Original Article

Taiwanese Version of the M. D. Anderson Symptom Inventory: Symptom Assessment in Cancer Patients

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Abstract

The purpose of this study was to validate the Taiwanese version of the M. D. Anderson Symptom Inventory (MDASI-T) in a sample of 556 Taiwanese patients with multiple diagnoses of cancer. The internal consistency Cronbach alpha was 0.89 for symptom severity items and 0.94 for interference items. The test-retest reliability was 0.97 for the severity composite score and 0.96 for the interference composite score over a 3-day interval in a sample of 12 patients. Construct validity was established by factor analysis, which revealed a two-factor structure. Concurrent validity was examined by correlating the MADSI-T scores and scores of the Medical Outcome Study 36-Item Short-Form Health Survey. Known-group validity was established by comparing MDASI-T scores between patients having low functional status and those having high functional status (Karnofsky Performance Status scores ≤ 50 or > 50, respectively) and between inpatients and outpatients. The MDASI-T's sensitivity (its ability to detect small differences in reporting variations) was examined by comparing the MDASI-T composite symptom scores and composite interference scores before, during, and one week after treatment in a sample of 20 breast cancer patients receiving chemotherapy. The MDASI-T is a reliable, valid, and sensitive instrument for measuring the severity and interference with daily life of cancer-related symptoms among Taiwanese cancer patients. J Pain Symptom Manage 2007;33:180–188.

Key Words

Taiwan, symptoms, assessment tool, validation, reliability, validity, sensitivity

Introduction

Cancer is the leading cause of death in Taiwan. Although cancer patients often experience multiple symptoms caused by cancer or its treatment,[1] little is known about the prevalence, severity, or management of cancer-related symptoms in Taiwan. Unrelieved symptoms greatly affect a patient's quality of

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life and ability to function. Relief of cancer-related symptoms is, therefore, essential for health promotion efforts aimed at improving quality of life and maintaining a sense of well-being for people living with cancer. Despite the fact that many cancer-related symptoms can be partially or totally relieved through deliberate use of pharmacologic and other interventions,[2] several factors limit the effective management of such symptoms.[3]

Inadequate patient-provider communication about symptoms and patient misconceptions about symptom management are primary barriers to adequate control of cancer-related symptoms. Effective management relies on accurate communication between patients and health care providers. In many clinical practice settings, communication about symptoms is hindered by infrequent use of standardized tools for symptom assessment.[4,5] Hence, clinicians often underestimate the severity of patients' symptoms[6] and frequently underprescribe analgesics and other therapies for symptom relief.[7] Use of a well-developed multisymptom scale that provides a method for monitoring and quickly assessing cancer-related symptoms can thus be an effective way to enhance communications between patients and health care providers and ultimately to improve the management of cancer-related symptoms.

A variety of assessment instruments have been used in Western countries to identify cancer symptoms. These instruments include the Symptom Distress Scale,[8] the Memorial Symptom Assessment Scale,[9] the Rotterdam Symptom Checklist,[10] the Edmonton Symptom Assessment System,[11] and the M. D. Anderson Symptom Inventory (MDASI).[12] Although all of these assessment instruments are well established and have been demonstrated to have good reliability and validity, the MDASI has several advantages over the others.

The MDASI was developed specifically to measure multiple symptoms in cancer populations and contains a set of common symptoms that can be rated by all cancer patients from the time they begin treatment throughout the course of their disease. The MDASI assesses not only symptom severity but also how symptoms interfere with physical and affective functional domains, essential for understanding how cancer-related symptoms affect a patient's quality of life. Moreover, the MDASI is easy for most patients to complete because its 0−10 rating scale is frequently used in clinical practice and is familiar to most patients. The MDASI has been translated into a number of languages (including Chinese and Japanese) and its psychometric properties have been established.[13,14]

The purpose of our study was to establish the psychometric properties, including validity, reliability, and sensitivity, of a Taiwanese version of the MDASI (MDASI-T) in a sample of Taiwanese cancer patients, and to investigate the severity and prevalence of cancer-related symptoms experienced by Taiwanese cancer patients. Validation of the MDASI-T will provide a suitable tool for the rapid screening of cancer-related symptoms in Taiwanese cancer patients and will facilitate cross-cultural comparison of results from studies in various countries.

