The association of family functioning and psychological distress in the bereaved families of patients with advanced cancer: A nationwide survey of bereaved family members

Abstract

Objectives: Family conflict and family functioning were regarded as changeable factors associated with complicated grief (CG) and major depressive disorder (MDD) in the bereaved families of patients with advanced cancer, although the evidence is limited. We explored the family functioning associated with CG and MDD developing either independently or co☐morbidly in the bereaved families of patients with advanced cancer who died in palliative care units (PCUs).

Methods: This study comprised a nationwide cross☐sectional questionnaire survey of bereaved family members of cancer patients who died in Japanese PCUs participating in evaluation of the quality of end-of-life care.

Results: A total of 529 questionnaires (69.2%) were returned, and we analyzed a total of 458 responses. A total of 14.2% of participants were considered as having CG, 22.5% as having moderate to severe depression, and 9.6% as having co☐morbid symptoms. Multivariate logistic regression analysis revealed that many family members insulted or yelled at one another (odd ratio (OR): 2.99, p=0.046; OR:2.57, p=0.033), and conflict regarding what is meant by a good death (OR:3.60, p=0.026; OR:4.06, p=0.004) was significantly positively associated with CG, MDD, and co-morbid symptom.

Conclusions: Specific family conflicts may increase the incidence of CG, MDD, and co-morbid symptoms in the bereaved families of patients with advanced cancer. Our results may encourage health care providers to approach discussions about end-of-life issue with the patient and their family in advance, especially focusing on what is considered a good death for the patient, which may prevent or resolve the family conflict.

Key points/Highlights
1. A total of 14.2% of bereaved families of patients with advanced cancer were considered as having complicated grief, and 22.5% as having moderate to severe depression.
2. The family conflict regarding what is meant by a good death was significantly positively associated with complicated grief and moderate to severe depression of bereaved families of patients with advanced cancer.
3.End-of-life discussion, focusing on what is considered a good death for the patient, may prevent or resolve the family conflict.

Introduction

The bereaved families of patients with advanced cancer often have psychological distress such as complicated grief (CG) and major depressive disorder (MDD), whose prevalence was reported as 7%-14% and 12%-17%, respectively(1,2). CG, which was named persistent complex bereavement disorder in the latest edition of the Diagnostic and Statistical Manual of Mental Disorders, is characterized by intense grief that is unusually severe and prolonged, causing impairment in daily life(3,4). A previous study suggested that CG is associated with sleep disturbance, suicidal thinking and behavior, and an increased risk of cardiovascular disease and cancer(5,6). Several studies reported that the prevalence of MDD in bereaved families of patients with advanced cancer was high, and that it deteriorated the quality of life of bereaved families(7–9). In addition, previous study indicated that the bereaved families of patients with advanced cancer who have CG and MDD, which called as co-morbid symptom, have more complex or severe psychological distress, and that these family members might seek more social support and/or spiritual/religious support(2).

Several previous studies revealed family functioning as one of the related factors for psychological distress and social adjustment of advanced cancer patients and their family[10]. Schuler et al. reported that the specific typology of family functioning can predict individual psychological morbidity in American families(10,11).

Other studies also suggested that constrained communication among the patient and their family is related to psychological distress, poor family relationship, and family conflict in end-of-life care(12–15). Therefore, poor communication among patients and their families was considered to increase the risk for psychological distress at the end of life and in bereavement(14,16).

Among several risk factors for psychological distress in bereaved families of patients with advanced cancer, such as family conflict and family functioning, is a changeable factor by psychotherapy such as through family focused grief therapy(17–19). However, evidence for the association among family conflict, family functioning, CG, and MDD in the bereaved families of patients with advanced cancer is limited[17,18,](20).

Although a considerable number of reports on family functioning and psychological distress in advanced cancer patients and their families have been published, Schuler et al. pointed out that the impact of family functioning on psychosocial morbidity needs to be examined in different cultural contexts(10).

