Original Article

Nutrition support in hospitalized cancer patients with malnutrition in China

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Background and Objectives: Malnutrition has adverse impacts on survival of cancer patients. The aim of the present study was to investigate the prevalence of malnutrition, and the nutrition support status in hospitalized patients with cancer in China. **Methods and Study Design:** A multi-center, cross-sectional study was conducted in 29 tertiary public hospital wards in 14 Chinese cities. Malnutrition was defined as weight loss (WL) >5% over the past 6 months or body mass index (BMI) <20 kg/m^2 with WL >2%. The nutrition risk index (NRI) and performance status (PS) were evaluated. **Results:** 1138 hospitalized cancer patients (93.4% of the initial sample, 662 men, 60.6±14.5 years) were enrolled. Overall, 41.3% of patients were malnourished. The percentage of nutritional disorders as determined by the NRI was 51.4%. PS was 0 in 50.3%, 1 in 15.4%, 2 in 13.9%, and 3 or 4 in 20.4%. Compared with patients with PS of 0-1, patients with PS of 3-4 had a relative risk of malnutrition of 1.275 (95% CI 0.250-0.488, p<0.0001). Only 38.6% of patients received nutrition support, of whom 45.0% of the malnourished and 31.9% of the non-malnourished patients did; 63.2% of patients complained of poor appetite, while merely 14.0% of patients had received nutrition counseling. **Conclusions:** The prevalence of malnutrition is high in hospitalized cancer patients, and inappropriate use of nutritional interventions highlights the urgent need to define standard operating procedures and quality control process.

Key Words: cancer, hospital malnutrition, nutrition counselling, oral nutrition supplements, nutrition therapy

INTRODUCTION

Cancer is a major public health challenge and is increasing in incidence worldwide. Global cancer statistics indicate that 14.[1] million new cases of cancer were diagnosed worldwide in 2012,[1] with 4.3 million cases occurring in China.[2] Cancer-related malnutrition, defined as a multimodal process and driven by a combination of reduced nutrient intake and metabolic derangements that are provoked by systemic inflammation, is more common because of both the disease itself and its treatments.[3,4] It has been reported that the prevalence of malnutrition in cancer patients ranges from approximately 20% to more than 70% worldwide, varying by patient age, cancer type, and cancer stage.[5-7] More than 10-20% of cancer patients actually die from malnutrition rather than from the malignancy itself and aggressive treatment.[8] Malnutrition in cancer patients is associated with a higher risk of complications,[6] longer length of stay,[9] poorer tolerance and response to anti-cancer treatments,[10] lower survival[11] and a more significant deterioration in patients' quality of life.[12,13]

Nutritional intervention aims to maintain or improve food intake and mitigate metabolic derangements, maintain skeletal muscle mass and physical performance, reduce the risk of reductions or interruptions of scheduled anticancer treatments, and improve quality of life.[14] However, recent studies in European hospitals found that only 30%-60% of cancer patients with nutritional risk actually receive nutritional support [i.e., oral nutritional supplements (ONS) and/or enteral nutrition (EN) and/or parenteral nutrition (PN)].[4,6] Attar et al[15] found that physicians misclassify the severity of cancer-related malnutrition in 40% of cases, which prevents many severely malnourished patients from receiving necessary nutritional interventions. The same situation exists in China. Yu et al[16] found that the prevalence of nutritional risk at admission among the total patients is 45.6%, that only 46.7% of at-risk patients receive nutritional support and that the average PN: EN ratio is 7.0:1. What is worse, when physicians recognize cancer-related malnutrition, the patients and their relatives often underestimate its presence.[17] Many cancer patients receive inappropriate nutrition edu-

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cation and therapy during the anticancer treatment period.[18]

Previous studies have evaluated the prevalence of malnutrition in various subgroups of patients with cancer.[16,19] However, few Chinese data are available regarding the nutrition status and current use of nutrition support in hospitalized cancer patients. In particular, non-selected groups of patients and large sample surveys are lacking. This study was performed in a non-selected population of cancer patients to better evaluate the prevalence of malnutrition and the current use of nutrition support in Chinese hospitalized patients with cancer. The information resulting from this descriptive study may be useful for developing strategies to optimize nutrition support for cancer patients in China.

