is a care	plan for individuals at ris	k of malnutrition?	Yes	No
SECTIO	N 2 – KNOWLEDGE OF N	NUTRITION IN PATIENTS	S WITH SCI		
1.	Which nutrition screenin	g tool does the NSIC us	e?		
	Malnutrition Univ Mini Nutrition As Spinal Nutrition Screening Tool f	versal Screening Tool (M sessment (MNA) Screening Tool (SNST) for Assessment of Malnu	IUST) trition in Paediatrics	(STAMP)	
2.	How many kcal are there carbohydrate?	e in one gram of protein,	one gram of fat and	one gram of	
	a) 5, 9, 7 d) 4, 9, 4	b) 9, 4, 4 🗌 e) 5, 7, 9 🔲	c) 7, 9, 5 🗌		
3. d	Approximately how man a) 500 ) 5,000	y kcal a day would a 70 b) 10,000 e) 10	Kg man in hospital n c) 2,000 □	eed?	
4.	How many kcal are there a) 100 d) 600	e in 1 litre of 5% dextros b) 200	∋? c) 500  □		
5.	How many kcal are there a) 100	e in 1 litre of Hartmann's b) 200	solution? c) 500		
6.	Approximately how much a) 1500ml d) 5000ml	h fluid per day would a 7 b) 2000ml [ e) 10, 000ml [	0 Kg man (40 yr old) c) 3000m 	with SCI nee I □	d?
7.	In what unit is body mas a) kg/m b) m d) kg/m <sup>2</sup> e) kg	s index (BMI) measured /kg <sup>2</sup> J	? c) m/kg □		
8.	What is the BMI range fo a) 10 -15 [] d) 25 - 30[]	or normal weight? b) 15-20 🔲 e) 30 -35 🗌	c) 20 – 25 🗌		
9.	What is the prevalence of a) 2%   d) 50%	of malnutrition in UK hos b) 10% e) 60%	oitals? c) 30% □		

10. What % weight loss (in the last 3months) is suggestive of malnutrition?

Figure 1 Questionnaire.

For comparison, questionnaires were also sent to 12 specialist dietitians working in other UK SCI centres (Band 6 to Band 8a).

#### Statistical analysis

Descriptive statistics were used to calculate the response frequency, and data are reported as medians (range). For numeric data on an ordinal level, the Mann–Whitney test was used, and for cross-tabulation on a nominal level, the  $\chi^2$  test was performed. The data were analysed using Minitab

	a) 2% d) 40%	b) 10% 🔲 e) 60% 🗍	c) 20% 🗌	
11.	How is % weight loss ca a) (usual wt - current wt) b) (current wt – usual wt c) (usual wt – current wt d) (current wt – usual wt e) (usual wt – 100)	<ul> <li>divided by usual v</li> <li>divided by usual v</li> <li>divided by usual v</li> <li>divided by curren</li> <li>divided by curren</li> <li>divided by curren</li> </ul>	wt     x 100       wt     x 100       t wt     x 100       t wt     x 100       t wt     x 100       t wt     x 100	
12.	Which of the following isa) Albumind) BMI	a <b>poor</b> measure of n b) % weight loss e) Mid upper arm cir	utritional status? c) weight cumference	
13.	A 50 year old obese mar lost 20% of his body weig support should be given a) parenteral nutrition b) an oral nutritional sup c) a weight reducing die d) a high fibre diet e) nocturnal nasogastric	admitted with pneur ght in the last 3 month to him? plement t feeding	nonia, who is being means and now weighs 100	chanically ventilated, has Kg. What nutritional
14.	What is the recommender nasogastric tube? a) abdominal x-ray b) listen for bubbles in s c) chest x-ray d) aspirate gastric acid e) endoscopic confirmat	ed method to use to c tomach ion	onfirm the correct positi	on of a fine bore

# SECTION 3 - IMPROVING NUTRITION SCREENING IN THE NSIC

1. Which measures do you think would improve nutrition screening in the NSIC? You may tick as many as you wish.

	A regular update session for existing staff
	Nutritional screening included in the new staff induction programme
	Additional equipment (e.g. hoist scale) made available to the ward
	Regular nutrition link nurse meetings
	I don't think it is necessary to improve nutrition screening
Would	you like to make any further comments about improving nutritio

2. n screening in the NSIC?