Methods

Participants and Settings

A cross-sectional and descriptive correlational design was used in this study. The study was approved by the Institutional Review Boards of Taipei Medical University in Taiwan and by The University of Texas M. D. Anderson Cancer Center in the United States. A convenience sample was recruited from outpatient oncology clinics, inpatient oncology units, and the palliative care unit at two medical centers in southern Taiwan and two medical centers in northern Taiwan. Selection criteria required participants to 1) have a pathological diagnosis of cancer, 2) be 18 years or older, and 3) be able to communicate in Mandarin or Taiwanese. Patients were excluded if they were cognitively impaired, refused to participate, or could not understand the intent of the study. The final sample consisted of 556 patients, including 196 oncology outpatients, 140 oncology inpatients, and 220 palliative care inpatients.

Instruments

A four-part survey was used to collect the data. The survey included 1) the MDASI-T, 2) the Medical Outcome Study 36-Item Short-Form Health Survey (SF-36), 3) the Karnofsky

Performance Status (KPS), and 4) a demographic questionnaire.

The Taiwanese Version of the M. D. Anderson Symptom Inventory. The original MDASI was developed to measure 13 symptoms in patients with cancer, including intensity and subsequent interference with life activities, in the previous 24-hour period. The first part of the MDASI consists of 13 single-item measures of symptom intensity, including fatigue, sleep disturbance, pain, drowsiness, poor appetite, nausea, vomiting, shortness of breath, numbness, difficulty remembering, dry mouth, distress, and sadness. Each symptom item is rated on a scale of 0 (not al all) to 10 (as bad as you can imagine). The second part of the MDASI assesses the extent to which symptoms interfere with general activities, mood, normal work, relations with other people, walking, and enjoyment of life. Each of the six interference items is rated on a scale of 0 (does not interfere) to 10 (completely interferes). A symptom severity composite score (average of the 13 symptom items) and an interference composite score (average of the six interference items) were computed. The validity and reliability of the MDASI have been established.[12]

The MDASI-T was developed using a translation and back-translation process. The MDASI was first translated from English into Taiwanese by a bilingual person. A second bilingual person who had not seen the original English version back translated each item from Taiwanese into English. The back-translated items were compared with the original English items for congruency. This process was repeated until the back-translated items and the originals agreed.

The Medical Outcomes Study Short Form-36, Taiwanese Version. The SF-36 measures health-related quality of life, including concepts of physical functioning (10 items), role limitations due to physical health problems (four items), bodily pain (two items), general health (five items), vitality (four items), social functioning (two items), role limitations due to emotional problems (three items), and mental health (five items). The Taiwanese version of SF-36 was validated in a healthy adult sample.[15,16]

Karnofsky Performance Status. The KPS was used to assess patients' performance status. The KPS is rated on a scale of 1−100, in steps of 10. The KPS has been documented to have good predictive validity.[17]

Questionnaire for Demographic and Disease Information. A demographic information sheet covered basic patient information, including age, gender, education, marital status, religious beliefs, and occupation. A disease information sheet covered a patient's diagnosis, medications, and treatment status, as well as whether metastasis had occurred.

Procedure

Approval for this study was obtained from the Human Subject Committee of the hospital. The research assistant individually approached patients to describe the study and obtain informed consent. After their informed consent was obtained, the patients were asked to complete self-administered questionnaires.

Statistical Analysis

The reliability and validity of the MDASI-T were evaluated as follows. Internal consistency was established by calculating the Cronbach alpha coefficient, which ranges from 0 to 1 with higher values indicating less measurement error. Test-retest reliability was evaluated by calculating the Pearson product-moment correlation coefficient between pretest and posttest with a 3-day interval in a sample of 12 patients. Construct validity was established by principal-axis factor analysis with direct oblimin rotation. The number of factors was identified using a scree test, a plot showing the number of factors against the eigenvalues. Cluster analysis was used to explore the symptom patterns of the Taiwanese cancer patients. Convergent validity was examined by calculating the Pearson product-moment correlation coefficient between the MDASI-T scores (the symptom severity and interference composite scores) and scores of the SF-36. The Pearson product-moment correlation coefficient between the MDASI-T interference composite score and the KPS score was also computed.