Ozono et al. previously explored the family functioning and psychological distress among post-operative breast cancer patients and their families(18), although no study with families of advanced cancer patients receiving palliative care has been performed.

Thus, the association between family functioning and psychological distress in advanced cancer patients and their families while receiving palliative care should be investigated in different cultures.

Therefore, we explored the association between the family context and psychological distress, i.e.,

CG, MDD, and co-morbidities, in the bereaved families of patients with advanced cancer.

Method

This study was a secondary analysis of nationwide multicenter questionnaire survey targeting the bereaved family members of cancer patients who died in palliative care units (PCUs) to evaluate the quality of end☐of☐life care in Japan (the Japan Hospice and Palliative care Evaluation study 2016: J☐HOPE2016). We sent letters to the 169 PCUs, which were members of Hospice Palliative Care Japan (HPCJ) before September 1, 2015, and 71 institutions participated in the study.

Participants and procedures

A cross☐sectional, anonymous, self☐reported questionnaire survey was conducted between May and July 2016. We asked each institution to identify and list up to 80 bereaved family members of patients who had died prior to January 31, 2016. The major inclusion criteria were that the patient was aged 20 years or older and died of cancer, and the major exclusion criterion was that the candidate participant had severe psychological distress determined by the primary care physician and nurses(21). Questionnaires were sent to the bereaved family members identified by each participating institution along with an explanation of the survey, and return of the completed questionnaire was regarded as consent to participate in the study. We asked participants to return the completed questionnaire to the study secretariat office (Tohoku University) within 1 month, and return of the completed questionnaire was regarded as consent to participate in the study. We sent a reminder to non-responders at 1 month

after sending the questionnaire. If they did not wish to participate in the study, they were asked to

check a "no participation" box and return the incomplete questionnaire. The institutional review board

of the Tohoku University approved the protocol of this study (2015-1-672).

Conceptual model

We hypothesized the conceptual model based on two previous studies that described the relationship

among sociodemographic factors, stressors, and psychological distress in bereaved family

members(17,19). (Appendix 1) Pearlin et al. proposed the conceptual model of Alzheimer's caregivers'

stress process(19), and Kramer et al. remodeled and validated this model to describe the association

between family conflict and CG in the bereaved families of lung cancer patients(17). We also added

the factors for each component based on several previous studies that explored the risk factors for CG

and MDD in the bereaved family in terms of sociodemographic risk factors, and risk factors due to

family conflict and family functioning(1,2,14,15,18,20,22–26,3,5–11).

Participant characteristics

We asked the participating institutions to collect the data of each patient's background characteristics

(age, gender, primary tumor site, and duration of stay in the palliative care unit) via medical records

between May and July 2016.

The bereaved family members were asked for details concerning their age, gender, physical and psychological health status while the patient was in the PCU (good, moderate, fair, or bad), relationship with the patient, educational background of bereaved family members, social support while the patient was in the PCU (feeling of being loved and cared for, and how they felt people listened to their worries or problems), and whether other caregivers were present. In previous studies, these questions were considered important factors related to CG and MDD among bereaved individuals(2,27).

Measurements

After bereavement, we asked about the caregiver's physical and psychological health status while the patient was in the PCU, family relationships before the patient became ill, family conflicts after the patient became ill, and family communication after the patient became ill.

Inventory of Complicated Grief (ICG)

The Inventory of Complicated Grief (ICG) is well validated and widely used to assess CG in the Japanese population and worldwide, and distinguishes it from typical grief symptoms in terms of the prediction of morbidity, persistence, and intensity(17,28,29). The instrument consists of 19 first-person statements concerning the immediate bereavement-related thoughts and behaviors of the client. There are 5 response options, ranging from "Never" to "Always" and scored from 0 to 4. A previous

study found that respondents with ICG scores > 25 were significantly more impaired in social, general, mental, and physical health functioning, and in more bodily pain than those with ICG scores < or = 25(28).

