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Stressor Prevalence, Grouping, Distribution, and Association with Anxiety among Hospitalized Patients: A Precursor Study for Developing Targeted Chaplain Interventions

By

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Epidemiology

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An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Science in Public Health
in Epidemiology
2018

ABSTRACT

Stressor Prevalence, Grouping, Distribution, and Association with Anxiety among Hospitalized Patients: A Precursor Study for Developing Targeted Chaplain Interventions

By Patricia K. Palmer

OBJECTIVE: To lay the groundwork for the development of targeted chaplain interventions by exploring hospital inpatients' stressors, how they are distributed (singly and in groups), and how these exposures, along with other factors, are associated with the outcome of anxiety.

METHODS: We conducted a cross-sectional study of inpatients (n = 271) at two Southeastern U.S. metropolitan hospitals using data collected from August 2017 to January 2018. Participants recruited randomly from rooms within each medical and intensive care unit completed a survey to identify which of 41 stressors they were experiencing. We grouped related items through factor analysis and improved factor reliability and validity by separating out stressors that did not load strongly or cleanly on a single factor. We evaluated the prevalence of grouped and single stressors, their distribution, and their crude association with anxiety, measured with the State Trait Anxiety Index six-item scale (STAI-6). We used linear regression to estimate the association between stressors and anxiety, and adjusted for demographic, illness, and religion in sequential models.

RESULTS: Study participants were older, more educated, and more likely to be Protestant or African American than the U.S. population. Although stressors differed across unit type, pain, being unable to sleep, and feelings of frustration, being overwhelmed, and sadness were common across all or most unit types. Factor analysis produced two thematic multi-item factors: isolation and fear. Bivariate analysis shows that patients requesting a chaplain or reporting lower importance of religion in their day-to-day life had significantly higher levels of clinically-relevant anxiety. Significance was marginal for those who were younger, female, or on Medicaid. In all regression models, isolation and fear factors, inability to sleep, worries about quality of life (QOL), treatment on a cardiology or hematology/oncology unit, and having requested a chaplain were significantly associated with anxiety.

CONCLUSION: Study results suggest that multiple stressors are prevalent among hospital inpatients. Interventions for anxiety or emotional/spiritual burden may be best targeted to isolation, fear, and other significant or frequency-endorsed stressors, especially among young and female patients on units with elevated anxiety. Study results provide rich context in which to develop and deploy interventions.

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Acknowledgements

I would like to thank Dr. Ellen Idler for generously offering her guidance and encouragement through all aspects of this thesis, Dr. Jenny Mascaro for her mentorship and collaboration, and the research team for their efforts in data collection. I would also like to express gratitude for the Transforming Chaplaincy Fellowship that made my trip through Rollins School of Public Health possible, and to thank Dr. George Grant, Executive Director of Spiritual Health at Emory Healthcare, for his vision and commitment to the three pillars of spiritual care: education, service, and research.

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BACKGROUND

Anxiety in the Hospital

Being in the hospital can be a time of stress and anxiety, which can add to a patient's suffering. The negative association of anxiety with health has been recognized by many, as has the importance of identifying and treating anxiety in hospitalized patients (1, 2). Anxiety is associated with longer, more costly hospital stays, worsening of somatic illness, and greater disability (3). In a review of 31 studies involving 16,922 patients with chronic illness, Katon et al. found that chronically ill patients with anxiety, compared to those without anxiety, report higher numbers of medical symptoms, even after controlling for disease severity. Symptom burden was at least as strongly associated with the presence of anxiety as with common physiologic indicators of disease severity, such as spirometry for pulmonary function, or the number of coronary arteries occluded >70% in heart disease (4, 5).

Given the importance of hospital anxiety on health outcomes, understanding its prevalence and contributing factors is important in identifying interventions to reduce anxiety and improve patient outcomes. Studies on the prevalence of anxiety and contributory factors have largely been conducted outside the U.S. and have focused on specific patient sub-populations, such as those with cancer or undergoing surgery (6-10). However, a few studies have explored anxiety among hospital inpatients more broadly. In a cross-sectional study (n = 282) in Rio Grande, Brazil, Gullich et al. found anxiety (≥ 9 on the anxiety subscale of the Hospital Anxiety and Depression Scale [HADS]) present in over a third of adult hospital clinical unit inpatients (11). In a cross-sectional study of 98 inpatients and 68 home-based controls in Norway, Kvaal et al. found anxiety prevalence

of 41% among female and 47% among male geriatric hospital patients, determined by a score of 40 or above on the State-Trait Anxiety Index (STAI) (12). Rosselli et al. found prevalence of anxiety (based on HADS score) ranging from 10% to 68%, depending on disease category, in 189 hospitalized patients in Italy (3).