METHODS

Study design and subjects

A multi-center, one-day cross-sectional study was conducted in 29 tertiary public hospital wards in 14 Chinese cities. The project specifically targeted hospitalized adult patients with cancer. The following inclusion criteria were used to identify patients who were eligible for the study: 1) present in medical and surgical wards on the survey day, including admissions and discharges within that period; 2) older than 18 years of age; 3) with histologically diagnosed malignant tumors; 4) well-oriented to time and place; and 5) able to sign the informed consent form. Patients who were admitted and discharged during the same calendar day or admitted to intensive care unit were excluded.

Ethical approval

The study was conducted in compliance with the provisions of the Declaration of Helsinki. The protocol was approved by the ethics committee of our hospital (Approval No. S-K013). The participating centers were not required to obtain separate approval from their own ethics committees. However, each competent patient was asked to provide his or her written informed consent. Only de-identified data were transferred to the central coordinating center or stored in a database.

Data collection and data quality

All the subjects were interviewed by uniformly trained medical investigators on the interview day. Their height and current and usual body weights (in the past 6 months) were collected. The patient's body weight in light clothing was determined to the nearest 0.1 kg with a portable electronic scale. The patient's height was measured with a portable stadiometer to the nearest 0.1 cm. Weight and height were used to calculate the body mass index (BMI). According to Fearon et al[20] malnutrition was defined as weight loss (WL) >5% over the past 6 months (in the absence of simple starvation) or a BMI <20 kg/m^2 with WL >2% in this study. Other data collected on the audit day included patient's characteristics, including age and sex; disease information, including type of tumor, primary tumor site, and presence of metastases; infection situation (local or general); medication; and nutrition therapies [1) nutrition counseling, as the basis of nutrition therapy, is a dedicated and repeated professional communication process designed to provide patients with a thorough understanding of nutritional topics that can lead to lasting changes in eating habits. 2) oral nutrition support includes regular food or fortified foods as meals or snacks and ONS, which are commercially available homogeneous and usually complete nutrient mixtures for oral consumption. 3) artificial nutrition is the non-volitional application of nutrients via enteral tubes (EN) or parenteral infusions (PN)]. The information on 'nutrition support' was the second part of the questionnaire and collected from the patients' doctor or medical orders in electronic medical record on the day of audit. When a recent serum albumin result (<1 week) was available, the nutrition risk index (NRI) was calculated as follows: NRI = 1.519 x serum albumin (g/L) + 41.7 (current weight/usual weight).[21] Patients with a score ≥97.5 were classified as well nourished, between 83.5 and 97.5 as moderately malnourished, and below 83.5 as severely malnourished.

In addition, patients were asked to complete a self-administered questionnaire related to their subjective assessment of their feeling about cancer-associated symptoms including fatigue, pain, depression, and changes in appetite and nutrient intake.

The physical activities of the patients were also recorded. Performance status (PS) was determined on the audit day using the Eastern Cooperative Oncology Group (ECOG) score, also called the World Health Organization (WHO) or Zubrod score, which ranges from 0 to 5, with 0 denoting perfect health and 5 death.[22]

During one week after the survey, the participating centers were asked to either input the data online via the assigned website or to send the questionnaires to the central coordination center in Beijing, China. Data cleaning was performed by the central coordination center. The respective unit was contacted if any data were unclear or illogical.

Statistical analysis

All statistical analyses were performed using SPSS for Windows version 23.0 (SPSS, Inc., Chicago, IL, USA). Descriptive statistics were computed for all study items. Continuous data are expressed as the mean ± standard deviation. Relative and absolute frequencies were calculated for the categorical variables. The differences in percentage of patients with cancer-associated symptoms between non-malnourished and malnourished patients were evaluated by the Wilcoxon signed-rank test. The Spearman Rank Correlation Coefficient Approach was employed for correlation between the two diagnostic methods of malnutrition. The relative risk of malnutrition in patients with different PS levels and the risk of infection in patients with different nutrition statuses were calculated. A p value <0.05 was considered significant, and confidence intervals (CIs) were calculated at the 95% level.

RESULTS

Overall, we received data from 1218 hospitalized patients with cancer. Seventy-nine patients were excluded because they refused to participate (n=19), were comatose (n=6), failed to complete the questionnaire (n=54). The final sample consisted of 1138 hospitalized cancer patients (93.4% of the initial sample; 662 men and 476 women).

