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# Care burden and needs assessment tool for family caregivers of elderly palliative cancer patients

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## Abstract

# Objectives

With the growing demand from elderly cancer patients under palliative care at the end of life, family caregivers often face great pressure and burdens. This study aims to develop a burden and needs assessment tool for family caregivers of elderly cancer patients who receive palliative care at the end of life, and identify caregiver needs in the context of eastern culture.

# Methods

After the literature review and two rounds of Delphi consultations from 15 palliative care, geriatric, and oncology experts, a survey questionnaire was developed to assess the care burden and needs of family caregivers of elderly cancer patients who received palliative care at the end of life. Using the convenience sampling method, a multicenter survey was conducted for family caregivers from 30 medical institutions across China, from January to November 2025.

# Results

The final questionnaire included four dimensions and 13 items, with a Kendall coefficient of 0.319, indicating a high degree of consensus on Delphi consultations. The Kaiser-Meyer Olkin value and Bartlett test of sphericity was 0.831 and < 0.001, respectively, with a Cronbach's α coefficient of 0.723–0.860, indicating the satisfactory reliability and validity of the questionnaire. The questionnaire included four main caregiver needs dimensions: medical decision-making needs, social support needs, spiritual and psychological needs, and life support needs. Medical decision-making needs had the highest average score among the survey participants.

# Conclusion

The constructed care burden and needs assessment tool for family caregivers has satisfactory reliability and validity, and can be used as an evaluation tool for care needs.

## Background

The global demographic shift, which is characterized by the accelerating aging process, has fundamentally reshaped the healthcare industry worldwide [1]. This resulted in the continuous and substantial growth in number of elderly patients with end-stage diseases, including various forms of cancer, advanced organ failure, and neurodegenerative diseases [2, 3]. Consequently, there has been a significant surge in demand for specialized palliative care services worldwide, which focus on managing symptoms and enhancing quality of life during the terminal phase of illness [4]. Since the medical needs

of the elderly population are complex, the role of family caregivers has become indispensable, serving as the core component of the home-based palliative care system [5]. These family caregivers of elderly patients with end-stage diseases often take on the demanding, complex, and multi-dimensional responsibility of providing long-term care without adequate formal training and support [6, 7]. The responsibility and commitment required by family caregivers can result in tremendous burdens that impact their overall well-being, from psychological anxiety, depression, and emotional distress to physical decline due to fatigue, sleep deprivation, and neglect of personal health needs, as well as socio-economic strain from loss of income and increased medical expenses [8–10]. All of these burdens can result in compromised physical and mental health in family caregivers, leading to a substantial decline in their quality of life, and highlighting the urgent requirement for targeted support and care for caregivers [11].

Although previous research has developed various tools and strategies aimed at assessing and alleviating family caregiver burdens, these still have limitations: (1) The universality of tools is insufficient: For example, the Career Support Needs Assessment Tool (CSNAT) is not optimized for the long-term needs of dementia caregivers and day-to-day context variations [12, 13]. In addition, a number of tools that were initially developed for conditions, such as dementia or stroke, were later applied to other areas, such as cancer, without careful validation for different patient populations [14]. (2) The sustainability challenge of intervention: Multidisciplinary teams rely on manpower and capital investment, and it is difficult to promote in low-income areas [15, 16]. Therefore, effective support should transition towards efficient, easily deployable, and low-cost intervention methods. (3) Cultural differences were not fully included. A recent comprehensive review of 17 instruments for measuring family caregiver burden revealed that one of the instruments reported cross-cultural validity and responsiveness [17]. Most tools were developed based on Western samples and cultural norms, and lack necessary adjustments to Eastern cultures, where specific traits, such as “family responsibility,” need to be adjusted in a targeted manner [18, 19]. These cultural mandates can influence how burden is perceived and expressed, potentially rendering Western-centric tools inaccurate or invalid in a non-Western context, and resulting in misaligned or ineffective interventions. Thus, a new burden and needs assessment tool is required for family caregivers to address the above-mentioned gaps in advancing palliative care.

Therefore, the present study was conducted to develop a burden and needs assessment tool for family caregivers of cancer patients who receive palliative care at the end of life, and rigorously validate this tool in the context of eastern culture, with the goal of improving the clinical management of family caregiver distress, informing optimized and individualized therapeutic decision-making for family support, and enhancing the quality of life and prognosis of both family members and patients within the palliative care framework.