Patient Health Questionnaire 9

The Patient Health Questionnaire 9 (PHQ□9) is a widely accepted instrument comprising 9 items used to assess the severity of depression in both clinical practice and scientific research[29]. The reliability and validity of the scale, as well as the Japanese version of the questionnaire(31), have been confirmed. Responses were rated on a scale from 0 to 3, with total scores ranging from 0 to 27. We defined the MDD as a score of ≥10, represented by a valid cut□off point that identifies moderate to severe depression.

Outcome-Family Conflict scale

We evaluated family conflict using the Outcome-Family Conflict (OFC) scale, an eight-item scale developed to specifically measure family conflict at the end of life(26). The construct validity of this scale was supported by significant correlations with a standardized measure of family functioning, and internal consistency was supported by a Cronbach's alpha of 0.89. As we previously reported, the bereaved caregivers were asked to use a 5-point scale (1 = not at all to 5 = very much) to answer 7 of

the 8 questions (except for the question "disagreement about health care decisions") regarding the end-of-life experience(26). We also asked the bereaved caregivers to answer the question "disagreement about health care decisions" in a yes/no format. We calculated the agreement rates for each item (defined as the sum of "sometimes", "often", and "very much"). Regarding the question on "disagreement about health care decisions", we regarded the answer "yes" as agreement.

Family relationship index

We evaluated family relationships before being diagnosed with cancer by asking bereaved family members using the family relationship index (FRI), which was validated in a Japanese population and used as a research tool in a Japanese cancer population(18,32). This is a well☐validated measure of an individual's perception of their family's functioning, including constructs such as interpersonal relationships and organizational structure(24,33–35). It is a 12☐item, true☐false response scale that originated from the short form of the family environment scale(32), which was developed to assess family functioning(36). FRI comprises three subscales: 1) cohesiveness (e.g., "There is a feeling of togetherness in our family"), 2) expressiveness (e.g., "We tell each other about our personal problems"), and 3) conflict resolving (e.g., "Family members fight a lot"). The subscales form a global measure of family interaction. Subscale scores range from 0 (low) to 4 (high), and the global score ranges from 0 to 12. Higher scores indicate good historical family relationships. Although a

previous study noted that a history of family conflict before illness was one contributor to present

family conflict(14), another recent study revealed that 9% of caregivers experiencing conflict reported

no history of prior conflict within the family(26). In addition, the FRI includes several questions to

assess the details of prior family conflict as one component of the family relationship. Thus, we

considered the FRI useful for the comprehensive assessment of the history of family conflict. We

defined an FRI $\geq$ 10 as having a good family relationship, as reported previously(10,35).

Care Evaluation Scale, version 2—Short Version.

The Care Evaluation Scale (CES) was developed to measure end-of-life (EOL) care from the

perspective of bereaved family members, with a focus on the structure and process of care. The short

version of the CES consists of 10 representative items, and the validity and reliability of the scale were

previously confirmed(37). Each item was rated using a 6-point Likert scale ranging from $1 - 6$ (1:

absolutely agree to 6: absolutely disagree), with higher scores indicating better care. We calculated the

agreement rate as the sum of "somewhat agree", "agree", and "absolutely agree".

Good Death Inventory—Short Version.

We used the short version of the Good Death Inventory (GDI) to measure patients' achievement of a

good death from the perspective of bereaved family members. The short version of the GDI consists

of 18 representative items from each domain, and the validity and reliability of the scale were previously confirmed(37). Participants evaluated each attribute using a 7 point Likert scale (1: absolutely disagree to 7: absolutely agree). We calculated the agreement rate as the sum of "somewhat agree", "agree", and "absolutely agree".

Communication constraints

We measured communication constraints using 4 items embedded in the Family Assessment Device (FAD), which was developed as a self reported measure of perceived family functioning(38). We asked for responses to the following statements on a 5 point scale (1 = strongly disagree; 5 = strongly agree): "We cannot talk to each other about the sadness we feel", "We avoid discussing our fears and concerns", "We can express feelings to each other", and "We confide in each other"(26). Two of the items were reverse coded for directionality, and higher scores indicated more severe communication constraints.