The age varied from 21 years old to 89 years old (mean±SD: 60.6±14.5 years). The mean BMI was 22.6±3.7 kg/m^2, and the percentage of patients with BMI ≥25 kg/m^2 was 32.5%. Cancer was local in 18.5% (201/1089), regional in 36.8% (401/1089), and metastatic in 44.7% (487/1089) of patients. The purpose of this patients' admission was for diagnosis in 6.0%, chemotherapy in 49.6%, radiotherapy in 9.9%, surgery in 15.6%, target/hormone therapy in 4.3%, palliative care in 9.3%, cancer/treatment-related complications in 5.3%. The percentage of patients with local or general infection was 14.6% and 3.2%, respectively. The patient characteristics by type of cancer were listed in Table 1.

Prevalence of malnutrition

Overall, 41.3% of patients (40.9% of the women and 41.6% of the men) were malnourished. In total, 64.0% of the patients had experienced WL in the past 6 months; 44.5% had lost more than 5% of their body weight, and 26.6% had lost more than 10%. In addition, 85.5% of the patients with WL had experienced an unintentional change in weight. Analysis of the prevalence of malnutrition by type of cancer was as follows: 32.1%, lung (n=244); 45.1%, colon/rectum (n=168); 59.3%, esophagus/stomach (n=155); 67.0%, head and neck (n=94); 36.0%, hematology (n=80); 19.0%, breast (n=79); 31.6%, hepatobiliary (n=59); 34.2%, uterus/ovaries (n=57); 63.0%, pancreas (n=30); 33.3%, kidney/bladder (n=28); 28.6%, prostate/ testicles (n=14); and 36.3%, other disease sites (n=130) (Figure 1A). The prevalence of malnutrition was 32.0% (n=56) in patients with localized cancer, 40.9% (n=153) in patients with regional cancer, and 46.5% (n=198) in patients with metastatic cancer. The NRI was calculated for a subgroup of 955 patients for whom recent (in the previous week) serum albumin results were available. The prevalence of malnutrition as determined by the NRI was 51.4% (24.8% were severely malnourished, 26.6% were moderately malnourished and 7.9% were mildly malnourished). The relationship between malnutrition (determined by BMI and/or body WL) and malnutrition (determined using the NRI) is shown in Figure 1B, and the Spearman rank correlation coefficient was 0.300 (p<0.0001).

Relationship between nutrition status and PS or incidence of infection

The PS was 0 for 570 patients (50.3%), 1 for 173 (15.4%), 2 for 157 (13.9%), 3 for 105 (9.3%), 4 for 125 (11.1%). The prevalence of malnutrition was stratified by the PS. There was a small difference in the incidence between malnutrition determined by the BMI and/or WL and that determined by the NRI for patients with a PS from 0 to 4 (Figure 2). Compared with patients with a PS of 0-1, for patients with a PS of 3-4, the relative risk of malnutrition was 1.275 (95% CI 0.250-0.488, p<0.0001). The percentage of patients with infection (including local and general) was respectively 10.8% (47/435) in well-nourished patients versus 20.4% (92/450) in moderately or severely malnourished patients determined using the NRI (Table 2), and the relative risk of infection was 2.121 (95% CI 1.451- 3.101, p<0.0001). The percentage of patients with infection was respectively 13.3% (75/563) in non-malnourished patients versus (78/390) 20.0% in malnourished patients determined by the BMI and/or WL (Table 2), and the relative risk of infection was 1.627 (95% CI 1.149- 2.302, p<0.0001).

Nutrition support

Overall, 38.6% of patients received nutrition support. In all, 45.0% of the malnourished and 31.9% of the non-malnourished patients received nutrition support: 14.0% of the patients were receiving nutrition counseling (41.0% of the malnourished patients and 48.1% of the non-malnourished patients), 8.9% of the patients were receiving oral nutrition support (47.0% of the malnourished patients and 44.0% of the non-malnourished patients), 4.1% were receiving EN (43.5% of the malnourished patients and 23.9% of the non-malnourished patients), 9.8% were receiving PN (40.9% of the malnourished patients and 45.5% of the non-malnourished patients), and 1.7% were receiving EN+PN (47.4% of the malnourished patients and 47.4% of the non-malnourished patients). The percentage of patients with nutrition support is shown by disease site in Table 3.