# Methods

### Study design

## 1. Delphi expert consultations

The research team consisted of a chief physician, a deputy chief nurse, and an attending physician. All team members have long-standing expertise in palliative care, and were responsible for the literature review, expert selection, expert letter questionnaire preparation, letter questionnaire distribution and recovery, and data collation and analysis.

Before designing the expert letter inquiry form, the research team visited palliative care units at four community health service centers in Shanghai, China, in order to understand the present situation of the service needs of elderly patients and their families. The research team members conducted discussions and screenings to form the expert letter inquiry form. The first version of the expert letter questionnaire for the “Family Caregivers’ Care Burden and Needs Assessment Tool for Elderly Cancer End-stage Patients” included five first-level indicators and 19 second-level indicators.

From Beijing, Shanghai, Jiangsu, Hunan, Henan, Jilin, Yunnan, and Liaoning provinces in China, 15 experts involved in palliative care, geriatric, and oncology fields were selected. The expert selection criteria were as follows: (1) engaged in the fields of palliative care, geriatric medicine, geriatric care, and oncology for more than five years, and has an understanding of long-term care for the elderly; (2) with intermediate or above technical titles; (3) willing to participate in the present study.

Two rounds of letter inquiry questionnaires were distributed through WeChat or E-mail. The first round of expert letter questionnaires mainly included three parts: (1) Letter to experts: explains the purpose, significance, and questionnaire recycling time. (2) Expert consultation form: consists of the form description, index importance score, and modification opinions. The index importance score was based on the Likert’s 5-level scoring method, from “very unimportant” to “very important,” corresponding to 1–5 points, respectively. (3) Basic information of experts: Instructs the experts to fill in their personal information, familiarity with research issues, and basis for judgment. The basis for judgment included four items: practical experience, theoretical analysis, reference to domestic and foreign data, and intuitive judgment. A value was assigned according to the degree of influence on expert judgment: practical experience (0.5, 0.4, 0.3), theoretical analysis (0.3, 0.2, 0.1), reference to domestic and foreign data (0.1, 0.1, 0.1), and intuitive judgment (0.1, 0.1, 0.1). The experts’ familiarity with the content of the indicator was assigned into five levels: very familiar, relatively familiar, generally familiar, not very familiar, and unfamiliar. These levels had the following values: 1.0, 0.8, 0.6, 0.4 and 0.2, respectively. After the first round of expert letter inquiries, the research team summarized and analyzed the expert opinions through literature review and group discussion, in order to form the second version of letter inquiries questionnaire, which included the feedback on the first round of consultation results. After two rounds of letter inquiries, the experts’ opinions became consistent, and the letter inquiries were concluded to form the draft questionnaire. The index retention criteria during the research process were, as follows: indicators with an importance score of $> 3.5$, coefficient of variation (CV) of $< 0.3$, and full score rate of $\geq 0.2$. These were combined with the expert’s written opinions and actual situation.

## 2. Development of the family caregivers' care burden and needs assessment tool of elderly cancer patients who receive palliative care at the end of life

Using the convenience sampling method, a cross-sectional survey was conducted for family caregivers involved in palliative care for elderly cancer patients at end-of-life, who visited any of the participating medical institutions across the country. The survey has been performed in accordance with the principles stated in the Declaration of Helsinki. The present study was reviewed and approved by the ethics committee of the Institutional Review Board of Shanghai Cancer Center, Fudan University (Number: 2312288). An informed consent was obtained from all participating family caregivers.

The inclusion criteria for family caregivers were, as follows: (1) age ≥ 18 years old; (2) participated in palliative care for elderly cancer patients (≥ 60 years old) with an estimated survival time of ≤ 6 months; (3) full awareness of the patient's condition; (4) normal language comprehension and communication skills, without a history of mental disorders. The exclusion criterion was individuals with a history of cognitive or psychiatric disorders, who were unable to cooperate in completing the investigation.

The sample size for the formal survey was calculated based on 10 times the number of items in the final questionnaire and 10% invalid questionnaire assumptions.