Unpreparedness for death

As there are no validated tools to assess the unpreparedness for death by the bereaved family, we used the two items in our previous study(21). We assessed the difficulty of integrating awareness of death by the response to the statement "Thinking about my family member's death is very difficult for

me before bereavement" on a 5□point scale (1 = strongly disagree; 5 = strongly agree). We categorized

the answer regarding how difficult it was to think about the family member's death as a binary variable,

with "somewhat agree", "agree", and "strongly agree" being defined as yes = 1.

We assessed "come in contact with family members who had no prior interaction before the patient

became sick" by a single question (0 = no; 1 = yes), which was family members who were not

previously in regular contact with the patient suddenly became more involved because of the patient's

illness. The question was "Did any family members who were not previously in regular contact

suddenly become more involved as a result of your family member's illness?"(26).

Statistical analysis

First, we conducted descriptive analyses of the demographic characteristics, and the severity of grief

and depression as assessed by the ICG and the PHQ□9, respectively. And we defined the participant

with co-morbid symptom as who had both ICG scores > 25 and MDD as a score of ≥10. We used

Pearson's correlation coefficient to investigate the relationship between the severity of CG and

potential related factors, between that of MDD and potential related factors, and between that of co-

morbid symptoms and potential related factors as bivariate statistics. The chi□square test and Fisher's

exact test were used to assess the correlation with the presence of CG, MDD, and co-morbid symptoms.

Subsequently, we performed multivariate logistic regression analysis for twelve factors; FRI, family

conflicts (8 conflicts), come in contact with family members who had no prior interaction before the

patient became sick, FAD, and difficulty of integrating awareness of death, with two types of

adjustment for each variable; minimally and fully adjusted models. Minimally adjusted models

included age, gender, relationship with patients, and education. Fully adjusted models also included

age, gender, relationship with patients, education, CES score, GDI score, caregiver's physical health,

and mental status during last admission. Significance was accepted at $p < 0.05$ and all analyses were

performed using SPSS□J software (ver. 25.0; IBM, Tokyo, Japan).

Results

In total, 767 family members met the inclusion criteria, though 3 were subsequently excluded (Appendix 2). We sent out 764 questionnaires, and 529 (69.2%) were returned. As 70 family members declined to participate and we were unable to identify the answers in one questionnaire, we analyzed a total of 458 responses (86.6% of the returned questionnaires).

The characteristics of the participants are summarized in Table 1 and those of patients are summarized in Appendix 3.

A total of 14.2% of participants were considered to have CG by ICG cut-off points, 22.5% to have MDD by PHQ-9 cut-off points, and 9.6% to have co-morbid symptoms. (Table 1)

The distribution of the OFC scale, FRI, CES, GDI, and family conditions is shown in Table 2. The average FRI score was 8.8 ± 2.4 (maximum: 12 points), and the percentage of FRI ≥ 10 was 47.4%.

Bivariate analysis revealed that several factors were commonly associated with CG, MDD, and co-morbid symptoms; ex. poor psychological status during caregiving, FAD, and difficulty of integrating awareness of death. (Appendix 4) Several family conflicts were significantly associated with both CG and MDD, and co-morbid symptoms, although only the FRI subgroup of cohesiveness was significantly associated with CG.

The multivariate logistic regression analysis using the fully adjusted model revealed that many family

members insulted or yelled at one another (odds ratio (OR): 2.99, p=0.046; OR:2.57, p=0.033; OR:3.20, p=0.049), and conflict regarding what is meant by a good death was significantly positively associated with CG, MDD and co-morbid symptoms (OR:3.60, p=0.026; OR:4.06, p=0.004; OR:7.03, p=0.001). Furthermore, the FAD (OR: 1.17, p=0.016; OR: 1.12, p=0.025; OR:1.15, p=0.047) and difficulty of integrating awareness of death (OR: 8.52, p<0.001; OR: 2.68, p=0.001; OR:7.53, p=0.033) were significantly positively associated with both CG and MDD. Coming in contact with family members who had no prior interaction before the patient became sick was significantly negatively associated with MDD (OR: 0.53, p=0.032). (Table 3, Appendix 5)

Discussion

To the best of our knowledge, this is the first large-scale survey to explore the association between the family context and psychological distress in the bereaved families of patients with advanced cancer in PCUs.