Known-group validity was established by comparing the MDASI-T symptom and interference severity composite scores between patients having low functional status (KPS score

≤50) and those with high functional status (KPS score >50), and between inpatients and outpatients. We hypothesized that inpatients and patients with poor functional status would have more severe symptoms and interference than would outpatients and patients with better functional status. Known-group validity was also established by comparing the MDASI-T symptom severity composite scores from oncology outpatients, oncology inpatients, and palliative inpatients. We hypothesized that palliative inpatients would report the most severe symptoms, followed by oncology inpatients, then by oncology outpatients.

In addition to the reliability and validity analyses, we examined the MDASI-T's sensitivity (its ability to detect small differences in reporting variations) by comparing its severity composite scores and interference composite scores before, during, and one week after treatment in a sample of 20 breast cancer patients receiving chemotherapy. We hypothesized that patients would experience the most severe symptoms during chemotherapy treatment, less severe symptoms one week posttreatment, and the least severe symptoms before beginning treatment. Repeated measure analysis of variance was used to examine these hypotheses. All statistical procedures were performed using SPSS statistical software, version 12. All *P*-values were set at 0.05.

Results

Participant Characteristics

Demographic and disease-related characteristics of patients are presented in Table 1. Thirty-five percent of participants were retired. Most of the participants were palliative inpatients, slightly fewer were oncology outpatients, and the remaining were oncology inpatients. The participants were diagnosed with various types of cancer, including lung (12), breast (12%), brain (12%), colorectal (11%), cervical (9%), gastric (8%), nasopharyngeal (8%), hematologic (8%), liver 4%), oral (3%), ovarian (3%), and various other types (10%), and most had metastatic disease.

Table 1
Demographic and Disease-Related Characteristics of Patients ($n = 556$)

Characteristics	Mean	SD
Age (years)	60.44	13.29
Education (years)	8.19	5.19
KPS	51.85	25.79
	n	%
Sex		
Male	304	55
Female	252	45
Marital status		
Married	415	75
Other	141	25
Disease stage		
Localized	392	71
Metastasized	164	29
Recruitment sites		
Oncology inpatient	196	36
Oncology outpatient	140	25
Palliative care inpatient	220	39

Construct Validity

The scree test indicated a two-factor solution. Confirmatory factor analysis (principal-axis factor analysis with oblimin rotation) was used to determine the underlying constructs measured by the items in the MDASI-T. The analysis generated a two-factor solution (general and gastrointestinal symptoms) for symptom severity items (Table 2). Two factors had eigenvalues ≥1.0, accounting for 55.1% of the variation in the current analysis.

Groups of similar items were identified using hierarchical cluster analysis (Fig. 1). Clusters were formed using the average linkage between groups. As shown in Fig. 1, distress was linked to sadness, fatigue was linked to sleep, dry mouth was linked to poor appetite, difficulty remembering was linked to drowsiness, and nausea was linked to vomiting.

Table 2
Factor Analysis for the MDASI-T ($n = 556$)

	Factor Loading	
Symptom Item	Factor 1	Factor 2
Pain	**0.67**	0.27
Fatigue	**0.72**	0.27
Disturbed sleep	**0.71**	0.34
Distress	**0.84**	0.37
Shortness of breath	**0.64**	0.38
Difficulty remembering	**0.59**	0.31
Poor appetite	**0.67**	0.40
Drowsiness	**0.68**	0.38
Dry mouth	**0.54**	0.26
Sadness	**0.79**	0.32
Numbness	**0.43**	0.25
Nausea	0.49	**0.84**
Vomiting	0.35	**0.80**

Bold numbers indicate a high factor loading on the factor.