Figure 1 Continued.

version 15 (Coventry CV3 2TE, Minitab Ltd, Coventry, UK) and significance was accepted if P < 0.05.

# RESULTS

A total of 129 questionnaires were sent, and responses were received from 10 of 15 doctors (66.7%), from 41 of 102 nurses (40.2%), and from 9 of 12 SCI dietitians (75%). The overall response rate was 46.5%.

### Demographics

Demographic characteristics of the respondents are shown in Table 1.

#### Awareness of a nutrition screening tool and nutrition care plan

Table 2a summarises the awareness of a nutrition screening tool and Table 2b the nutritional care of at-risk patients in the SCIC. There were significant differences in awareness of the screening tool within

## Table 1 Demographic characteristics of respondents

Staff group	Number of questionnaires returned	Range of scores	Average (mean) score out of 14
Doctors			
Consultant	5	6–9	7.5
SHO (CT1)	5	4–9	6.8
All doctors	10	4–9	7
Nurses			
Grade 8b	1	5	5
Grade 7	2	4–6	5
Grade 6	15	0–9	5.2
Grade 5	23	1–8	5
All nurses	41	0–10	5
Dietitian	9	10-13	12.3
Total respondents	60	0–13	6.3

Abbreviation: SHO, senior house officer.

## Table 2a Awareness of ward-base nutrition screening tool

	Doctors	Nurses	Dietitian	Overall %
Yes	5 (50.0%)	35 (77.8%)	8 (88.9%)	40 (83%)
No	5 (50.0%)	6 (22.2%)	1 (11.1%)	11 (17%)
Not recorded	_	1	_	1
Total	10	42	9	61

P=0.033.

Overall: χ<sup>2</sup>=6.807.

# Table 2b Awareness of nutritional care plan for individuals at risk of malnutrition?

	Doctors	Nurses	Dietitian	Overall %
Yes	6 (60%)	30 (73.2%)	8 (88.9%)	44 (72.1%)
No	4 (40%)	11 (26.8%)	1 (11.1%)	16 (27.9%)
Not recorded		1	_	1
Total	10	42	9	61

P=0.033.

Overall: χ<sup>2</sup>=6.807.

professional groups (doctors: 50%; nurses: 77.8%; and dietitians: 88.9%; P=0.033). The nurse's awareness was higher than that of doctors (P=0.015,  $\chi^2$ : 5944; Table 2a).

There were also significant differences with regard to the care plan (doctors: 60%; nurses: 73.2%; and dietitians: 88.9%; P<0.001). The numerically higher awareness of nurses than that of doctors was not statistically significant (Table 2b).

## Nutrition knowledge

The specialist dietitian's total score was significantly higher (median: 13) than that of the other two professional groups (P<0.001) and the nurses scored significantly least well (Table 3).

There was no apparent difference between the scores of doctors of different seniority (consultant vs doctors in training: 7.5 vs 6.8) or those of different nursing grades (Band 5 to Band 8 nurse: 5). Table 4

# Table 3 Scores of 13 questions according to profession and question type

Profession	n	n <i>Median score (range)</i>		Total score
		Assessment/requirements Enteral nutrition		
		Q1-Q12	Q13-Q14	
Doctors	10	6 (4–9) <sup>a</sup>	1 (0–2)	7 (4–9) <sup>a</sup>
Nurses	41	4 (0–9) <sup>b</sup>	0 (0–2)	5 (1–9) <sup>b</sup>
Dietitians	9	12 (9–12) <sup>c,d</sup>	1 (1–2)	13 (10–13) <sup>c,d</sup>
<sup>a</sup> P<0.01 com	pared v	with doctors and nurses.		

