Introduction

Malnutrition is common in patients with cancer with prevalence reported at 40 to 80% (1). Hospitalisation frequently results in further nutritional depletion. Malnutrition increases morbidity and mortality, length of stay and health-care costs and decreases response to treatment and quality of life (2). Nutrition problems are often addressed reactively rather than proactively which means that interventions may only be offered to the severely malnourished (3). Frequently patients with cancer requiring chemotherapy are treated as day patients. Those requiring hospitalisation are often older, malnourished or have an advanced stage of disease. Professional practice has observed that these patients often continue to decline in nutritional status and have poorer tolerance to therapies.

Appropriate screening and assessment to detect patients at risk of becoming malnourished are important to implement effective nutrition strategies. Traditional outcome measures in nutrition studies have included biochemical indicators but these have the disadvantage of being affected by many non-nutritional factors (4). Other tools commonly used in practice, for example the Mini Nutritional Assessment (MNA), have not been validated in patients with cancer. The tool of choice to assess nutritional status and tailor nutrition intervention in patients with cancer is the scored Patient-Generated Subjective Global Assessment (PG-SGA) that has been specifically developed for use in patients with cancer (5). It is an adaptation of the validated nutrition assessment tool, subjective global assessment (SGA) (6). The score can guide the level of nutrition intervention required and be used to triage patients (5). We have previously shown that the scored PG-SGA is easy to use and allows quick identification and prioritisation of malnutrition in hospitalised patients with cancer (7). The PG-SGA score has been correlated with objective nutrition parameters (percentage weight loss, body mass index, quality of life, morbidity, survival, length of stay). It has a high degree of inter-rater reproducibility and a high sensitivity and specificity when compared with other validated nutritional assessment tools (8,9). The aim of this study was to observe the effect of intensive nutrition intervention on the nutritional status of hospitalised patients receiving chemotherapy using the scored PG-SGA.

The effect of intensive dietetic intervention on the nutritional status of hospitalised patients on chemotherapy

Elisabeth Isenring, Judy Bauer and Sandra Capra

Abstract

The goal of nutrition intervention is to maintain or improve nutritional status. Patients receiving chemotherapy face challenges in achieving this goal due to the effects of the tumour, side effects of the treatment or a combination of both. This paper describes observations made of the effect of intensive dietetic intervention on the nutritional status of hospitalised patients with cancer receiving chemotherapy using the scored Patient-Generated Subjective Global Assessment (PG-SGA). There was a significant linear trend in change in PG-SGA score for those patients who improved, maintained or declined in nutritional status according to SGA ($F_{1,15} = 19.2, P = 0.001$). There was no significant linear trend between the time spent by the dietitian in direct patient care and change in nutritional status according to SGA ($F_{1,15} = 3.62, P = 0.08$), however the trend was in the anticipated direction.

Key words: nutrition assessment, nutritional status, scored patient-generated subjective global assessment, malnutrition, cancer, outcomes

Insight

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Subjects and methods

Patients with cancer receiving chemotherapy for curative intent, aged at least 18 years, and admitted to an acute care medical facility were eligible for inclusion in the study over a six-week period. A convenience sample of 16 inpatients from two oncology wards of the hospital agreed to participate in the study: 56% (n = 9) were male and 44% (n = 7) female. The mean age was 59.8 ± 12.4 years. There were 31% (n = 5) of participants who had acute myeloid leukemia, 19% (n = 3) gastric carcinoma, 13% (n = 2) multiple myeloma, 6% (n = 1) acute lymphoblastic leukemia, 6% (n = 1) chronic lymphocytic leukemia, and the remaining 25% (n = 4) had either oesophageal carcinoma, breast cancer, lymphoma, or myosarcoma.

Patients received individualised nutrition intervention in the form of regular and intensive nutrition counselling by a dietitian, following a predetermined standard nutrition protocol, the Medical Nutrition Therapy (Cancer) protocol of the American Dietetic Association (10). This protocol included general guidelines but did permit individualisation of the therapy to meet the specific needs of the patients. Patients were assessed within 48 hours of admission and the appropriate nutritional care plan implemented. Patients who were malnourished or had lost weight involuntarily were counselled to increase their energy and protein food and fluid selections. Oral nutrition supplements were provided if deemed appropriate, on a case-by-case basis. Triage was based on the PG-SGA score and in most cases patients were seen every few days by the dietitian. Nutrition assistants assisted the patients with appropriate high energy and protein and/or modified texture menu selections daily. Outcomes were measured within 48 hours of admission and 14 days after hospital admission. Information on age, gender, treatment and diagnosis was obtained from the medical record.

The dietitian recorded all time spent in direct patient care, i.e. the time spent providing dietetic counselling and organising appropriate menus and oral nutrition supplements.