The most important finding was that specific family conflicts were associated with CG, MDD, and co-morbid symptoms. Our study demonstrated that the presence of family members who insult or yell at one another is significantly positively associated with CG, MDD, and co-morbid symptoms. However, families will not say such insults or yell in front of staff. Therefore, it may be better to assess anxiety, coping, competency, or preparedness for caring for dying patients comprehensively, which may lead to insults or yelling among family.

In addition, the presence of the argument about what is meant by "a good death" was significantly positively associated with CG, MDD, and co-morbid symptoms. This suggests that it is important to share patients' wishes and values, and to promote consensus building with their family members for a good death.

Although Kramer et al. previously reported an association between family conflict and CG, the novelty of our study lies in the clarification of specific conflict issues associated with CG, MDD, and co-morbid symptoms. This study may encourage health care providers to approach patients and their family about discussing end-of-life issue, especially focusing on a good death for the patient, which

might prevent or resolve family conflict. Although, previous studies noted that end-of-life discussion is associated with psychological distress in the bereaved families and family conflict[26,40], the detailed mechanism underlying the effects of end-of-life discussion on family conflict is unclear. Therefore, when and what kind of end-of-life discussions will have positive effects on the bereaved family need to be clarified.

The second important finding was that the family relationship before being diagnosed with cancer was not associated with CG, MDD, and co-morbid symptoms. This is inconsistent with a previous study reported by Ozono et al. that revealed family functioning after the patient was diagnosed or underwent surgery can identify psychologically at-risk families during treatment(18). One possible reason is that the timing to evaluate family functioning was different. In our current study, family functioning was evaluated before being diagnosed, whereas Ozono et al. had evaluated after diagnosis or surgery. Therefore, our current study may not reflect the exact family functioning after the cancer diagnosis. Thus, family functioning after the cancer diagnosis should be evaluated prospectively to explore its association with psychological distress in the bereaved family.

The third important finding was that coming in contact with family members who had no prior interaction before the patient became sick was significantly negatively associated with MDD, but not

with CG or co-morbid symptoms. Although a previous study suggested that coming in contact with family members who had no prior interaction before the patient became sick is likely to cause higher levels of family conflict(26), our study suggested it will reduce the incidence of MDD in the bereaved family. The associated factors were not fully assessed, but one possible mechanism of this phenomenon is that the involvement of the estranged family member will cause family conflict in addition to resolving it. Further studies, such as semi-structured interviews, are needed to clarify the interaction among coming in contact with family members who had no prior interaction before the patient became sick, family conflict, and psychological distress in bereaved families.

Of note, the difficulty of integrating awareness of death was significantly positively associated with the incidence of CG, MDD, and co-morbid symptoms. This is consistent with other previous studies(2,17,23). Therefore, our study may encourage health care providers to help the family become aware of how their loved ones wish to spend their final days, and to observe the bereaved family closely for signs of psychological distress.

Study limitations

This study had several limitations. First, the cut-off score for FRI to identify a good family relationship was not validated for the Japanese population. Therefore, interpretation of the FRI score

needs to be examined in terms of cultural differences in a future study. Second, as ICG and PHQ-9 is

only a screening tool, we might underestimate, or overestimate the diagnosis of CG and MDD.

Therefore, we could not explore the associated factor based on the exact clinical diagnosis. Third, less

than 50% of the invited institutions participated. Therefore, caution is needed to generalize the results

of our study. Fourth, we were unable to exclude recall bias because of the study design. However,

several previous studies performed from 3 to 12 months after death of the patient suggested that this

interval is reasonable considering both recall bias and the grieving process(2,27,39,40). Fifth, bereaved

families with psychological distress may not have returned the questionnaire, although the response

rate of this study was relatively higher than that in a previous study(39). Sixth, we were unable to

evaluate several factors, such as financial burden, pre-existing mental disorder, and beliefs regarding

the soul after physical death, which were significantly associated with psychological distress in a

previous study(2). Seventh, as we performed many tests, there may have been significant results by

chance.