## 3. Survey recruitment and data collection procedures

The pre-survey was conducted with the draft questionnaire using the convenient sampling method to select 20 participants from Shanghai's medical institutions. When there were uncertain items in the draft questionnaire, revision opinions were determined after discussion with the research group to obtain the final version of the questionnaire.

Using the convenience sampling method, a multicenter cross-sectional questionnaire survey was conducted nationwide from January 2025 to November 2025. Then, item analysis, and reliability and validity tests were conducted. A total of 30 medical institutions participated in the survey: Fudan University Shanghai Cancer Center, Wuxi Hospital of Traditional Chinese Medicine, Guang'an District People's Hospital, Xuhui Kangjian Community Health Service Center, Shanghai, Zhejiang Xin'an International Hospital, The Seventh People's Hospital of Chengdu, Xinxiang Central Hospital, Sanya People's Hospital, Tongling People's Hospital of Anhui Province, Yichun People's Hospital, Linshui County People's Hospital, The First Affiliated Hospital of Ningbo University, Linhai Ziyang Geriatric Hospital, Shiyan People's Hospital, Xiamen Taikang Community Luyuan Rehabilitation Hospital Co., Ltd., The First Affiliated Hospital of Xinxiang Medical University, Xindu District Hospital of Traditional Chinese Medicine, Chengdu, Hongyang Community Health Service Center, Qingbaijiang District, Chengdu, Suining Central Hospital (Department of Oncology, Ward 2), General Hospital of Ningxia Medical University, Hebei Province Cangzhou Hospital of Integrated Traditional and Western Medicine, Chongqing Liangjiang New Area People's Hospital, Baoshan Anli Hospital, The Affiliated Hospital of Shaoxing University, Inner Mongolia Autonomous Region People's Hospital, Hubei Provincial Hospital of Traditional Chinese

Medicine, Dali Bai Autonomous Prefecture People's Hospital, Hefei First People's Hospital, The First Affiliated Hospital of Jinzhou Medical University, and The Second People's Hospital of Lishui.

In order to ensure quality control during the survey process, all research personnel received unified training, which included the following: assessment methods and precautions with unified survey guidance to ensure consistency in understanding the questionnaire, purpose and evaluation content of needs assessment, evaluation methods for the evaluation content, and appropriate process and speech of communicating with patients. During the survey, the data collection was rescheduled when caregivers were too busy or tired, in order to ensure data objectivity and accuracy. The interviewers were instructed not to use inducible language, and not to arbitrarily evaluate the patient's words and needs during the evaluation process. After the questionnaire survey, trained investigators conducted a face-to-face investigation, and communicated with the patient's treating doctor in a timely manner for doubtful or uncertain parts. Meanwhile, the survey results were reviewed together with the patient's medical record.

# Statistical analysis

Data analysis was performed using SPSS 26.0 and Amos 24.0. Categorical and continuous data were expressed in number, frequency, mean, or standard deviation, when appropriate. The expert positive coefficient was expressed as the effective recovery rate of the questionnaire. The expert authoritativeness was described by the authoritative coefficient (Cr), which was the arithmetic mean of the judgment coefficient (Ca) and familiarity coefficient (Cs). The consistency and coordination of expert opinions were described by the CV and Kendall coordination coefficient. A $p$-value of $< 0.05$ indicated that the expert opinions have satisfactory coordination.

The Cronbach's α coefficient, split half coefficient, and intraclass correlation coefficient (ICC) were used to reflect the homogeneity reliability of the scale. The construct validity of the scale was analyzed by exploratory factor analysis. The Kaiser-Meyer Olkin (KMO) value was calculated, and the Bartlett test of sphericity (BTS) was performed to determine whether the factor analysis was appropriate. The factors were extracted by principal component analysis. Then, the extracted factors were verified by confirmatory factor analysis. The parameter estimation method used was the maximum likelihood method. The theoretical structure of the scale was tested by examining the degree of fit between the data and model.

