Assessment of awareness and knowledge of nutrition parameters among health professionals caring for Spinal Cord Injury in tertiary care hospitals – an Indian study

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Abstract: *Introduction:* Malnutrition has been reported to be amongst the leading causes of increased morbidity in patients with Spinal Cord Injury. *Objective:* A multi center survey was done with the objectives of finding awareness of nutrition parameters, related care plans and to test knowledge of nutrition among doctors/nurses working in tertiary care hospitals. *Design:* A 16 item questionnaire was prepared and sent to health professionals in the department of Orthopedics, PMR, Neurosurgery and Anesthesia over a period of two months. Each question had randomly arranged five responses of which one was the correct option. Completely filled questionnaires were included in the analysis. *Results and Conclusion:* This study demonstrated that awareness of need for nutrition screening is poor with a majority of participants failing to acknowledge existence of such parameters. It also highlighted other lacunas in knowledge pertaining to calorie content of intravenous fluids, indicators of malnutrition and choice of nutritional support in malnourished patients. Surprisingly, more than half of the participants reported a high perceived cut-off point for malnourishment implying that a large proportion of such patients go undetected and unmanaged, thus highlighting the need for further awareness in implementation of nutrition therapy.

Keywords: Malnutrition, Screening, Care plan, Health professionals, Spinal Cord Injury.

Introduction

Nutritional health is maintained by a state of equilibrium in which nutrient intake and requirements balance. Malnutrition occurs when net nutrient intake (nutrient intake corrected for abnormally large fecal or urinary losses) is less than requirements. It leads to a succession of metabolic abnormalities, physiologic changes, reduced organ and tissue function, and loss of body mass [1]. It is further clear that malnourished patients are at higher risk for infection, organ failure, decreased wound healing, and suboptimal response to regular medical treatment [2].

Malnutrition thus, continues to be a public health problem that has broad impact on health outcomes, mortality rates, and financial costs of health care around the world [3]. Several studies have reported an association between malnutrition and an increased risk of subsequent in-hospital morbidity and mortality [4-6]. Despite its high prevalence, malnutrition is often not recognized and thus, not treated due to the lack of nutritional screening programs [7]. Barriers, such as lack of awareness; time; money; and training, have prevented health care professionals from using knowledge about nutrition to full advantage [8-10]. In the hospital setting, the prevalence of malnutrition has been reported to range from 20% to 50% of patients [11]. Remarkably, these prevalence numbers are similar in hospitals of both developing and developed nations [12-16].

Currently there's limited data regarding the nutrition knowledge of doctors and nurses working in close association with the Spinal Cord Injured (SCI) patients. With this background, we conducted a survey to assess the awareness level of health professionals regarding malnutrition in Spinal Cord Injured patients. The importance of this study also lies in determining whether additional training might improve detection and treatment of malnutrition in the Spinal Cord Injured patients.

Material and Methods

The objective of this study was to determine awareness and knowledge about nutrition parameters among doctors and nurses working with SCI patients. An easy to administer, self-questionnaire was thus, prepared keeping in mind the various aspects related to nutrition and distributed to healthcare professionals working in departments of Orthopedics, Physical Medicine & Rehabilitation, Neurosurgery and Anesthesia in different tertiary care hospitals in New Delhi, India over a period of 08 weeks. In the first part of questionnaire, the subjects were asked to record their occupation and department. The second part of the questionnaire comprised of 16 multiple choice questions with five possible answers, of which only one randomly positioned option was correct (Figure 1).

Fig-1: Nutritional Status screening Questionnaire

I   What is your profession?   Doctor / Nurse

II   Department   :

III   Are you aware of any nutrition screening tool? If Yes, please specify

IV   Are you aware there is a care plan for individuals at risk of malnutrition?   Yes /No

Q Nos.