 $^{b}P < 0.01$  compared with nurses and dietitians.

<sup>c</sup>P<0.01 compared with doctors and dietitians.

 $^{d}P < 0.01$  compared with the other 2 groups.

# Table 4 Correct answer and number (%) in each profession giving the correct answer

Question (correct answer)	<i>Doctors</i> n=10 (%)	<i>Nurses</i> n=41 (%)	<i>Dietitian</i> n=9 (%)
1 (c) <sup>b</sup>	4 (40)	22 (53.6)	8 (88.9)
2 (d) <sup>b,g</sup>	4 (40)	9 (21.9)	9 (100)
3 (c) <sup>b,d</sup>	5 (50)	26 (63.4)	9 (100)
4 (b) <sup>b,d,g</sup>	6 (60)	16 (39)	9 (100)
5 (e) <sup>a,b,e,g</sup>	5 (50)	4 (9.6)	9 (100)
6 (b) <sup>d</sup>	6 (60)	17 (41.5)	7 (77.8)
7 (d) <sup>a,e,g</sup>	10 (100)	15 (36.6)	9 (100)
8 (c) <sup>a,e,g</sup>	8 (80)	17 (41.5)	9 (100)
9 (c) <sup>e,f</sup>	6 (60)	12 (29.3)	7 (77.8)
10 (b) <sup>c,e,f</sup>	3 (30)	16 (39)	8 (88.9)
11 (a) <sup>a,e,g</sup>	8 (80)	13 (31.7)	8 (88.9)
12 (a) <sup>b,e,g</sup>	2 (20)	6 (14.6)	7 (77.8)
13 (b)	3 (30	7 (17.1)	2 (22.2)
14 (d) <sup>b,e,f</sup>	4 (40)	16 (39)	8 (88.9)

<sup>a</sup>P<0.01 (doctor vs nurse).

 $^{b}P < 0.05$  (doctor vs dietitian).  $^{c}P < 0.01$  (doctor vs dietitian).

 $^{d}P < 0.05$  (nurse vs dietitian).

 $e_P < 0.01$  (nurse vs dietitian).

 $^{f}P < 0.05$  (three groups).

 $^{g}P < 0.01$  (three groups).

summarises the correct answer and number (%) in each profession giving the correct answer.

#### Assessment/requirement questions (Q1-Q12)

All of the dietitians scored nine or more on these questions and two answered all 12 correctly. Two dietitians underestimated the fluid requirements of SCI patients and underestimated the prevalence of hospital malnutrition. One dietitian thought body mass index (BMI) was a poor marker of nutritional status.

Although all doctors knew how to calculate BMI, only 38% of nurses understood how to perform this calculation. Surprisingly, nearly half (49%) of all participants thought that 20% weight loss or more was required to indicate malnutrition. Fifty-one percent (26/51) of respondents reported correctly on use of the nutrition screening tool.

Most doctors and nurses did not know the calorie content of macronutrients, the recommended weight loss cut-off points to

indicate malnutrition, or markers of poor nutritional status. The nurses performed most poorly in the assessment-based questions. One-third of nurses knew a healthy 70-kg men would need about 2000 kcal per day, but half of the nurses suggested that 5000 kcal per day were needed. Only few (9.6%) nurses and half of the doctors knew the calorie content of Hartmann's solution. All doctors, but few nurses (36.6%), knew the units of BMI. Conversely most nurses (59%), but only a few doctors (20%), knew the conventional BMI range.<sup>5</sup>

Most nurses (40%) thought that the prevalence of hospital malnutrition was higher than 30%. Although a majority of doctors (80%) were able to calculate percentage weight loss, only one-third (31.7%) of nurses could perform this calculation correctly.