## Results

# Delphi expert consensus and survey questionnaire formation

A total of 15 experts with an age range of 42–80 (54.1 ± 9.2) years old were included. The experience in palliative care of these experts ranged within 7–34 (16.9 ± 8.1) years. A total of 30 questionnaires were distributed in two rounds of expert consultations, with 30 valid consultation reports collected, and a

recycling efficiency of 100%. The Ca, Cs and Cr were 0.953, 0.946 and 0.949, respectively. The Kendall coefficient and W value for the second round of expert opinions was 0.319 and > 0.3, respectively, with statistically significant test results ($p < 005$). All experts had a high degree of consensus on the index structure.

Finally, based on the literature review and expert consultation, the final survey questionnaire for the "Family care burden and needs assessment of elderly patients with cancer at the end of life" with four dimensions and 17 questionnaire items was formed. The four main caregiver needs dimensions were, as follows: medical decision-making needs, social support needs, spiritual and psychological needs, and life support needs. According to the degree of caregivers' need for help for the care burden items listed in the questionnaire, the options were divided into five levels: very needed, needed, indifferent, less needed, and not needed. Each level was given 4, 3, 2, 1 and 0 points, respectively.

## Construct validity

A questionnaire survey was conducted for the caregiving burden and needs of family caregivers of elderly cancer patients who received palliative care at the end of life in multiple provinces, cities, and autonomous regions across China, as listed in the Methods section. A total of 240 valid questionnaire data were collected.

The KMO value was 0.851, and the significance of BTS was < 0.001, indicating that the questionnaire was suitable for exploratory factor analysis (EFA). Principal component analysis and orthogonal rotation were used to perform the EFA on 17 projects. Factor extraction was carried out based on the trend of the gravel plot, and the principle of eigenvalues greater than 1. A total of four factors were extracted, with a cumulative variance contribution rate of 64.19%. The loading for each factor is presented in Table 1. In order to achieve a well-structured questionnaire, items with a factor loading of < 0.4 were excluded. The new KMO value was 0.831, and the BTS was < 0.001, indicating the high structure validity of the questionnaire. Principal component analysis and orthogonal rotation were used to perform the EFA on 13 projects. A total of four factors were extracted, with a cumulative variance contribution rate of 70.69%.

Table 1
Factor loadings.

| F1 | Factor loading | Factor loading after removing items |
|---|---|---|
| **Q1.1** | 0.835 | 0.868 |
| **Q1.2** | 0.808 | 0.864 |
| **Q1.3** | 0.360 | / |
| **F2** | | |
| **Q2.1** | 0.041 | / |
| **Q2.2** | 0.756 | 0.743 |
| **Q2.3** | 0.149 | / |
| **Q2.4** | 0.371 | 0.470 |
| **Q2.5** | 0.085 | / |
| **Q2.6** | 0.663 | 0.706 |
| **Q2.7** | 0.800 | 0.802 |
| **F3** | | |
| **Q3.1** | 0.671 | 0.777 |
| **Q3.2** | 0.650 | 0.849 |
| **Q3.3** | 0.627 | 0.790 |
| **F4** | | |
| **Q4.1** | 0.768 | 0.772 |
| **Q4.2** | 0.639 | 0.762 |
| **Q4.3** | 0.780 | 0.746 |
| **Q4.4** | 0.452 | 0.498 |

Next, the maximum likelihood estimate (MLE) method for confirmatory factor analysis (CFA) was used (Table 2). After removing four items, the final questionnaire contained 13 items. The specific items are listed in Table 3.

Table 2
Confirmatory factor analysis.

| Model | X2/df | RMSEA | CFI | TLI |
|---|---|---|---|---|
| **m4** | 2.755 | 0.086 | 0.924 | 0.894 |

Table 3
Questionnaire items.

| | |
|---|---|
| Medical decision-making needs | I want to better understand the disease. |
| | I hope to receive timely notifications when his/her condition deteriorates, allowing me to respond calmly. |
| **Social support needs** | Due to the increased economic burden of caring for patients, I hope to receive support from the basic medical insurance system. |
| | I hope to receive grief counseling to help me cope with bereavement reactions. |
| | I hope to receive help from volunteer social work services. |
| | I hope to receive assistance from social welfare organizations to alleviate economic difficulties caused by caregiving. |
| **Spiritual and psychological needs** | As I anticipate separation from a close relative, I feel pessimistic, fearful, and anxious, and I hope to receive support when dealing with the death of a patient in the future. |
| | I often feel nervous when I am with the patient and experience a strong sense of responsibility for the patient. When the patient is uncomfortable, I feel self-reproach and guilt, hoping to alleviate the negative emotions caused by caring for the patient. |
| | During conflicts with the patient, I hope to be listened to, supported, understood, and empowered, in order to facilitate reconciliation between myself and the patient, and restore a harmonious relationship. |
| **Life support needs** | Caring for patients interferes with my sleep. I hope to have adequate rest. |
| | Due to personal and social inconvenience caused by caring for the patient, I hope to live closer to home. |
| | Due to physical exhaustion from caring for the patient, I hope to have adequate time to rest. |
| | I hope that the government can implement relevant policies that can provide caregivers with designated periods of paid care leave. |