1.   How many kcal are there in one gram of protein, one gram of fat and one gram of carbohydrate?

    a) 5, 9, 7   b) 9, 4, 4   c) 7, 9, 5   d) 4, 9, 4   e) 5, 7, 9

2.   Approximately how many kcal a day would a 70 Kg man in hospital need?

    a) 500   b) 10,000   c) 2000   d) 5000   e) 10

3.   How many kcal are there in 1 litre of 5% dextrose?

    a) 100   b) 200   c) 500   d) 600   e) 0

4.   How many kcal are there in 1 litre of Hartmann's solution?

    a) 100   b) 200   c) 500   d) 600   e) 0

5.   Approximately how much fluid per day would a 70 Kg man (40 yr old) with SCI need?

    a) 1500ml   b) 2000ml   c) 3000ml   d) 5000ml   e) 10, 000ml

6.   In what unit is body mass index (BMI) measured?

    a) kg/m   b) m/kg2   c) m/kg   d) kg/m2   e) kg

7.   What is the BMI range for normal weight?

    a) 10-15   b) 15-20   c) 20-25   d) 25 – 30   e) 30 -35

8.   What is the prevalence of malnutrition in Indian hospitals?

    a) 40%   b) 10%   c) 30%   d) 50%   e) 60%

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

    a) 2%   b) 10%   c) 20%   d) 40%   e) 60%

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10.   How is % weight loss calculated?

       a) (usual wt - current wt) divided by usual wt x 100

       b) (current wt – usual wt) divided by usual wt x 100

       c) (usual wt – current w t) divided by current wt x 100

       d) (current wt – usual wt) divided by current wt x 100

       e) (usual wt – 100)

11.   Which of the following is a poor measure of nutritional status?

       a) Albumin   b) % weight loss of weight   c) BMI   d) Mid upper arm circumference

12.   A 50 year old cervical spinal cord injury patient admitted with pneumonia, who is being mechanically ventilated, has lost 20% of his body weight in the last 3 months and now weighs 100 Kg. What nutritional support should be given to him?

       a) parenteral nutritions   c) a weight reducing diet   e) nocturnal nasogastric feeding

       b) an oral nutritional supplement   d) a high fibre diet

13.   In SCI patient, when should you consider nasogastric feeding, once the patient is unable to meet his nutritional requirements by oral route for

       a) 2 days   b) 5 days   c) 10 days   d) 14 days   e) 21 days

14.   What is the recommended method to use to confirm the correct position of a fine bore nasogastric tube?

       a) abdominal x-ray   c) chest x-ray   e) endoscopic confirmation

       b) listen for bubbles in stomach   d) aspirate gastric acid

15.   Which of the following are common complications related to malnutrition in a SCI patient? You may tick as many as you wish.

       a) Osteoporosis   c) Cognitive dysfunction   e) Hyperthermia

       b) Pressure ulcers   d) Metabolic syndrome

16.   Which measures do you think would improve nutrition screening in SCI patients? You may tick as many as you wish.

       a) A regular update session for existing staff

       b) Nutritional screening included in the new staff induction programme

       c) Additional equipment (e.g. hoist scale) made available to the ward

       d) Regular nutrition link nurse meetings

       e) I don't think it is necessary to improve nutrition screening

Further, data was gathered to assess their awareness about Nutrition Screening Tool (NST) and Nutritional Care Plan. Participants were divided into two groups with doctors included in Group A and nurses in Group B. The questionnaires were completed anonymously, and participants were asked to complete them without consulting with colleagues.

Statistical analysis: Data was managed using Microsoft Excel. Statistical analysis was performed on SPSS for windows (version 20) software. Independent T test was used for comparison of continuous variables & chi-square test was used for dichotomous responses. Significance was set at 5% (p value<0.05).