Data collection

A dietitian experienced in performing SGA and using the scored PG-SGA assessed all patients. SGA was completed as described by Detsky et al. (5) and the scored PG-SGA was completed as described by Ottery (6). Each patient was classified as either well nourished (SGA A), moderately or suspected of being malnourished (SGA B) or severely malnourished (SGA C). In addition, a total PG-SGA score was calculated. While the PG-SGA and SGA scores are related, they are independent assessment and triage systems. The scored PG-SGA consists of two sections: a patient-completed medical component and a component completed by the clinician. The four medical components (weight loss, nutrition impact symptoms, intake and functional capacity) are completed by the patient using a check-box format. The clinician is required to complete the form (diagnosis, age and metabolic stress), conduct a physical examination assessing fat, muscle stores and fluid status and perform a global assessment of nutritional status (SGA). For each component of the PG-SGA, points (0–4) are awarded depending on the impact on nutritional status. Typical scores range from zero to 35 with a higher score reflecting a greater risk of malnutrition and scores at or greater than nine indicating a critical need for nutrition intervention and symptom management.

Statistical analyses were carried out using SPSS Version 10 (SPSS Inc, Chicago, SPSS for Windows, version 10 2000). Paired Student’s t-tests were used to compare mean PG-SGA scores at each time point. Chi-square tests were used to examine SGA classification at each time point. Correlation analysis was used to examine the association between PG-SGA score and BMI (Pearson test) and percentage weight loss in the previous six months and time spent by the dietitian (Spearman test). Linear regression was used to examine the linear trend for PG-SGA score and SGA classification; change in PG-SGA score after two weeks of hospitalisation and change in SGA and time spent by the dietitian with patients and change in SGA. Statistical significance was reported at the conventional P < .05 level (two-tailed).

This study was a secondary analysis of data collected as part of routine clinical practice. The process of nutritional assessment was explained and all subjects gave informed consent prior to any data collection with the data being noted in the medical records.

Results

Nutritional status at baseline

According to SGA, 37.5% of patients (n = 6) were well nourished and 62.5 % (n = 10) malnourished, of which 37.5% (n = 6) were moderately or suspected of being malnourished and 25.0% (n = 4) were severely malnourished at baseline (Table 1).

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Age (years) ± SD</td>
<td>59.8 ± 12.4</td>
</tr>
<tr>
<td>Gender (M:F) (%)</td>
<td>9 (56%): 7 (44%)</td>
</tr>
<tr>
<td>BMI (kg/m²) ± SD</td>
<td>22.8 ± 5.2</td>
</tr>
<tr>
<td>Percentage weight loss in the previous 6 months (93% CI)</td>
<td>1.9 (0, 27)</td>
</tr>
<tr>
<td>PG-SGA score (± SD)</td>
<td>11.4 ± 7.9</td>
</tr>
</tbody>
</table>

Nutritional status

| SGA A (well nourished) (%) | 6 (37.5%) |
| SGA B (suspected or moderately malnourished) (%) | 6 (37.5%) |
| SGA C (severely malnourished) (%) | 4 (25.0%) |

(a) Continuous variables presented as mean ± SD for normally distributed variables or median (range) for data that are not normally distributed.
(b) Categorical variables are presented as counts (%).
Nutritional status after two weeks of hospitalisation

There was no significant change in nutritional status according to PG-SGA score (\(P = 0.90\)), SGA (\(P = 0.137\)) or BMI (\(P = 0.990\)) after two weeks of hospitalisation. According to SGA, 62% (\(n = 10\)) of subjects maintained their nutritional status, 19% (\(n = 3\)) experienced a deterioration of nutritional status and 19% (\(n = 3\)) had an improved nutritional status after two weeks of hospitalisation. The three patients that had a worsening of nutritional status moved from a SGA A (well nourished) classification to a SGA B (suspected or moderately malnourished). The three patients who improved in nutritional status moved from a SGA C (severely malnourished) to a SGA B (suspected or moderately malnourished). The median change in PG-SGA score was 0.19 (range -8.0,13). There was a significant linear trend in change of PG-SGA score for those patients who improved, maintained or declined in nutritional status according to SGA (\(P = 0.001\)) (Table 2). There was a significant correlation between subjects losing the greatest amount of weight in the previous six months and receiving more time with the dietitian (\(r = 0.612; P = 0.012\)). There was no significant linear trend between time spent by the dietitian in direct patient care and change in nutritional status according to SGA (\(P = 0.08\)), however the trend was in the anticipated direction.