Patients' perception

The percentage of patients with cancer-associated symptoms (including pain, depression, weakness, and poor appetite) is shown in malnourished and non-malnourished patients determined by WL and/or BMI in Figure 3A. The degree of cancer-associated symptoms had significant differences between the non-malnourished and malnourished patients (p<0.05). 63.2% of the patients reported that they were eating less than before diagnosed, 32.7% that they were eating the same quantity as before, and 4.1% that they were eating more than before. The main reasons reported for decreased oral food intake were nausea/vomiting (38.1%), loss of taste/early satiation (25.8%), pain (19.2%), constipation (10.8%), change in taste/smell (8.6%), diarrhea (2.9%), inflammation in the mouth (2.1%), and other factors (9.5%). In total, 70.3% of the patients reported that they had no difficulty complying with their treatment, and 19.2% of them had difficulty. The 65.4% of patients who believed that nutritional support benefits to them (Figure 3B). Neither measure showed significant differences between the non-malnourished and malnourished patients (p>0.05).

DISCUSSION

Malnutrition is known to increase the risk of infection and impair the clinical outcome of patients with cancer. This study, conducted on a large population of hospitalized patients with non-selected cancer in 29 tertiary public hospitals wards from 14 cities covering the eastern, central and western regions of China, showed a high prevalence of malnutrition (41.3%) and a high rate of malnourished patients not receiving nutrition support [(55.0%), including nutrition counseling and/or oral nutrition support and/or EN and/or PN].

There is not yet a universally accepted standard method for diagnosing malnutrition in cancer patients. In our study, the criteria for determining the prevalence of malnutrition were very strict, and the prevalence observed probably underestimates malnutrition. The study con-

Table 1. Patient characteristics

Type of cancer	n	Age, M±SD, y	Sex, M/F	Tumor, Local/ regional/ metastatic	BMI, M±SD, kg/m^2	Unintentional WL%	Body WL% M±SD, kg/m^2	Chemotherapy %	Infection, none/local/ general	PS, 0/1/2/3–4
Lung	224	63.8±11.4	178/66	35/70/106	23.0±4.2	60.7	2.7±9.6	56.2	170/42/3	101/47/32/54
Colon/rectum	168	62.3±17.8	124/64	17/52/82	22.7±3.4	64.3	7.7±9.3	60.3	130/16/2	83/14/17/39
Esophagus/stomach	155	62.9±11.7	90/65	14/60/55	21.2±2.9	76.1	11.5±10.2	65.6	105/20/2	63/24/17/26
Head and neck	94	59.5±12.3	73/21	36/29/21	22.4±3.5	71.3	5.0±7.4	43.3	80/7/0	55/7/16/10
Hematology	80	59.2±15.3	51/29	9/40/22	22.7±3.7	62.5	4.5±10.1	75.9	49/14/15	39/15/8/17
Breast	79	58.3±12.9	0/79	19/23/29	24.6±4.0	54.4	0.7±7.4	48.6	58/11/0	37/18/9/10
Hepatobiliary	59	49.7±13.1	37/22	14/18/19	22.1±3.0	57.6	4.8±5.8	28.3	40/7/5	28/8/8/9
Uterus/ovaries	57	54.9±14.6	0/57	4/26/25	23.3±3.9	59.6	3.9±7.6	56.2	49/6/1	22/13/10/11
Pancreas	30	65.4±11.4	18/12	2/6/13	23.0±3.8	70.0	6.6±14.4	52.4	16/2/1	5/4/5/7
Kidney/bladder	28	64.6±10.2	19/9	4/9/14	23.3±3.7	71.4	1.8±9.8	53.6	21/7/0	12/3/7/6
Prostate/ testicles	14	68.2±9.4	14/0	1/2/9	23.4±3.1	64.3	4.1±7.0	69.3	9/3/1	7/1/2/3
Others	130	57.1±15.5	78/52	20/47/43	22.8±3.9	60.6	3.0±7.8	55.6	89/10/1	49/15/12/29
Total	1138	60.6±14.5	662/476	201/401/487	22.6±3.7	69.1	5.5±9.7	49.6	864/154/34	570/173/157/225

WL: weight loss; PS: performance status.