Results

A total of 300 questionnaires were distributed out of which 250 were handed out to doctors and 50 to nurses. But, only 192 questionnaires

(64%) were returned back duly filled and included in the analysis out of which 158 were answered by doctors and 34 by nurses. Further, majority of the subjects enrolled were from Anaesthesia department (27.6%) followed by department of Physical Medicine and Rehabilitation (19.8%), department of Orthopaedics (18.6%) and department of Neurosurgery (16.1%). Demographic characteristics of the participants are shown in table 1. Table 2 depicts the awareness of a nutrition screening tool and table 3 summarizes awareness of the nutritional care of at-risk patients. There were significant differences in awareness of the screening tool among doctors in the different specialties included in this study (p value 0.001, Chi square test). Table 4 summarizes the correct answer and number (%) in each profession giving the correct answer.

Table-1: Demographic characteristics of respondents				
	Orthopedics	**PM&R**	**Neurosurgery**	**Anesthesia**
Doctors				
Number of questionnaires returned	36	38	31	53
Average % (mean) score out of 16	40.28+3.15	24.67+8.34	62.29+3.77	52.59+3.76
Nurses				
Number of questionnaires returned	03	10	10	11
Average % (mean) score out of 16	43.75	35.62+3.02	74.37+7.48	56.25

Table-2: Awareness of ward-base nutrition screening tool				
	Orthopedics	**PM&R**	**Neurosurgery**	**Anesthesia**
Doctors (n)	36	38	31	53
Correct	11 (30.6%)	07 (18.4%)	10 (32.3%)	26 (49.1%)
Incorrect	19 (52.8%)	20 (52.6%)	06 (19.4%)	20 (37.7%)
Not answered	06 (16.7%)	11 (28.9%)	15 (48.4%)	07 (13.2%)
Nurses (n)	03	10	10	11
Correct	02 (66.7%)	02 (20%)	03 (30%)	02 (18.2%)
Incorrect	00 (0%)	01 (10%)	01 (10%)	05 (45.5%)
Not answered	01 (33.3%)	07(70%)	06 (60%)	04 (36.4%)

Table-3: Awareness of nutritional care plan for individuals at risk of malnutrition				
	Orthopedics	**PM&R**	**Neurosurgery**	**Anesthesia**
Doctors (n)	36	38	31	53
Correct	25 (69.4%)	25 (65.8%)	19 (61.3%)	36 (67.9%)
Incorrect	07 (19.4%)	07 (18.4%)	06 (19.4%)	13 (24.5%)
Not answered	04 (11.1%)	06 (15.8%)	06 (19.4%)	04 (7.5%)
Nurses (n)	03	10	10	11
Correct	02 (66.7%)	09 (90%)	03 (30%)	06 (54.5%)
Incorrect	01 (33.3%)	01 (10%)	04 (40%)	03 (27.3%)
Not answered	00 (0)%	00 (0%)	03 (30%)	02 (18.2%)

Table-4: Correct answer and number (%) in each profession giving the correct response				
Questions (*correct answer*)	Doctors (n=158)	Nurses (n=34)	Total (n=192)	P value
1 (d)	92 (58.23%)	18 (52.94%)	110 (57.29%)	0.006
2 (c)	112 (70.89%)	16 (47.05%)	128 (66.67%)	0.002
3 (b)	68 (43.04%)	13 (38.24%)	81 (42.18%)	0.183
4 (e)	40 (25.32%)	04 (11.76%)	44 (22.92%)	0.168
5 (c)	62 (39.24%)	12 (35.29%)	74 (38.54%)	0.653
6 (d)	137 (86.71%)	17 (50%)	154 (80.21%)	0.000
7 (c)	123 (77.85%)	21 (61.76%)	144 (75%)	0.005
8 (a)	12 (7.59%)	06 (17.65%)	18 (9.37%)	0.022
9 (b)	78 (49.37%)	11 (32.35%)	89 (46.35%)	0.003
10 (a)	80 (50.63%)	19 (55.88%)	99 (51.56%)	0.026
11 (d)	43 (27.21%)	08 (23.53%)	51 (26.56%)	0.718
12 (e)	18 (11.39%)	07 (20.59%)	25 (13.02%)	0.000
13 (b)	46 (29.11%)	12 (35.29%)	58 (30.21%)	0.678
14 (c)	28 (17.72%)	07 (20.58%)	35 (18.23%)	0.913
15 (a, b, d)	138 (87.34%)	25 (73.53%)	163 (84.89%)	0.109
16 (a, b, d)	135 (85.44%)	26 (76.47%)	161 (83.85%)	0.433