# Homogeneity reliability

The internal consistency reliability revealed that the internal consistency of the questionnaire was satisfactory, with a Cronbach's α coefficient of 0.723–0.860 (Table 4).

Table 4
Cronbach's α coefficient and split-half coefficient.

| Evaluation dimension | Cronbach's α coefficient | Split-half coefficient |
|---|---|---|
| Medical decision-making needs | 0.723 | 0.730 |
| Social support needs | 0.757 | 0.727 |
| Spiritual and psychological needs | 0.860 | 0.851 |
| Life support needs | 0.796 | 0.812 |

# Caregiver demographics

The 240 family caregivers who participated in the present study were from 12 provinces, two municipalities, and two autonomous regions in China. Among these caregivers, 145 (60.42%) and 95 (39.58%) caregivers were female and male, respectively, with a median age of 57 years old (age range: 19–95 years old).

The total score ranged from 3 to 52, with an average score of 36.16. There was no significant difference in total score between male and female caregivers (37.19 and 35.45, respectively).

### Family caregiver medical decision-making needs, social support needs, spiritual and psychological needs, and life support needs

The needs assessment tool involved four main caregiver needs dimensions: medical decision-making needs, social support needs, spiritual and psychological needs, and life support needs. The median score for each evaluation dimension is presented in Table 5. The number of items included for each dimension was 2, 4, 3 and 4, respectively. The total score for each evaluation dimension was grouped by the number of items, in order to obtain the average score for each dimension. Medical decision-making needs had the highest average score (Figs. 1 and 2).

Table 5
Evaluation dimension score.

| Evaluation dimension | Median | Range | Mean | Standard deviation |
|---|---|---|---|---|
| Medical decision-making needs | 6 | 0–8 | 6.538 | 1.316 |
| Social support needs | 11 | 0–16 | 9.942 | 3.875 |
| Spiritual and psychological needs | 9 | 0–12 | 8.225 | 3.203 |
| Life support needs | 12 | 0–16 | 11.46 | 3.566 |

The top three items with the highest score in the questionnaire (with an average score of ≥ 3) were, as follows:

*“I hope to receive timely notifications when his/her condition deteriorates, allowing me to respond calmly”;*

*“I want to better understand the disease”;*

*“Due to physical exhaustion from caring for the patient, I hope to have adequate time to rest”.*

# Discussion

The growing demand for palliative care among elderly cancer patients at the end of life has placed significant pressure on family caregivers, who are often required to provide complex, around-the-clock support, while coping with emotional, physical, and financial strains [20, 21]. The present study developed a care burden and needs assessment tool for family caregivers of elderly cancer patients under palliative care in China, and further confirmed the effectiveness and reliability of this tool. This needs assessment tool involved four main caregiver needs dimensions: medical decision-making needs, social support needs, spiritual and psychological needs, and life support needs.

Long-term care work has a significant impact on the physical health of caregivers, which manifests as sleep deprivation, chronic fatigue, and self-health problems [22–24]. Around-the-clock or overnight caregivers frequently reported sleep deprivation and disruption, with poor sleep quality, frequent awakenings at night, and reduced total sleep duration [25]. A Spanish study on the careers of patients with multiple diseases revealed that caregivers often ignore their own health management [26]. In the present study, 197 (82.08%) participating caregivers reported that they had insufficient sleep, and needed more sleep time in the process of caring for patients. In addition, 205 (85.42%) caregivers felt exhausted while caring for the patient. All these results reveal that adequate sleep and rest time was one of the most important concerns for family caregivers.