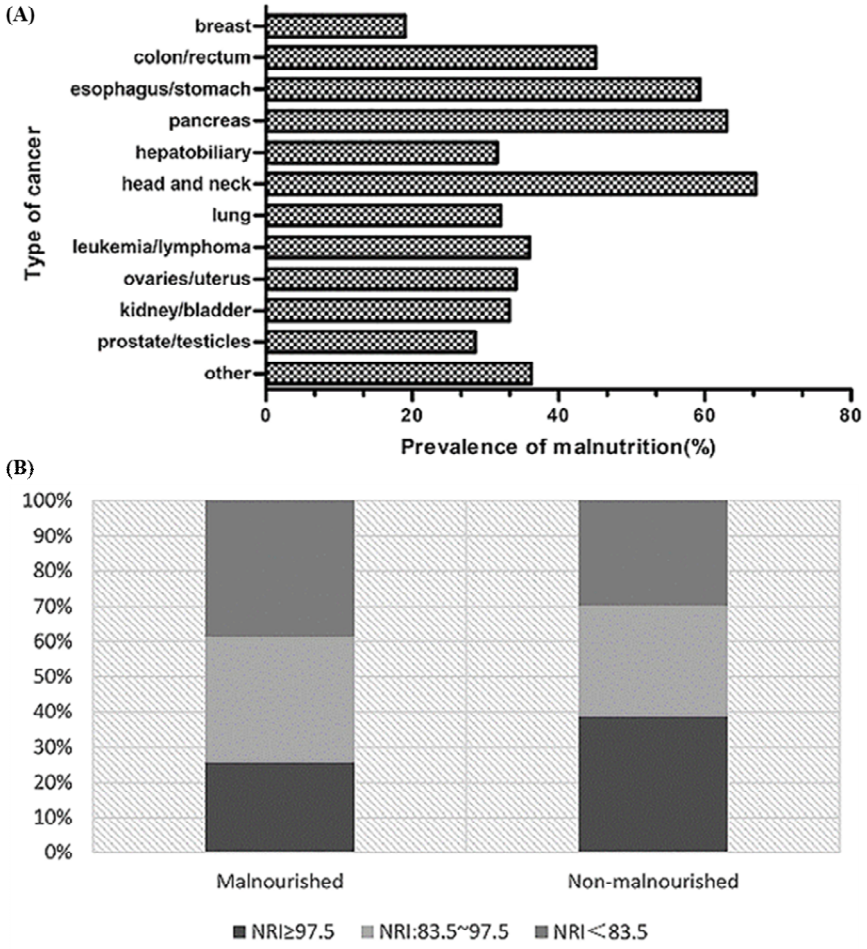

Figure 1. Prevalence of malnutrition. (A) Prevalence of malnutrition by type of cancer. (B) Prevalence of moderate and severe malnutrition determined using the nutrition risk index (NRI) in malnourished and non-malnourished patients (determined by weight loss and/or body mass index).

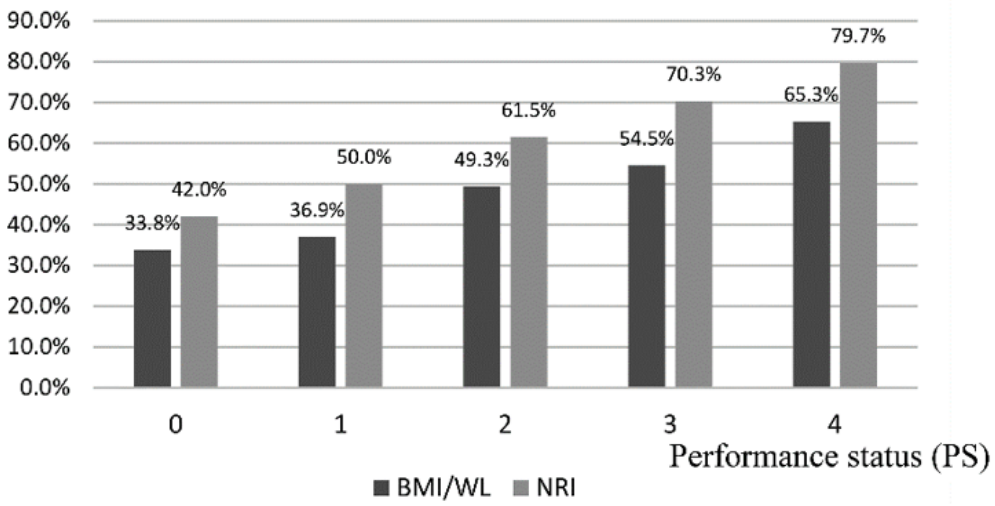

Figure 2. Prevalence of malnutrition determined using the weight loss (WL) and/or body mass index (BMI) and nutrition risk index (NRI) in patients with a performance status from 0 to 4.