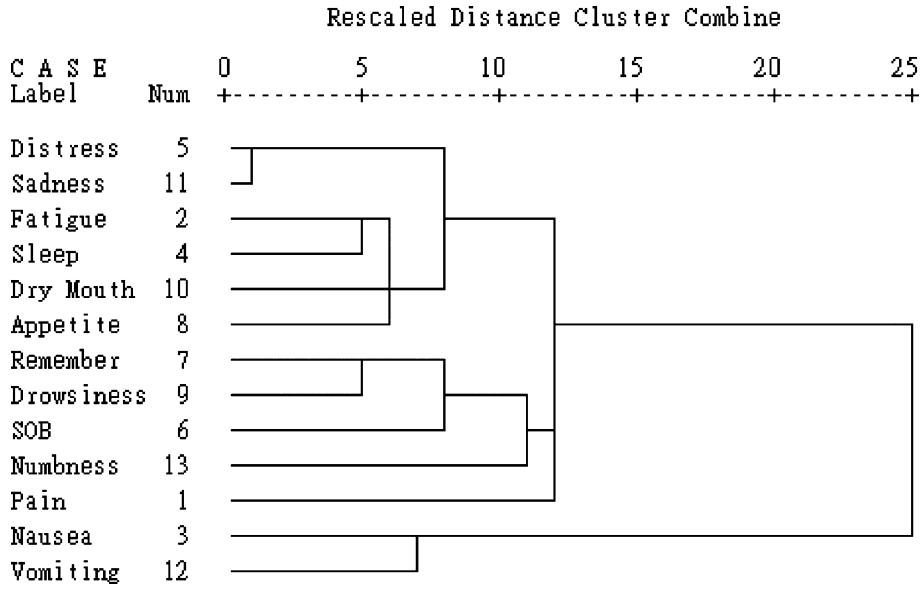

Fig. 1. Cluster analysis: relative distance among MDASI-T symptom items. This dendrogram shows the results of a cluster analysis that was performed to examine the similarity of the symptom items. Clusters were formed based on the distance between symptom ratings, which was calculated using squared Euclidian distances. Symptoms that join together earlier (toward the left side of the figure) are more similar than symptoms that join together later (toward the right side of the figure).

Concurrent Validity

The MDASI-T scores (the symptom severity and interference composite scores) were significantly correlated with the selected SF-36 subscales and the KPS scores (Table 3). The results support the hypotheses that the MDASI-T severity and interference scores correlate with the quality-of-life domains measured by the SF-36 and with functional status measured by the KPS.

Known-Group Validity

As we hypothesized, patients with lower functional status (KPS score ≤ 50) reported significantly greater symptom severity and symptom interference than patients with higher functional status (KPS score > 50). Similarly, inpatients reported significantly increased levels of symptom severity and symptom interference compared with outpatients (Table 4).

Table 3
Correlation Between MDASI-T, Selected SF-36 Subscales, and KPS ($n = 556$)

	MDASI-T Severity	MDASI-T Interference
Physical functioning	−0.72	−0.64
Role functioning physical	−0.50	−0.54
Role functioning emotional	−0.58	−0.60
KPS	−0.73	−0.66

$P < 0.05$ (two-tailed) for all values.

Internal Consistency

Internal consistency was established by calculating the Cronbach alpha coefficient. Coefficients of 0.89 for the MDASI-T symptom scales and 0.94 for interference items indicate the good internal consistency of the MDASI-T (Table 5).

Prevalence and Severity of Symptoms

Patients' ratings of symptom severity using the MDASI-T are presented in Table 5. Fatigue was the most severe and most prevalent symptom. Overall, the three most severe symptoms were fatigue, poor appetite, and disturbed sleep. The three most severe symptoms by group were: for the oncology outpatient group, fatigue, dry mouth, and disturbed sleep; for the oncology inpatient group, fatigue, poor appetite, and dry mouth; and for the palliative care group, fatigue, disturbed sleep, and drowsiness. The most prevalent severe symptoms (ratings ≥ 7) experienced by more than half of all patients were fatigue, poor appetite, disturbed sleep, and dry mouth.

Table 4
Mean (SD) MDASI-T Scores by Functional Status (KPS) and Recruitment Site

	Low KPS	High KPS	*t*	*P*-value
MDASI-T severity	6.48 (1.23)	3.97 (1.69)	19.48[a]	<0.001
MDASI-T interference	8.51 (1.39)	5.57 (2.64)	15.73[a]	<0.001

	Palliative Inpatient	Oncology Inpatient	Oncology Outpatient	*F*	Post Hoc Comparison
MDASI-T severity	6.51 (1.24)	4.83 (1.71)	3.62 (1.60)	193.26[a]	PI > OI > OO
MDASI-T interference	8.62 (1.20)	6.64 (2.78)	5.03 (2.31)	150.53[a]	PI > OI > OO

PI = palliative inpatient; OI = oncology inpatient; OO = oncology outpatient.
[a]$P < 0.05$ (two-tailed).