Calorie requirement questions (Q1-Q5): The overall response to question (Q1) related to calorie content of macronutrients and certain intravenous solution was satisfactory with almost 57.29% participants (n $_A$=92, 47.9%; n $_B$=18, 9.4%) answering it correct. Statistical differences between the two groups was however, noted only for Q2 with p value of 0.002. The poorest response was noticed in answering the calorie content of Hartmann's solution with only 22.92% participants answering it correctly. In comparison to Hartmann's solution, response for calculating the kilocalories in 1L of 5% Dextrose was better with 42.18% positive responses. Overall, the response of doctors was better than nurses for the segment pertaining to calorie contents of various fluids and calorie requirements for patients in certain situations.

Body Mass Index related questions (Q6-Q7): Only 50% of the participants in group B could answer the correct measurement unit of Body Mass Index (BMI) with 61.76% aware of the correct BMI range for normal weight. Group A performed better with 86.71% being aware of the correct unit for BMI and 77.85% answering the correct BMI range for normal weight. Statistical

differences were significant for both Q6 and Q7 with their p value being 0.000 and 0.005 respectively.

Malnutrition related questions (Q8-Q11): Both groups were unable to answer the prevalence of malnutrition in Indian hospitals with only 9.37% correct responses. Statistical difference was noticed only for question 9 (% loss of weight in last 3 months suggestive of malnutrition) with p value of 0.003. Awareness about the poor predictors of malnutrition was also low with only 26.56% (n $_A$ =43, 22.4%; n $_B$=08, 4.2%) answering it correctly.

Nutrition support questions (Q12-Q14): When asked about the choice of nutritional support in a commonly encountered clinical setting, a very dismal 13.02% of participants could answer it correctly. Knowledge about the nasogastric mode of nutrition was poor amongst both the groups with group B demonstrating better awareness than group A. The p value was significant at 0.000 only for Q12.

Miscellaneous (Q15-Q16): In this section there was more than one correct answer for each question. Participants were evaluated correct even if they answered one right choice. Most of them answered correctly when asked about the complications related to malnutrition in SCI patient (84.89%; n_A =138, 71.9%; n_B = 25, 13.02%) and also about the measures which should be taken to correct the deficit in knowledge (83.85%; n_A =135,70.3%; n_B = 26, 13.5%). No statistical significant differences were noted.

Discussion

Hospital acquired malnutrition has been a worldwide reality and challenge [11-16]. Though a number of studies have been done showing co-relation between nutrition level and presence of comorbidities, [2, 4-6] very few studies have been done which report the awareness about nutrition screening and assessment amongst the health professionals [17-18]. SCI profoundly impacts energy metabolism through its effect on the somatic nervous system, as well as the autonomic nervous system (ANS) [19]. Rodriguez et al. demonstrated that persons with acute SCI remained in negative nitrogen balance for at least 8 weeks despite 120% caloric overfeeding and dietary protein supplementation of 2g/kg/day; in contrast, non-SCI trauma patients achieved positive nitrogen balance within 3 weeks [20].

Various studies have also demonstrated that basal metabolic rate (BMR) and total daily energy expenditure (TDEE) significantly reduce in persons with SCI compared to estimates for non-SCI patients [21-24]. Recognition of metabolic abnormalities in patients with Spinal Cord Injury is thus, very important for improving clinical care.

A substantial percentage of clinical malnutrition is iatrogenic and its prevention is possible only when clinicians are able to identify the patients at risk of developing malnutrition. The knowledge level of health professionals is thus, of paramount importance as a lot of inpatients go unnoticed for malnutrition, thereby, delaying their recovery and predisposing them to complications. To the best of our knowledge, this is the first Indian study to assess the awareness about various parameters of nutrition amongst health professionals treating SCI patients.