Psychological burden is one of the core challenges faced by caregivers, which mainly manifests as depression, anxiety, and prolonged grief disorder [27, 28]. Caregivers who have lost their loved ones can face high stress of mourning after the patient dies [29]. Several studies have shown that psychological stress in spouse caregivers is particularly prominent. For example, a study on the caregivers of patients with advanced cancer in Veterans Medical Center revealed that spouse caregivers had significantly higher depression and social support scores, when compared to non-spouse caregivers, and that their perception of patients’ unmet needs directly increased their psychological burden [30, 31]. In the present questionnaire results, 151 caregivers checked “need” or “very need” for three items in spiritual and psychological needs, showing a high degree of psychological stress, and the requirement for appropriate interventions to provide caregiver emotional support and mourning counseling.

Family caregivers of elderly cancer patients can experience substantial direct out-of-pocket costs, including expenses on transportation to medical facilities, medications not covered by insurance, food and nutritional supplements, medical equipment and supplies, home modifications for safety and accessibility, and household assistance. These caregivers can also incur indirect cost from decreased

work productivity, lost of income, and debt accumulation [32, 33]. Financial concern was cited as one of the most common concerns among family caregivers of cancer patients under palliative care [34]. The Silver Chain Hospice Care Service in western Australia used CSNAT tools to systematically evaluate a caregiver's physical, psychological, social, practical, economic, and spiritual needs [35]. That study revealed that among caregivers with a mean age of 62 years old, most female caregivers, and caregivers who are married or with *de facto* marriage relationships, 40% of them noted that care for the elderly has a great impact on their occupational status. Some caregivers were forced to reduce working hours or resign due to nursing responsibilities, resulting in a decline in family income. In the present questionnaire, there were two items related to economic and insurance needs: 181 (75.42%) family caregivers believed that a medical insurance system is needed to support them due to the increase in economic burden of caring for patients, and 125 (52.0%) caregivers hoped to get support from social welfare organizations. These data call on policy makers to alleviate economic pressure on caregivers through economic subsidies and flexible employment policies.

The "filial piety ethics" in Eastern culture has forced caregivers to suppress negative emotions, and led to the formation of "emotional silence" when facing elderly patients with serious illnesses [36]. This cultural tendency to avoid discussing end-of-life issues creates an inherently unpleasant situation that isolates family caregivers, and prevents them from openly expressing their emotional burden during the final stages of patient life [37]. Under this cultural background, social support is particularly necessary. Social support can help family caregivers acquire a correct view of life and death, cope with bereavement reactions, and face the death of patients in the future [38].

The strength of the present study was the relatively large sample size obtained from 30 medical institutions across different regions in China, which reinforced the generalizability of the present research findings. However, the present study was limited by the lack of external validation,

In summary, the care burden and needs assessment tool developed for family caregivers of elderly cancer patients who receive palliative care at the end of life carries satisfactory reliability and validity. This can be used as an assessment tool for unmet needs. In addition, multiple unmet needs of family caregivers in the Chinese society were identified, providing an evidence-based foundation for promoting medical services to reduce the burden on these family caregivers.

# Declarations

## Human Ethics and Consent to Participate

The survey has been performed in accordance with the principles stated in the Declaration of Helsinki. The present study was reviewed and approved by the ethics committee of the Institutional Review Board of Shanghai Cancer Center, Fudan University (Number: 2312288). An informed consent was obtained from all participating family caregivers.

# Competing interests

The authors declare no competing interests.

# Consent for publication

Not applicable.

# Authors' contributions

Authors' contributions: Wenwu Cheng: conceptualization, methodology, project administration, writing–review and editing, supervision. Jing Zhang and Lingchen Ren: investigation, validation, analysis, writing – original draft. HongYan Qian, Liangyu Cai, Junxia Yang, Aihong Pan, Kefeng Liu, Hua Guo, Nan Xie, Yanli Wang, Xi Lin, Daqing Xie, Yin Liu, Feng Cao, Zezhou Wang and Yuezhong Tang: resources, investigation (pre-screening), writing – review and editing.