Clinical implications

This study has several clinical implications. First, the presence of family members who insult or yell

at one another is a specific family conflict that leads to psychological distress for bereaved families.

Second, health care providers mat be able to identify psychologically at-risk bereaved families who

had specific family conflicts such as arguments about what is meant by "a good death". Third, coming

in contact with family members who had no prior interaction before the patient became sick may

reduce the incidence of MDD in bereaved families, although the details of this mechanism need to be

clarified.

The strengths of this study were that it was a large☐scale multicenter investigation of a homogeneous

sample with a high response rate. Therefore, our findings are likely to apply to the families of patients

with advanced cancer in PCUs, especially in Japan.

Conclusion

Specific family conflicts may increase the incidence of CG, MDD, and co-morbid symptoms in the bereaved families of patients with advanced cancer. Our study may encourage health care providers to approach discussions about end-of-life issue with the patient and their family in advance, especially focusing on a good death for the patient, which may prevent or resolve the family conflict.

Conflict of Interest Statement

The author(s) have declared no potential conflicts of interest regarding the research, authorship, and/or publication of this article.

Availability of data and materials

Research data are not shared.

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Table 1 Characteristics of bereaved family members
  Table 1 shows the characteristics of bereaved family members

Table 2 Distribution of the Outcome-Family Conflict, Family Relationship Index, Care Evaluation Scale, and Good Death Inventory Scores, and Contributing Factors
  Table 2 shows the distribution of the Outcome-Family Conflict, Family Relationship Index, Care Evaluation Scale, and Good Death Inventory Scores, and Contributing Factors

Table 3 Multivariate logistic Regression Analysis of the ICG≥26, PHQ-9≥10 and Co-morbid symptom
  Table 3 shows the result of multivariate logistic Regression Analysis, which has minimally and fully adjusted models, of the ICG≥26, PHQ-9≥10 and Co-morbid symptom

Table 1 Characteristics of bereaved family members

		n	%
Age (mean ± standard deviation)		62.1 ±12.3	
Gender			
Male		148	33.3
Female		297	66.7
Relationship with patient			
Husband/wife		199	44.6
Child		177	39.7
Daughter-in-law or son-in-law		22	4.9
Parents		12	2.7
Siblings		25	5.5
Others		11	2.5
Education			
Less than high school		55	12.6
High school graduate		200	45.8
Post-high school education		182	41.6
Caregiver's physical health status during last admission			
	Good	113	24.7
	Moderate	248	54.1
	Fair	66	14.4
	Bad	17	3.7
Caregiver's mental health status during last admission			
	Good	63	13.8
	Moderate	186	40.6
	Fair	141	30.8
	Bad	32	7.0
Presence of other caregivers		318	69.4
Perceived social support			
How people listen to one's worries or problems			
	Not at all	3	0.7
	Not much	20	4.4
	Somewhat	142	31.0
	Quite a bit	188	41.0
	A great deal	93	20.3
How people show you kindness and compassion			
	Not at all	2	0.4
	Not much	19	4.1
	Somewhat	136	29.7
	Quite a bit	185	40.4
	A great deal	99	21.6
Duration of bereavement (mean ± standard deviation, months)		9.4 ±4.5	

Duration of bereavement (median, range, months)	8.6 (3.1-30.0)	
Duration of bereavement < 6 months	97	21.2
Inventory of Complicated Grief (mean ± standard deviation, range: 19 - 85)	32.4 ±13.4	
Inventory of Complicated Grief ≥ 26	65	14.2
Patient Health Questionnaire 9 (mean ± standard deviation, range: 0 - 27)	6.0 ±6.1	
Patient Health Questionnaire 9 ≥ 10	103	22.5
Inventory of Complicated Grief ≥ 26 and Patient Health Questionnaire 9 ≥ 10	44	9.6