In the present study sample size involved was 192(n=192) with a response rate of 64% which was comparable with other published studies [25-26]. This study demonstrated that awareness of the need for ward based nutritional screening is poor with less than 50% of staff acknowledging their familiarity with nutrition screening tools; however, most of the participants were aware of some care plan for individuals at risk of malnutrition.

But the question that arises here is that, without adequate knowledge of nutrition screening tools, how can the care plan be implemented for patients, when they are at risk of malnutrition. Similar observations have also been reported by Huysentruyt K et al in their study [18] where they have investigated the use of nutritional screening tools in pediatric department of secondary level hospitals and found that only half of the respondents were aware of the existence of pediatric NST. Further, in their study less than 5% of the respondents were of the opinion that screening for malnutrition is unnecessary and expressed the opinion that experience and clinical judgement alone should enable clinicians to recognize under-nutrition.

Our study further demonstrated various lacunae in knowledge about the assessment and management of malnutrition. Since doctors and nurses are responsible for maintaining adequate nutrition of patients, it is a cause for concern, as this suggests that malnutrition is likely to continue to be undetected and hence, untreated. Almost 84% of participants were of the opinion that screening for malnutrition should be improved with regular update sessions for existing SCI staff and inclusion of nutritional screening must be made into the staff orientation program. Similar concerns about regular update sessions have also been observed in the works of Nehme AE and also that of Trujillo EB et al. [27-29].

Management of malnutrition should start with identifying at-risk patients as early as possible [30] and thus, it is of utmost importance that healthcare professionals discern the difference between screening and assessment [31]. Ideally, all healthcare staff should receive

training to use simple, quick, and inexpensive validated assessment and screening tools such as Subjective Global Assessment (SGA), Malnutrition Universal Screening Tool (MUST) [32], etc. Using a simple screening tool that identifies nutrition risk may be the best that a limited-resource facility can do. Simple and practical questions on appetite loss or low food intake could also be asked, as they have a high correlation with poor health outcomes [33].

When high risk is found, an assessment tool, such as the SGA [34] could be used to determine whether the individual meets threshold criteria for actual diagnosis of malnutrition or not. Once identified, at-risk individuals should receive appropriate nutrition therapies, while those not at risk can remain under observation. Irrespective of the route, adequate nursing care and periodic monitoring are necessary to reduce complications like infections, pressure ulcers, delayed healing etc. and improve the cost-effectiveness of nutrition therapy [30]. 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 [35].

But despite the importance of appropriate nutrition therapy on positive outcomes, this increased burden of nutrition support on physicians has not been supplemented by most institutions with additional and adequate nutrition training [36-38]. Unfortunately not much emphasis is paid to the nutritional training of health professionals catering to the SCI patients; participants thus, answered these questions based on knowledge and experience gained from their undergraduate teaching and self-directed learning. Findings from this study thus, stress upon the need for stricter implementation of nutrition

screening program in the spinal wards. Further a nutrition support team comprising of doctors, nurses and dieticians (where available) could be made which would help to improve the delivery of nutrients. A number of studies have demonstrated significant improvements in patient nutrition status and improved clinical outcomes, including reduced mortality and reductions in cost, when patients were appropriately managed by multispecialty Nutrition Support Team vs individual caregivers [27-29].

Conclusion

This is the first Indian study to assess the knowledge of health professionals about various parameters related to nutrition and malnourishment. Though doctors performed better than nurses, yet the overall awareness remains dismal. More efforts should be made to increase the awareness about increased prevalence of hospital based malnutrition in SCI patients and its impact on increased morbidity. Stricter implementation of the ward based care plans and nutrition screening modules needs to be done at all the levels of interaction between a SCI patient and a healthcare professional.

Limitations of Study

There were few limitations to this study. The sample size was not uniformly divided between the two groups with only 34 nurses participating in the study. Further participants were from only four hospitals of New Delhi and the results are thus not applicable for the entire country.