Equivalency of HADS and STAI. Although many previous studies examining anxiety among hospital patients used either HADS or STAI to measure anxiety, these instruments perform similarly, and thus results may be compared across studies, including the current study. The HADS and STAI instruments are both commonly used in clinical settings (13-15). Studies of the psychometric properties of these scales have found strong correlation ($\rho = 0.56$ to 0.77) between the two scales, suggesting that they may be considered equally valid measures in examining anxiety among various patient populations (9, 16, 17). Further, previous studies examining anxiety among hospital inpatients identified clinically-relevant anxiety based on commonly-accepted cut-points (9 for HADS and 40 for STAI). This further supports our claim that they provide comparable measures across studies (18).

The Association of Anxiety with Spiritual Distress

Researchers studying spiritual distress among hospitalized patients have reported an association between spiritual distress and anxiety. In a mixed-methods study exploring the multidimensional nature of spiritual pain among patients with advanced cancer in a palliative care hospital in New York ($n = 57$), Mako et al. asked patients if they were in spiritual pain and to describe it (19). Patients framed their spiritual pain in terms of three relational domains: ruptures in relationship to self, others, and the divine. Mako et al. further categorized responses in terms of their emotional content (despair,

isolation, regret, and anxiety). Anxiety was reported by 10% of participants who described having spiritual pain in intrapsychic terms, and by 28% of those who described having spiritual pain in terms of a rupture in their relationship with the divine. Anxiety as a category of emotional content was not prominent in responses given by patients who described their spiritual pain in interpersonal terms. In a cross-sectional study in a Portuguese hospital, Caldeira et al. found that while 40.8% of patients overall reported that they were experiencing anxiety, 97.1% of patients with a nursing diagnosis of spiritual distress reported that they were experiencing anxiety, compared to 56% of patients without the diagnosis of spiritual distress (20). To diagnose spiritual distress, Caldeira et al. considered researcher judgment, the patient's answer to the question "Are you in spiritual distress?", and a score on the spiritual well-being questionnaire of 3 or lower. The association between spiritual distress and anxiety reported in these studies suggests that an examination of stressors related to anxiety among hospitalized patients should include stressors that are spiritual in nature, or, in less explicitly religious language, burdens on the heart.

Stressors

Our consideration of what stressors or conditions may be present among hospitalized patients experiencing anxiety is informed by several studies that have found anxiety among pre- and post-surgical patients to be associated with many stressors in different physical, psychological, and social domains. Identified stressors include: insufficient sleep, pain, insufficient explanation of the treatment, and separation from family (21); surgery procedure and possible complications, illness, pain, suffering, and uncertainty (22); helplessness and self-blaming (23); loss of control, fear of death, pain,

loss of function and normalcy, and impaired body image (24). While stressors associated with anxiety are relatively well-characterized among surgical patients, research on stressors and anxiety within the more general inpatient population, including medical as well as surgical patients, is lacking. This knowledge gap makes the development of intervention targeted to the broader inpatient population difficult.

Interventions for Anxiety

Although researchers have explored the efficacy of several non-pharmacological interventions outside the realm of chaplaincy to reduce anxiety among patients facing serious illness, few have targeted specific stressors. Interventions that have been explored to reduce general anxiety include, for example, music therapy, aroma therapy, and massage therapy (25-28). Many of these studies evaluate interventions delivered in ambulatory surgery, radiation therapy, or other outpatient procedure patient populations, and both study quality and outcome vary. The most extensively and rigorously studied complementary therapy for anxiety appears to be music. In 2002, a systematic review of studies comparing patients who received music therapy prior to surgical and other invasive procedures to those receiving no music identified mixed results; however, a 2017 review of more recent randomized controlled trials testing music as an intervention reported more consistently positive results among patients undergoing cardiac catheterization, with an average decrease in STAI score of 3.95 points (26, 29). Far less common are studies of interventions targeted to a known predictor of anxiety; one notable exception is Martín et al.'s controlled trial of a patient education intervention delivered by nursing staff prior to transfusion of red blood cells, which was targeted to one specific cause of anxiety: insufficient information about treatment (30).

Chaplain Interventions

A growing body of research describes and evaluates the interventions hospital chaplains employ in providing spiritual care. Flannelly et al. studied chaplains' daily actions in 3,570 spiritual care encounters at Memorial Sloan-Kettering Cancer Center of New York City, of which 2,299 were patient encounters, including 1,413 initial consults and the remainder second or third consults (31). Interventions included Bible reading or prayer, religious ritual or blessing, faith affirmation, confession/amends, bringing a religious item, or other spiritual support; and life review, emotional enabling, counseling, crisis intervention, and response to bereavement. Of these, the interventions most commonly employed for patients under general treatment are emotional enabling (56.9%) followed by Bible reading or prayer (32.6%). The study did not describe any formal assessment of spiritual needs, and interventions generally did not seem to be targeted to specific stressors.