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# Author Contribution

Authors' contributions: Wenwu Cheng: conceptualization, methodology, project administration, writing–review and editing, supervision. Jing Zhang and Lingchen Ren: investigation, validation, analysis, writing – original draft. HongYan Qian, Liangyu Cai, Junxia Yang, Aihong Pan, Kefeng Liu, Hua Guo, Nan Xie, Yanli Wang, Xi Lin, Daqing Xie, Yin Liu, Feng Cao, Zezhou Wang and Yuezhong Tang: resources, investigation (pre-screening), writing – review and editing.

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# Availability of data and material

The datasets generated and/or analyzed during the current study are not publicly available due to ethical restrictions but are available from the corresponding author on reasonable request.

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# Figures

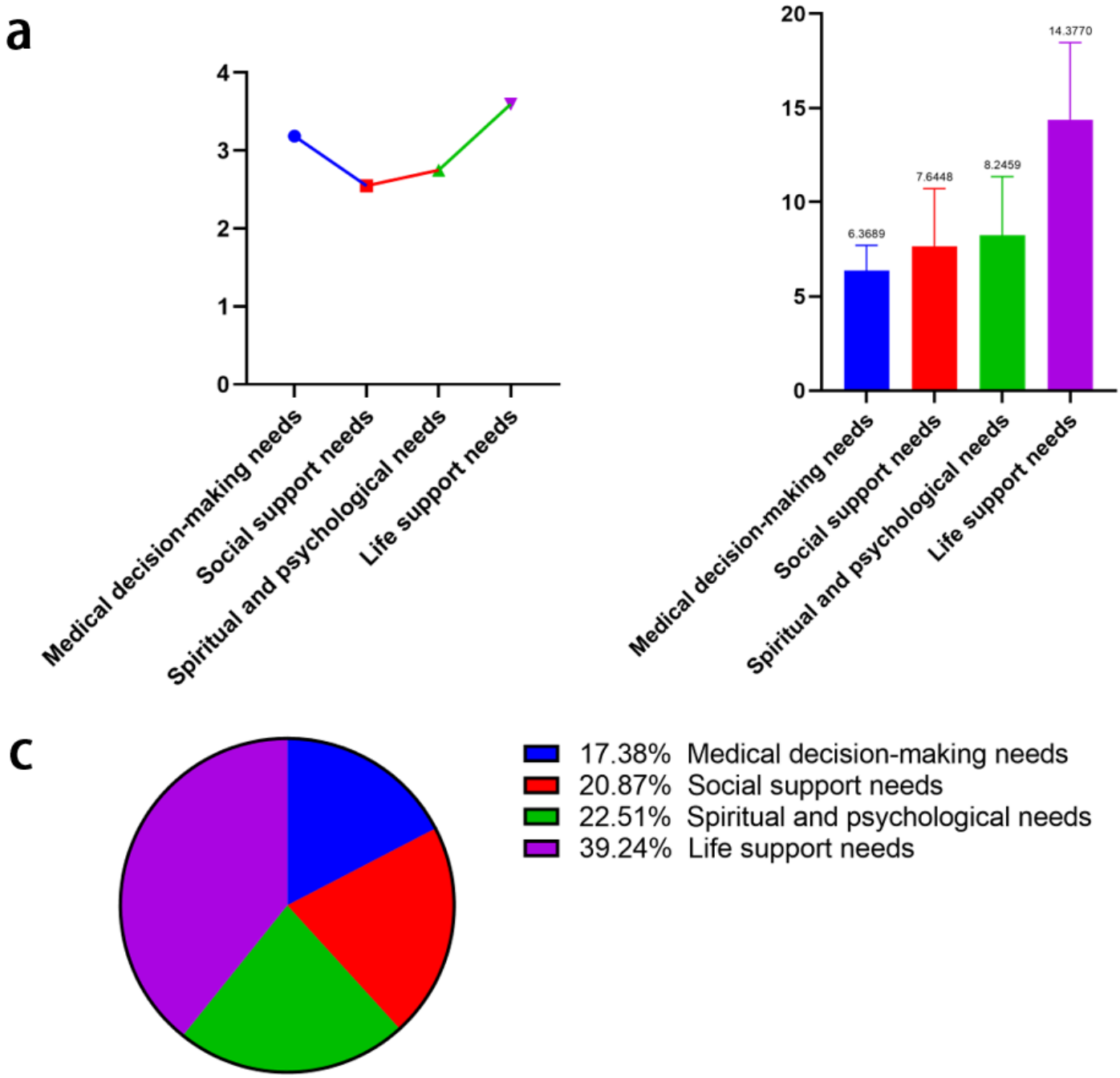
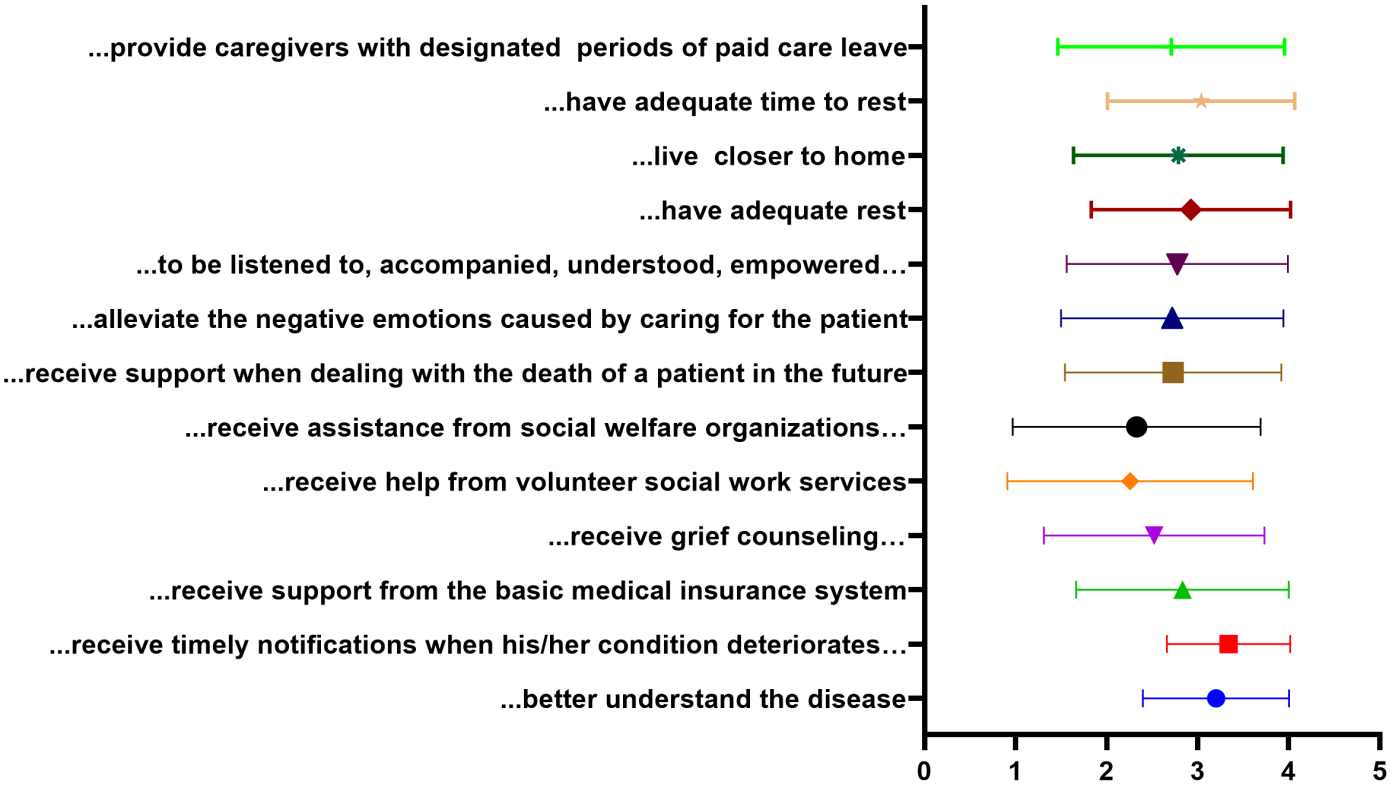



**Figure 1**

Assessment dimension score proportion and average score of the survey questionnaire. (a) Average score of each item under each evaluation dimension (total score of each evaluation dimension / number of items in each dimension). (b) Assessment dimension average score. (c) Assessment dimension score proportion.




## Figure 2

Average score for the 13 questionnaire items.