ducted in two Chinese teaching hospitals by Yu et al[16] showed that the prevalence of nutritional risk (NRS 2002 score ≥3) among total cancer patients was 45.6% (313/687) at admission and 52.6% (361/687) at 2 weeks after admission or discharge. In another study by Zhang et al[19], nutritional status was determined using the Patient-Generated Subjective Global Assessment (PG-SGA) form in hospitalized patients (n=498) with advanced gastrointestinal cancer. They found that 98% of the patients required nutrition intervention and that 54% of the patients required improved nutrition-related symptom management and/or urgent nutritional support (PG-SGA score ≥9). Planas et al[4] reported that the prevalence of nutritional risk determined using the NRS 2002 was 33.9% at

Table 2. The percentage of patients with infection (including local and general) in malnourished and non-malnourished patients

Nutrition status determined by the NRI or BMI and/or WL	n	% of patients without infection	% of patients with local infection	% of patients with general infection	r	*p*
Nutrition status determined by the NRI	885				0.136	<0.0001
Well nourished	435	52.0	37.0	22.6		
Moderately or severely malnourished	450	48.0	63.0	77.4		
Nutrition status determined by BMI and/or WL	953				0.097	0.007
Non-malnourished	563	61.0	46.7	58.1		
Malnourished	390	39.0	53.3	41.9		

NRI: Nutrition Risk Index; BMI: body mass index; WL: weight loss.

Table 3. The characteristics of participating chefs and cooks (n=90)

Disease site	n	% of patients with NS	% of malnourished patients with NS	% of non-malnourished patients with NS	% receiving nutrition counseling	% receiving ONS	% receiving EN	% receiving PN
Lung	244	19.0	22.5	12.6	9.5	5.0	2.3	2.8
Colon/rectum	168	54.3	56.3	52.6	14.6	16.6	4.0	19.9
Esophagus/stomach	155	63.1	63.8	57.1	21.5	16.2	16.1	16.1
Head and neck	94	40.7	41.9	36.7	23.3	2.3	9.3	5.8
Hematology	80	20.8	21.4	17.8	6.5	6.5	1.3	6.5
Breast	79	18.3	40.0	14.5	11.3	5.6	1.4	1.4
Hepatobiliary	59	41.5	46.7	39.4	15.1	11.3	3.8	11.3
Uterus/ovaries	57	35.1	39.4	23.5	8.8	10.5	1.8	15.8
Pancreas	30	57.1	60.0	54.5	14.3	4.8	4.8	33.3
Kidney/bladder	28	57.1	87.5	43.8	21.4	14.3	7.2	17.9
Prostate/ testicles	14	50.0	66.7	50.0	16.7	0	16.6	25.0
Others	130	32.7	39.4	28.6	12.5	7.7	3.8	8.7
Total	1138	38.6	45.0	31.9	14.0	8.9	5.8	11.5

NS: nutrition support; ONS: oral nutritional supplements; EN: enteral nutrition; PN: parenteral nutrition.

hospital admission and 36.4% at discharge, respectively. In another study of upper gastrointestinal cancer patients on chemotherapy, the prevalence of malnutrition was 52%.[15] In the study by Wie et al,[8] the overall prevalence of malnutrition was 61%, varying by cancer type and stage. In addition to differences in diagnosis criteria, the inconsistency of the prevalence of malnutrition among cancer patients is also associated with different cancer types. It has been reported a lower incidence of malnutrition in breast cancer patients, which is 15-20%, even though these numbers are also heavily influenced by the criteria used to diagnose malnutrition.[6,16,23] Similarly, in this study, the lowest prevalence of malnutrition was 19.0% in patients with breast cancer and 32.0% in patients with localized cancer. The results also showed that malnutrition may be observed in the early stages of the disease and that malnutrition contributes to impairment of the clinical status. In addition, in our study, the prevalence of malnutrition as determined by the NRI was 51.4% (24.8%, severely malnourished; 26.6%, moderately malnourished; and 7.9%, mildly malnourished). It is difficult to conclude whether the NRI is a good nutritional indicator, but it has a good correlation with infection. Tappenden et al[24] deemed that relying as it does on the serum albumin level, the NRI may in fact be more indicative of disease severity than of true malnutrition.