References

1. Khursheed N, Jeejeebhoy. Nutritional Assessment. *Nutrition*. 2000; 16:7-8.
2. American Society for Parenteral and Enteral Nutrition (ASPEN). Guidelines for the use of parenteral and enteral nutrition in adult and pediatric patients. *JPEN*. 2002; 26(1 Suppl):1SA-9SA, 18SA-24SA.
3. Steiber A, Hegazi R, Herrera M et al. Spotlight on Global Malnutrition: A Continuing Challenge in the 21st Century. *J AcadNutr Diet*. 2015; 115(8):1335-41.
4. Ockenga J, Pirlich M, Gastell S, Lochs H. Tumour anorexia-tumour cachexia in case of gastrointestinal tumours: standards and visions. *Z Gastroenterol* 2002; 40:929-36.

5. Kyle UG, Pirlich M, Lochs H, Schuetz T, Pichard C. Increased length of hospital stay in underweight and overweight patients at hospital admission: a controlled population study. *ClinNutr* 2005; 24:133-42.

6. Pirlich M, Lochs H. Nutrition in the elderly. *Best Pract Res Clin Gastroenterol* 2001; 15:869-84.

7. McWhirter JP, Pennington CR. Incidence and recognition of malnutrition in hospital. *BMJ* 1994; 308:945-8.

8. Cahill NE, Murch L, Cook D, Heyland DK. Barriers to feeding critically ill patients: A multicenter survey of critical care nurses. *J Crit Care.* 2012; 27(6):727-734.

9. Jones NE, Suurdt J, Ouelette-Kuntz H, Heyland DK. Implementation of the Canadian Clinical Practice Guidelines for Nutrition Support: A multiple case study of barriers and enablers. *Nutr Clin Pract.* 2007; 22(4):449-457.

10. Allard JP, Keller H, Jeejeebhoy KN et al. Malnutrition at hospital admission contributors and effect on length of stay: A Prospective cohort study from the Canadian Malnutrition Task Force. *J Parenter Enteral Nutr.* 2016; 40(4):487-97.

11. Norman K, Pichard C, Lochs H, Pirlich M. Prognostic impact of disease-related malnutrition. *Clin Nutr.* 2008; 27(1):5-15.

12. Kondrup J, Allison SP, Elia M, Vellas B, Plauth M. ESPEN guidelines for nutrition screening 2002. *Clin Nutr.* 2003; 22(4):415-421.

13. Edington J, Boorman J, Durrant ER et al. Prevalence of malnutrition on admission to four hospitals in England. The Malnutrition Prevalence Group. *Clin Nutr.* 2000; 19(3):191-195.

14. Pirlich M, Schutz T, Kemps M et al. Prevalence of malnutrition in hospitalized medical patients: Impact of underlying disease. *Dig Dis.* 2003; 21(3):245-251.

15. Wyszynski DF, Perman M, Crivelli A. Prevalence of hospital malnutrition in Argentina: Preliminary results of a population-based study. *Nutrition.* 2003; 19(2):115-119.

16. Correia MI, Campos AC. Prevalence of hospital malnutrition in Latin America: The multicenter ELAN study. *Nutrition.* 2003; 19(10):823-825.

17. Wong S, Derry F, Graham A, Grimble G, Forbes A. An audit to assess awareness and knowledge of nutrition in a UK spinal cord injuries centre. *Spinal Cord,* 2012; 50:446-451.

18. Huysentruyt K, Goyens P, Alliet P, Bontems P, Hautem HV et al. More training and awareness are needed to improve the recognition of under-nutrition in hospitalised children. *Acta Paediatrica,* 2015; 104(8): 801-807**.**

19. Gater DR, Pai AB. Metabolic Disorders. In: Kirshblum S, Campagnolo D, editors. *Spinal Cord Medicine.* 2nd edition, 2011; 185-210.