#### Enteral nutrition support questions (Q13-Q14)

No statistical difference was found across professional groups (Table 3). Only a few healthcare professionals (doctors: 30%, nurses: 17.1%; and dietitians: 22.2%) recognised that an overweight person who loses weight rapidly is also at risk of undernutrition and, therefore, in need of nutritional supplements. Only 40% of doctors and 39% of nurses knew that aspiration of gastric acid alone can be a sufficient indicator that the tip of a nasogastric tube is in the stomach. Half of the doctors and 32% of nurses wanted either an abdominal or chest X-ray to confirm position.

### Feedback/suggestions

The majority of staff (73.3%) thought that regular update sessions and the inclusion of a session on nutritional screening in new staff induction (71.6%) would be the most effective ways of improving nutritional screening.

#### DISCUSSION

Nutrition education of physicians in America and Europe has been shown to be poor.<sup>11–14</sup> To our knowledge, ours is the first study that has formally assessed the awareness and knowledge of nutrition among SCI physicians and nurses. The sample size involved and response rate in the present study (n=60, response rate: 46.5%) was comparable to other published studies.<sup>11,14</sup>

This audit demonstrated that awareness of the need for nutritional screening is good; 83% of staff reported that they are aware there is a nutrition screening tool in place. However, only 53% of staff reported the correct nutrition screening tool.

This audit demonstrated areas of poor knowledge about the assessment and management of malnutrition among doctors, nurses and student nurses working in the SCI centre.

The present participants did particularly poorly in their understanding of the energy content of macronutrients and intravenous fluids, the indicators of malnutrition and the choice of nutritional support in malnourished patients. Surprisingly, 49% of the participants thought that  $\ge 20\%$  weight loss was required to indicate malnutrition, meaning that < 20% weight loss in 3 months would not be considered a risk. As doctors and nurses are normally responsible for referring patients for detailed nutritional assessment by dietitians, this is cause for concern, as it suggests that malnutrition is likely to continue to be undetected and unmanaged.

The current training programme in the national SCI centre does not offer formal nutritional training, and therefore participants answered these questions based on knowledge and experience gained from their undergraduate teaching and self-directed learning. However, these disappointing results may even overestimate knowledge, as individuals who thought they had a reasonable knowledge may have been more willing to complete the questionnaires. This poor knowledge may be a barrier for good nutritional management and it is probable that it partly explains the poor compliance with malnutrition screening within SCI centres.<sup>15</sup> In addition, a recent national study showed that the provision of dietetics in SCI centres is limited,<sup>8</sup> suggesting that these undetected patients are especially unlikely to receive complete nutritional management during their hospital stay. We feel that this probably leads to poorer clinical outcomes and to increased overall health care costs.<sup>4–6</sup>

Our results highlight the need for more thorough nutritional education of SCI healthcare professionals (and probably more widely in acute hospital settings) to address this aspect of patient care. Current medical undergraduate and postgraduate medical curricula are being updated to include more nutrition education, but more senior doctors who did not receive sufficient nutrition training earlier in their careers may be more difficult to reach.

A number of reports and organisations have highlighted the importance of tackling hospital malnutrition as a multidisciplinary responsibility.<sup>11–15</sup> In the United Kingdom, the King's Fund report<sup>16</sup> and the National Institute for Health and Clinical Excellence guide-lines<sup>5</sup> have increased the awareness of nutrition in hospital settings. Recently, the Multidisciplinary Association for Spinal Injury Professions published guidance jointly with the Royal College of Physicians, supporting nutritional screening and assessment as an essential part of management of patients with spinal cord injury.<sup>17</sup>

In conclusion, this is the first study to document the need for nutrition education among SCI doctors and nurses. Although SCI doctors scored better than nurses, only specialist dietitians consistently achieved respectable scores in the management of patients with nutrition related complications. These results indicate that doctors and nurses should have more structured teaching about malnutrition and its treatment at undergraduate and postgraduate level. Nutrition education should also be provided for more senior staff who have previously been denied this opportunity.

#### DATA ARCHIVING

There was no data to deposit.

### CONFLICT OF INTEREST

The authors declare no conflict of interest.

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