Test-Retest Reliability

Test-retest reliability was evaluated by calculating the Pearson product-moment correlation coefficient between pretest and posttest ratings over a 3-day interval in a subsample of 12 cancer inpatients. The test-retest reliability was 0.97 for the MDASI-T severity composite score and 0.96 for the interference composite score.

Sensitivity

We examined the sensitivity of the MDASI-T in a subsample of 20 cancer patients receiving chemotherapy. As we hypothesized, post hoc Sheffe test revealed that patients reported their lowest MDASI-T severity and interference scores before chemotherapy treatment and their highest scores during the treatment (Table 6).

Discussion

The validation study of the Taiwanese version of the MDASI demonstrated that the MDASI-T has good reliability, validity, and sensitivity and is consistent with the psychometrically validated English, Chinese, Japanese, Greek, and Russian versions. The use of the MDASI-T allows study results to be compared across different countries. The MDASI-T is one of few instruments measuring cancer symptoms that was developed with Taiwanese cancer patients and that has shown excellent reliability and validity. The reliability was supported by high internal consistency (Cronbach alpha) and test-retest coefficients. The MDASI-T's overall validity was supported by good concurrent validity, as indicated by significant correlation between MDASI-T and SF-36 subscale scores, and by good known-group validity, as indicated by the higher MDASI-T scores reported by palliative inpatients and patients with poor KPS performance status scores. The sensitivity of the MDASI-T was established by the fact that the MDASI-T scores changed significantly across different chemotherapy stages.

Table 5
MDASI-T Severity, Prevalence, and Internal Consistency ($n = 556$)

	Mean (SD)	% > 0	% ≥ 5	% ≥ 7	Cronbach alpha
Thirteen symptom items	5.07 (1.95)	0	55	19	0.89[a]
Six interference items	6.86 (2.62)	—	—	—	0.94[a]
General symptoms	5.59 (2.03)	0	62	31	0.89[a]
Gastrointestinal symptoms	2.21 (2.86)	55	19	12	0.80[a]
Prevalence by symptom					
Fatigue	7.42 (2.09)	99	91	70	0.88
Poor appetite	6.60 (3.12)	88	81	62	0.88
Disturbed sleep	6.58 (2.72)	92	83	61	0.88
Dry mouth	6.34 (2.59)	95	81	54	0.89
Drowsiness	5.61 (2.88)	90	66	44	0.88
Distress	5.51 (2.90)	88	68	45	0.88
Sadness	5.18 (3.00)	84	64	38	0.88
Pain	4.91 (3.59)	76	56	39	0.88
Difficulty remembering	4.56 (2.79)	84	55	29	0.88
Numbness	4.53 (2.99)	81	54	27	0.89
Shortness of breath	4.24 (3.27)	74	49	31	0.88
Nausea	3.01 (3.48)	54	23	33	0.89
Vomiting	1.42 (2.75)	30	15	10	0.89

[a]Cronbach alpha coefficient for subscale. All other coefficients are Cronbach alpha if symptom item is deleted.

Table 6
Repeated Measure Analysis of Mean (SD) of the MDASI-T Across Different Chemotherapy Stages ($n = 20$)

	Before Treatment 1	During Treatment 2	After Treatment 3		
	Mean (SD)	Mean (SD)	Mean (SD)	*F*	Sheffe Comparison
MDASI-T severity	3.95 (1.47)	6.46 (1.49)	5.45 (1.26)	113.51[a]	2 > 3 > 1
MDASI-T interference	5.73 (2.43)	8.08 (1.72)	6.83 (2.08)	20.09[a]	2 > 3 > 1

[a] $P < 0.05$ (two-tailed).

This study demonstrates that the MDASI-T is feasible for use at different stages throughout the course of cancer disease, that is, treatment, follow-up, and palliative care. It is sensitive to detect differences in symptom severity and interference scores at different stages of the disease and treatment course. Furthermore, the MDASI-T is a simple measure that most Taiwanese patients can complete in a short period of time without too much burden. This could be due to the fact that the MDASI-T contains a minimal set of common symptoms and is rated on a 0—10 numerical scale, which is easy and familiar to Taiwanese patients. It is important to have a brief and simple symptom assessment tool because many cancer patients, especially those who are experiencing a high level of symptom burden, are often too distressed to complete a long or complicated instrument.