Table 2 Distribution of the Outcome-Family Conflict, Family Relationship Index, Care Evaluation Scale, and Good Death Inventory Scores, and Contributing Factors

	mean ± standard deviation	agreement rate (%)
Outcome-Family Conflict (range: 1-5, agreement rate*[1])		
Family members insult or yell at one another	1.5 ± 0.9	10.5
Disagree or argue about health care decisions for your relative	2.0 ± 1.0	18.6
Disagree or argue about your relative's illness or physical condition	2.7 ± 0.8	13.5
Disagree or argue about the way a member was treating your relative	1.7 ± 0.8	11.1
Disagree or argue about certain family members not pulling their weight	1.9 ± 1.1	21.2
Disagree or argue about what is meant by "a good death"	1.6 ± 0.8	8.1
Disagree or argue about how money is being spent	1.3 ± 0.5	2.2
Disagree or argue about where your relative should live out his/her remaining days	1.6 ± 0.8	10.7
Family Relationship Index □ (range: 0 - 12)	8.8 ± 2.4	
Family Relationship Index ≥ 10		47.4
Family Relationship Index subscale (range: 0 - 4)		
cohesiveness	3.1 ± 1.1	
expressiveness	2.7 ± 1.3	
conflict resolution	3.0 ± 1.1	
Care Evaluation Scale (range: 1-6, agreement rate*[2])		
Physicians endeavored to relieve physical discomfort of the patient	1.7 ± 0.8	92.4
Nurses endeavored to relieve physical discomfort of the patient	1.7 ± 0.8	92.8
Physicians, nurses, and staff endeavored to relieve patient's concerns and worries	1.8 ± 0.8	91.7
Physician gave sufficient explanation to the patient about their condition and medical treatment	2.1 ± 1.0	84.1
Physician gave sufficient explanation to the family about the patient's condition and medical treatment	2.0 ± 0.9	88.4
Hospital or room was convenient and comfortable	1.8 ± 0.9	91.3
Consideration was given to the health of the family	2.3 ± 1.0	80.1
The total cost is reasonable	2.1 ± 0.9	88.0
Admission (use) is possible when necessary without waiting	2.0 ± 1.2	86.9
There is good cooperation among staff members such as physicians and nurses	2.0 ± 0.9	89.7
Good death inventory (range: 1-7, agreement rate*[3])		
Being free from physical distress	5.2 ± 1.3	73.8
Being able to stay at one's favorite place	4.8 ± 1.5	52.0
Having some pleasure in daily life	4.3 ± 1.6	41.9
Trusting the physician	5.5 ± 1.2	72.1
Not being a burden to others	3.7 ± 1.6	47.4
Spending sufficient time with one's family	5.1 ± 1.4	65.9
Being independent in daily activities	3.0 ± 1.8	24.5
Living under calm circumstances	5.4 ± 1.3	74.7

Being valued as a person	6.0 ± 0.9	88.6
Feeling that one's life is completed	4.7 ± 1.7	50.9
Four items of Family Assessment Device§ (range: 4 - 20)	9.5 ± 3.0	
Thinking about my family member's death is very difficult for me †		40.8
Come in contact with family members who had no prior interaction before the patient became sick		38.4

*1 1: not at all; 5: very much (the agreement rate is the sum of "sometimes", "often", and "very much")

*2 1: absolutely agree; 6: absolutely disagree (the agreement rate is the sum of "somewhat agree", "agree", and "absolutely agree")

*3 1: absolutely disagree; 7: absolutely agree (the agreement rate is the sum of "somewhat agree", "agree", and "absolutely agree")

☐ Higher scores indicate the family has good historical family relationships.

†1: strongly disagree; 5: strongly agree (the agreement rate is the sum of "somewhat agree", "agree", and "strongly agree")

§Higher scores indicated more severe communication constraints.