Our study showed that 64.0% of the patients had experienced WL in the past 6 months and that 63.2% of the patients had had lower food intakes since disease onset. It is well known that WL and poor food intake will often result from the side effects of cancer treatments (drug- or radiation-therapy and surgery) or tumor-related local effects, such as anorexia, nausea/vomiting, pain, fatigue, dry mouth or mouth ulcers, constipation, and diarrhea due to infections or malabsorption.[25] However, those symptoms are often underestimated both by patients and doctors, and their nutrition impacts have yet to be fully elucidated. In our study, the two main causes of decreased oral food intake were nausea/vomiting and loss of taste/early satiation. Better knowledge of those indirect effects of cancer or its treatments is warranted to generate evidence-based clinical, preventive, and therapeutic guidelines.

Physical functioning is usually assessed objectively by using PS scales; it is clearly a key component of quality of life and has been regarded as an important indicator of prognostic value for survival.[14] Impaired physical performance in cancer patients are all independently associated with an unfavorable prognosis, increased toxicity of anticancer treatments as well as reduced quality of life, and shorter survival.[26] Malnutrition is strongly associated with the PS. In our study, the percentage of patients with a PS of 0 was 50.4%; however, more than one-third of PS 1 patients had underlying malnutrition. Moreover, nearly half of the PS 2 patients were also malnourished. Consequently, screening all hospitalized patients with cancer for malnutrition before initiating cancer treatment is strongly recommended.