20. Rodriguez DJ, Clevenger FW, Osler TM et al. Obligatory negative nitrogen-balance following spinal-cord injury. *J Parenter Enteral Nutr* 1991; 15(3):319-322.

21. Bauman WA, Spungen AM, Wang J et al. The relationship between energy expenditure and lean tissue in monozygotic twins discordant for spinal cord injury. *J Rehabil Res Dev* 2004; 41(1):1-8.

22. Buchholz AC, McGillivray CF, Pencharz PB. Differences in resting metabolic rate between paraplegic and able-bodied subjects are explained by differences in body composition. *Am J Clin Nutr* 2003; 77(2):371-378.

23. Monroe MB, Tataranni PA, Pratley R et al. Lower daily energy expenditure as measured by a respiratory chamber in subjects with spinal cord injury compared with control subjects. *Am J Clin Nutr* 1998; 68(6):1223-1227.

24. Mollinger LA, Sparr GB, El Ghater AZ. Daily energy expenditure and basal metabolic rates of patients with spinal cord injury. *Arch Phys Med Rehabil* 1999; 66:420-426.

25. Adams KM, Lindell KC, Kohlmeier M, Zeisel SH. Status of nutrition education in medical schools. *Am J ClinNutr,* 2006; 83:914S-944S.

26. Raman M, Violato C, Coderre S. How much do gastroenterology fellows know about nutrition? *J ClinGastroenterol,* 2009; 43:559-564.

27. Trujillo EB, Young LS, Chertow GM et al. Metabolic and monetary costs of avoidable parenteral nutrition use. *J Parenter Enteral Nutr.* 1999; 23(2):109-113.

28. National Collaborating Centre for Acute Care. Nutrition Support for Adults: Oral Nutrition Support, Enteral Tube Feeding and Parenteral Nutrition. London, UK. *National Collaborating Centre for Acute Care,* 2011.

29. Nehme AE. Nutritional support of the hospitalized patient: the team concept. *JAMA.* 1980; 243(19):1906-1908.

30. Mallath KM. Healthcare Demographics, Prevalence, and Pharmacoeconomics of Hospital Malnutrition in the Oncology Setting: Indian Perspective. 113th Abbott Nutrition Research Conference Nutrition Health Economics and Outcomes Research. 30-31st July 2012, Singapore. *www.ANHI.org*.

31. Field L, Hand R. Differentiating malnutrition screening and assessment: A nutrition care process perspective. *J AcadNutr Diet.* 2015; 115(5):824-828.

32. Ferguson M, Capra S, Bauer J, Banks M. Development of a valid and reliable malnutrition screening tool for adult acute hospital patients. *Nutrition.* 1999; 15(6):458-464.

33. Hiesmayr M, Schindler K, Pernicka E et al. Decreased food intake is a risk factor for mortality in hospitalised patients: The Nutrition Day survey 2006. *Clin Nutr.* 2009; 28(5):484-491.

34. Detsky AS, McLaughlin JR, Baker JP et al. What is subjective global assessment of nutritional status? *J Parenter Enteral Nutr.* 1987; 11(1):8-13.

35. NICE Clinical Guideline No. 32: National Cost Impact Report to Accompany 'Nutrition Support in Adults: Oral Nutrition Support, Enteral Tube Feeding and Parenteral Nutrition.' London, England: *National Institute for Health and Clinical Excellence* 2006.

36. Darer JD, Hwang W, Pham HH, Bass EB, Anderson G. More training needed in chronic care: a survey of US physicians. *Acad Med.* 2004; 79(6):541-548.

37. Vetter ML, Herring SJ, Sood M, Shah NR, Kalet AL. What do resident physicians know about nutrition? An evaluation of attitudes, self-perceived proficiency and knowledge. *J Am CollNutr.* 2008; 27(2):287-298.

38. Scolapio JS, DiBaise JK, Schwenk WF II, Macke ME, Burdette R. Advances and controversies in clinical nutrition: the education outcome of a live continuing medical education course. *NutrClin Pract.* 2008; 23(1):90-95.

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