Table 3 Multivariate logistic Regression Analysis of the ICG≥26, PHQ-9≥10 and Co-morbid symptom

| | ICG ≥ 26 | | | | | | PHQ-9 ≥ 10 | | | | | | Co-morbid symptom | | | | | |
| | Minimally Adjusted | | | Fully Adjusted | | | Minimally Adjusted | | | Fully Adjusted | | | Minimally Adjusted | | | Fully Adjusted | | |
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Family Relationship Index ≥ 10	1.11	0.60-2.06	0.734	1.19	0.56-2.53	0.652	1.52	0.90-2.97	0.115	1.40	0.77-2.55	0.270	1.36	0.67-2.77	0.397	1.53	0.65-3.62	0.333
Outcome-Family Conflict																		
Family members insult or yell at one another	4.55	1.89-10.96	0.001	2.99	1.02-8.75	0.046	3.67	1.78-7.56	<0.001	2.57	1.08-6.14	0.033	5.37	2.01-13.92	0.001	3.20	1.01-10.17	0.049
Disagree or argue about health care decisions for your relative	2.06	1.02-4.13	0.043	1.52	0.64-3.60	0.344	2.83	1.58-5.07	<0.001	2.56	1.31-5.00	0.006	2.62	1.22-5.60	0.013	2.20	0.87-5.54	0.096
Disagree or argue about your relative's illness or physical condition	2.41	1.10-5.28	0.028	1.40	0.52-3.80	0.509	2.98	1.57-5.67	0.001	2.86	1.33-6.13	0.007	3.45	1.49-7.97	0.004	2.96	1.04-8.40	0.042
Disagree or argue about the way a member was treating your relative	2.20	0.88-5.47	0.090	1.35	0.45-4.05	0.598	2.75	1.37-5.53	0.004	2.86	1.29-6.32	0.009	2.02	0.73-5.59	0.173	2.00	0.61-6.55	0.250
Disagree or argue about certain family members not pulling their weight	1.41	0.70-2.86	0.339	0.93	0.39-2.22	0.878	1.57	0.88-2.81	0.128	1.18	0.60-2.32	0.637	1.40	0.62-3.19	0.420	0.85	0.32-2.27	0.747
Disagree or argue about what is meant by "a good death"	5.27	2.06-13.49	0.001	3.60	1.17-11.01	0.026	4.13	1.90-8.95	<0.001	4.06	1.56-10.58	0.004	7.35	2.79-19.33	<0.001	7.03	2.14-23.08	0.001
Disagree or argue about how money is being spent	5.48	1.05-28.46	0.043	6.96	0.89-54.79	0.065	5.22	1.31-20.79	0.019	3.46	0.67-17.88	0.139	4.16	0.70-24.58	0.116	2.94	0.35-24.69	0.321
Disagree or argue about where your relative should live out his/her remaining days	2.29	0.98-5.35	0.056	0.99	0.32-3.10	0.985	2.75	1.37-5.53	0.004	2.11	0.88-5.04	0.093	3.38	1.38-8.24	0.007	1.83	0.56-5.97	0.317
Come in contact with family members who had no prior interaction before the patient became sick	0.95	0.51-1.76	0.865	1.02	0.49-2.15	0.950	0.59	0.35-0.98	0.042	0.53	0.29-0.95	0.032	0.98	0.48-1.99	0.953	0.90	0.39-2.08	0.809
Four items of Family Assessment Device (continuous variable)	1.19	1.07-1.32	0.001	1.17	1.03-1.32	0.016	1.18	1.09-1.29	<0.001	1.12	1.01-1.24	0.025	1.19	1.06-1.34	0.003	1.15	1.00-1.32	0.047
Thinking about my family member's death is very difficult for me †	6.11	3.08-12.11	<0.001	8.52	3.31-21.93	<0.001	3.44	2.05-5.78	<0.001	2.68	1.46-4.92	0.001	6.32	2.75-14.52	<0.001	7.53	2.52-22.45	<0.001