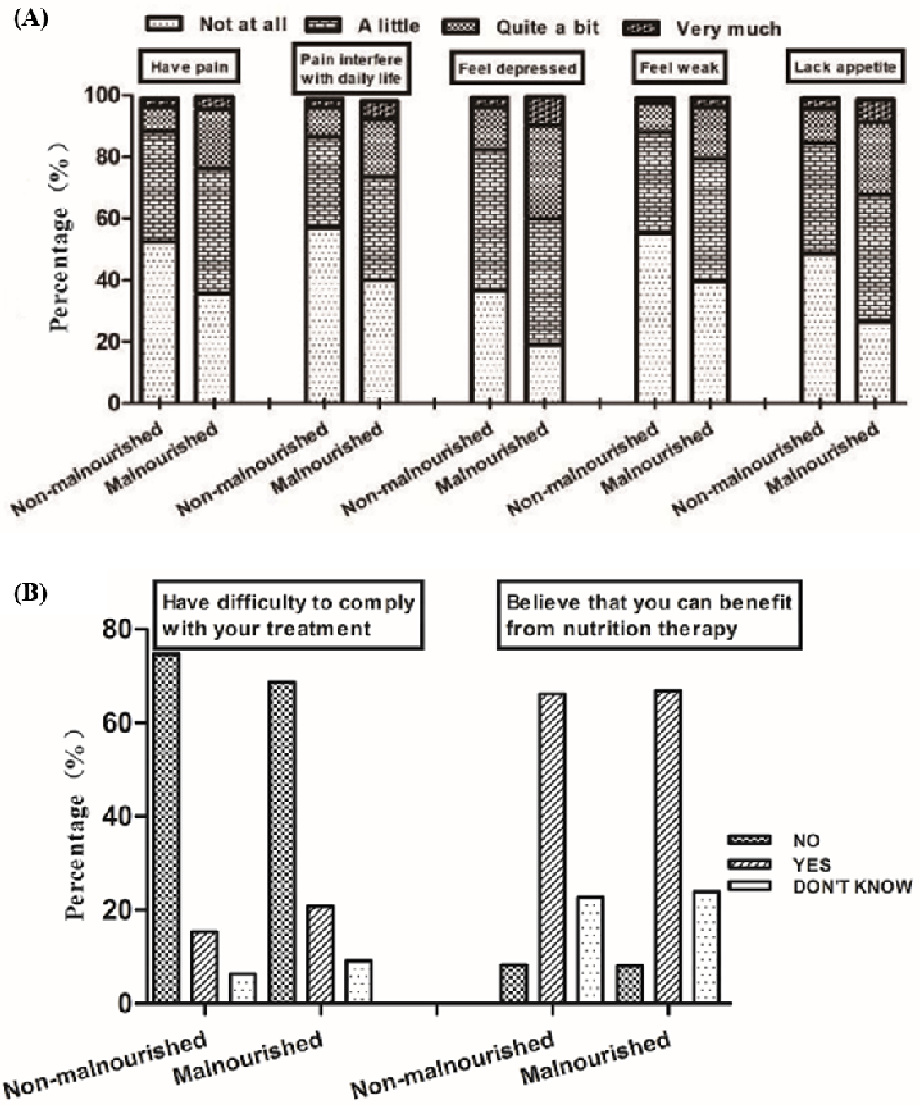

Figure 3. The patients' subjective perception. (A) The percentage of cancer-associated symptoms in malnourished and non-malnourished patients (determined by weight loss and/or body mass index). (B) The patients' perception regarding treatment in malnourished and non-malnourished patients.

Nutritional therapy and metabolic interventions in cancer patients aim to maintain or improve food intake and alleviate metabolic derangements.[3] It is very complex to implement individualized nutritional therapies for cancer patients with malnutrition at the optimal time, let alone for advanced patients with an expected overall survival of less than several months. Unfortunately, data are still lacking to define the optimal time for initiating nutritional support in cancer patients. ESPEN guidelines on nutrition in cancer patients recommend that each institution involved in treating cancer patients define standard operating procedures, responsibilities, and a quality control process.[14] Generally, nutritional therapy should preferably be initiated when patients are not yet severely malnourished and when the goals of care include maintaining or improving nutritional status.[27] Although it is difficult to revert to overt malnutrition in cancer patients with metabolic derangements,[28] there is a general consensus that nutritional intervention is at least partially effective and can improve the clinical outcome in certain settings, such as patients with tumors that impair oral intake or food transport in the upper gastrointestinal tract, with obstructing head and neck cancers, or with expected severe radiation-induced oral or esophageal mucositis.[14] In our study, 38.6% of patients received nutrition support, and 45.0% of the malnourished patients and 31.9% of the non-malnourished patients received nutrition support. In the study by Pan et al,[29] 48.7% of patients were given nutritional treatment when they were diagnosed under risk malnutrition of at the baseline assessment. Hebuterne et al[6] reported that 39.8% of patients receive nutrition support, and 57.6% of malnourished patients and 28.4% of non-malnourished patients receive nutrition support. Silva et al[5] reported that 66.7% of cancer patients at nutritional risk at discharge had not received nutritional support during hospitalization. Comparing the results at home and abroad, we found that only a third of the patients who were at nutritional risk or malnourished had received some type of nutritional support during hospitalization. This finding contrasts with the recommendations regarding nutritional interventions in a step-wise manner in cancer patients issued by ESPEN.[3,14]

Another point to stress is that it is agreed that nutritional counseling is the first and most commonly utilized in-

tervention for managing malnourished patients with cancer, which aims to help manage symptoms and encourage the intake of energy-enriched foods and fluids that are better tolerated; a diet enriched in energy and protein is the preferred way to maintain or improve the nutritional status.[3,14] The additional use of ONS is advised when an enriched diet is not effective in reaching nutritional goals. In our study, only 14.0% of the patients had received nutrition counseling, and 8.9% of the patients had taken oral nutrition support; these findings are significantly lower than the results of foreign studies. Hébuterne et al[6] reported that the percentage of patients receiving nutrition counseling was 35.8%, and that of patients receiving ONS was 31.8%.

The present study has several limitations. First, this was a one-day cross-sectional audit without a later evaluation of outcomes. Further studies should evaluate the benefit of this approach with respect to disease outcomes and the tolerability of cancer therapies.

Second, the definition of malnutrition was not very strict. According to the guideline of ESPEN, apart from BMI and WL, the loss of muscle mass is also a hallmark of cancer cachexia. This factor should be addressed in the future to determine the change in body composition of patients with cancer.

Conclusions

This study shows the high prevalence of malnutrition in hospitalized cancer patients. Weight loss and reduced oral food intake, which are hallmarks of advancing malnutrition, are common. More than half of cancer patients had significant nausea/vomiting and loss of taste/early satiation; thus, malnutrition must be detected and recognized as soon as possible. The inappropriate use of nutritional interventions in Chinese tertiary hospitals highlights the urgent need to define standard operating procedures and a quality control process. Systematic screening and interventions for malnutrition, as well as simultaneous nutrition-related symptom management, is extremely necessary for patients with cancer.

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AUTHOR DISCLOSURES

The authors declare no conflicts of interest.

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