**Table 2.** Change in PG-SGA score and time spent with the dietitian after two weeks of chemotherapy treatment in hospitalised patients whose nutritional status deteriorated, maintained or improved according to subjective global assessment classification

<table>
<thead>
<tr>
<th>Variable</th>
<th>Deteriorated nutritional status (n)</th>
<th>Maintained nutritional status (n)</th>
<th>Improved nutritional status (n)</th>
<th>(P^{(a)})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in PG-SGA score</td>
<td>8.0 (\pm) 4.6</td>
<td>0.1 (\pm) 4.6</td>
<td>-6.7 (\pm) 1.5 (^{(b)})</td>
<td>0.001 (^{(a)})</td>
</tr>
<tr>
<td>Time spent with the dietitian (minutes)</td>
<td>77.7 (\pm) 33.4</td>
<td>90.6 (\pm) 37.0</td>
<td>130.7 (\pm) 22.8</td>
<td>0.08 (^{(a)})</td>
</tr>
</tbody>
</table>

\(^{(a)}\) Linear trend examined by regression analysis. 
\(^{(b)}\) A negative value for change in PG-SGA score reflects an improvement in nutritional status.

Discussion

The aim of this study was to observe the effect of intensive nutrition intervention on the nutritional status of hospitalised patients receiving chemotherapy. The prevalence of malnutrition in the study population was high with 62.5% of patients malnourished at admission to hospital. These findings are not unexpected as patients with cancer have the highest incidence of malnutrition (11) and those requiring hospitalisation often have other complications that could impact on nutritional status. The scored PG-SGA was shown to be useful in identifying patients at risk of malnutrition as there was a significant linear trend in PG-SGA score for each SGA classification. The higher PG-SGA scores corresponded to an SGA classification of ‘C’ (severely malnourished).

Although 62.5% of patients were classified as malnourished, the mean BMI of the group was 22.8 \(\pm\) 5.2 kg/m\(^2\). Malnourished patients with cancer may have a BMI within the healthy or overweight range, with body fat masking loss of lean body mass. It is the magnitude of lean body mass lost that results in the increased morbidity and mortality associated with malnutrition (11). These data support the suggestion that weight status alone is not a useful measure of nutritional status.

Patients receiving chemotherapy may experience difficulty in maintaining nutritional status due to the metabolic effect of the cancer itself, the side effects of chemotherapy treatment or a combination of both. Cancer cachexia is a complex metabolic syndrome characterised by weight loss, decreased appetite, and increased energy expenditure. Chemotherapy side effects may include vomiting, nausea, anorexia, mucositis, diarrhoea, constipation and fatigue which may lead to a decreased food intake (2). An additional challenge faced by hospitalised patients is the negative impact the hospitalisation may have on nutritional status due to changes to usual food intake, meal routine, the environment, treatments and fasting for tests and procedures. Therefore the goal of nutrition support for hospitalised patients to maintain or improve nutritional status is even more challenging for patients with cancer receiving chemotherapy.

Early detection of nutritional problems and implementation of dietary modifications is essential for successful outcomes (2). In this study, there was no significant change in the nutritional status of patients after two weeks of hospitalisation according to SGA classification or PG-SGA score. Nutritional status was maintained or improved in 81% of patients according to subjective global assessment. As the PG-SGA score is a continuous measure, it is able to determine smaller changes in nutritional status than SGA, which is categorical. We have previously shown that to move one SGA category a change in PG-SGA score of nine is required (9). In this study after two weeks of hospitalisation there was no significant change in PG-SGA score (median 0.19, range -8.13). These findings are consistent with other studies that have demonstrated that dietary intervention in hospitalised patients can maintain or improve nutritional status (12).

There was no significant linear trend between the time spent with the dietitian in direct patient care and the change in nutritional status, however the trend was in the expected direction. The patients who received more time with the dietitian had SGA classifications of B (suspected or moderately malnourished) and C (severely malnourished) on admission and significant unintentional weight loss in the previous six months. Patients who received less time with the dietitian were classified as well nourished (SGA A) on admission, however three of these patients deteriorated in nutritional status over the course of treatment. This highlights the importance of ongoing monitoring of patients’ nutritional status, especially those...
at nutritional risk. One could hypothesise that a patient who received more time with a dietitian providing counselling and nutrition support would have greater improvements in nutritional status than a patient who received less time. However the small sample size limited the ability to detect any difference. The presence of a good food and nutrition service system ensured that the nutrition support was delivered as prescribed which may also partially account for this finding.

Limitations of this study include the possibility of selection bias introduced by the convenience sample and the exclusion of patients with physical, cognitive or emotional problems that prevented them from completing the scored PG-SGA. There was no control group in this study and hence the results are observations from practice rather than direct evidence that nutrition intervention maintained nutritional status. Patients were not followed up after discharge to assess whether the dietetic intervention resulted in maintenance of nutritional status in the longer term or differences in outcomes such as morbidity and mortality. Recommendations for further research include a randomised, controlled trial investigating the impact of intensive nutrition intervention versus usual care in hospitalised patients receiving chemotherapy.

Conclusion

Intensive dietetic intervention did not improve the nutritional status in this group of hospitalised patients with cancer receiving chemotherapy. However, this study does demonstrate the usefulness of the scored PG-SGA in practice. Further work needs to be conducted to determine the impact of intensive nutrition intervention versus usual care in this population.

References