In this study, two major symptom clusters (general and gastrointestinal symptoms) were identified based on the distances between symptom ratings. Confirmatory factor analysis also generated the same two-factor solution for symptom severity items. The consistency between cluster analysis and factor analysis results in this study supports the construct validity of the MDASI-T. The result of factor analysis of the MDASI-T in this study is also consistent with results from the validation study for the Chinese,[18] English,[12] and Japanese[14] versions of the MDASI. Furthermore, comparison of cluster analysis results between this study and the validation study for the English and Japanese MDASI[12,14] showed several similarities, with the following five clusters appearing in these three studies: 1) nausea and vomiting, 2) shortness of breath and difficulty remembering, 3) fatigue and disturbed sleep, 4) pain, and 5) numbness. This finding supports the cross-cultural validity of the MDASI-T. Nevertheless, some differences existed in these studies. For example, lack of appetite and dry mouth formed a cluster in this study and the validation study for the English MDASI,[12] but not in the validation study for the Japanese MDASI.[14] In clinical observations, it is common for Taiwanese patients who suffer from poor appetite to also complain about dry mouth.

We have documented in this study the most common and severe symptoms experienced by Taiwanese cancer patients. The most prevalent severe symptoms experienced by more than half of patients were fatigue, poor appetite, disturbed sleep, and dry mouth. Fatigue is an important and common complaint in cancer patients during and after treatment[19] and is related both to cancer and to cancer therapy. It is one of the most common symptoms of hepatocellular carcinoma patients upon admission to the hospice unit in Taiwan.[20] In a Taiwanese sample, 69.2% of patients reported significant fatigue in the past week.[21] Other studies have shown that the prevalence of fatigue in cancer patients ranged from 58% to 75%.[22—25]

Poor appetite, the second most prevalent severe symptom reported by the patients in this study, was especially common and severe in oncology inpatients. Poor appetite was also among the most prevalent symptoms in adult Russian cancer patients[26] and in Japanese children with terminal cancer.[27] Poor appetite is a distressing problem to cancer patients and their families, affecting not only physical symptoms but also psychological, social, and functional aspects of the quality of life.[28] It is quite common for Taiwanese cancer patients and their families to identify poor appetite as a specific contributor to their perceptions of the seriousness of the disease.

Disturbed sleep was the third most prevalent severe symptom reported by all patients in this study and was especially common and severe in oncology inpatients and palliative inpatients. Sleep disturbance was also reported to be the second most severe symptom in Chinese and Russian cancer patients.[18,26] The prevalence of sleep disturbance in cancer patients has been

estimated to be almost twice that in the general population.[29] Although sleep disturbance is one of the most frequently encountered problems among cancer patients, it has received little attention in the oncology literature.[30] Patients with cancer are at high risk for sleep disturbance because of a number of factors, such as demographic, lifestyle, psychological, and disease- and treatment-related issues, that may alter normal sleep regulatory processes.[31]

This study had several limitations. First, test-retest reliability and sensitivity were tested in small samples. These should be tested in a future study with a larger sample size. Second, for this study we recruited a heterogeneous sample of patients with a variety of diagnoses. Future research that compares the severity and prevalence of cancer-related symptoms across different diagnostic groups may provide more understanding about the nature of cancer-related symptoms. Finally, concurrent validity was examined by correlating the MADSI-T scores only with scores of the physical functioning and emotional functioning subscales of the SF-36; there is no other criterion measurement in Taiwan with which one can assess symptom severity and its interference with daily life for patients with cancer.

In conclusion, the findings from this study supported that the MDASI-T is a reliable, valid, sensitive, and clinically easy-to-use measurement of cancer-related symptoms in Taiwanese cancer patients. The MDASI-T is a comprehensive measure that not only assesses the severity of cancer-related symptoms, but also evaluates the extent to which cancer-related symptoms interfere with daily life. In addition to the English version, the MDASI has been translated into and validated in many other languages, such as Chinese, Japanese, Greek, and Russian, so that the use of the MDASI-T allows study results to be compared across different countries. Using a reliable, valid, simple, and easily administered tool can improve communication about cancer-related symptoms between patients and clinicians, and thus has a great potential to improve the management of cancer-related symptoms.

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