Handzo et al. reported the results of a multi-site study of chaplain interventions for 30,995 patients, family, and staff at 13 healthcare institutions, including eight hospitals, in the greater metropolitan area of New York City (32). Chaplain-delivered interventions included those enumerated in the 2004 study by Flannelly et al., as well as ethical consultation/deliberation, patient advocacy, empathetic listening, theological development, and meditation. The most common religious interventions employed for patients under general treatment were prayer (used in 49.3% of encounters), blessing (47.2%), and faith affirmation or theological development (34.9%). The general intervention most commonly reported by chaplains was empathetic listening, which occurred in 71% of encounters overall. For patients undergoing general treatment, this

was followed by emotional enabling (20.3%), and life review (16.1%). It was not clear whether the interventions were targeted to specific stressors.

In 2010, Montonye and Calderone reported the results of a study of chaplain interventions based on 30,700 chaplain-patient encounters in an acute-care hospital in Springfield, Massachusetts (33). Data were collected from electronic medical records, in which chaplains documented the assessed need(s), intervention(s) delivered, and outcome(s) achieved for each patient encounter using a documentation form previously designed by Spiritual Health and Information Technology staff, based on a review of internal data and external resources on documentation and assessment tool design. Montonye and Calderone reported the most commonly identified patient needs as physical pain and suffering (reported in 37.0% of encounters), faith related issues (25.6%), and anxiety/despair/loneliness (17.3%). The most common interventions were prayer/spiritual support (33.8%), empathic listening/presence (25.9%), and life review (22.3%). Interventions seem to have been generally employed for a wide range of patients. The study did not describe how interventions were selected or whether they were delivered to address specific patient needs.

A detailed review of the hospital chaplain's role and daily actions was conducted in 2013 by Idler et al. (34). Based on 1,140 chaplain encounters with 782 unique patients in an academic acute-care hospital in the southeast U.S., patients' concerns as indicated by topics of patient-directed conversation fall into two categories based on cluster analysis. "Practical matters" (74.6% of consults) included, in descending order of frequency, "family concerns, life review, medical care, diagnosis, advance directives, prognosis, hospice care, work, and financial concerns." "Ultimate concerns" (63.7% of

consults) included, by descending order of frequency, “physical symptoms, religious/spiritual matters, existential matters, and [the expression of] emotions.” Physical symptoms, included in the “ultimate concerns” category because of their contribution to suffering, were discussed in 30.6% of consults. Researchers found that, while a minority (< 30%) of chaplain-patient encounters included interventions that were overtly religious or spiritual, the greatest proportion of the chaplains’ time was spent on active listening (92%), ministry of presence (48.1%), and spiritual assessment (38.8%). Interventions were not identified for specific patient needs.

Efficacy of Chaplain Interventions

Although the studies by Flannelly, Handzo, Montoye, and Idler and their colleagues represent research that has been done on patient needs and chaplain interventions, interventions are not standardized, they often are not targeted to specific needs, and little is known about their efficacy. However, within the hospital inpatient population, two randomized clinical trials suggest that even *general* spiritual care can reduce anxiety. Moeini et al. found that a three-day program of spiritual care, consisting of supportive presence and touch, encouragement for the patient to express their experience, active listening, and ritual support, reduced anxiety by 60% ($p < 0.01$), as measured with the Depression, Anxiety, and Stress Scale (DASS) among 64 hospitalized adult leukemia patients (35).

Iler et al. estimated the effect of daily chaplain visits (average number of visits = 4.2) on anxiety, length of stay, and patient satisfaction in 50 patients hospitalized for chronic obstructive pulmonary disease (COPD) in a Virginia hospital and found that the admission-to-discharge reduction in anxiety, measured with the Beck Anxiety Index, was

25% greater for patients who received chaplain visits than those who did not, and that the difference between groups was statistically significant, even when controlling for anxiety level at admission ($F_{1,46} = 3.9$, $p = 0.05$) (36). Iler et al. also found that patients who received chaplain visits stayed, on average, one-third fewer days and rated satisfaction with their hospital stay higher than patients who did not receive chaplain visits. In both studies, only general spiritual care was delivered.

The testing of chaplain interventions with specific, targeted content is limited. In a randomized controlled study in one Midwest medical center on 170 patients undergoing coronary artery bypass graft surgery, Bay and colleagues estimated the effect of five chaplain visits (one of which was to the family) averaging a total of 44 minutes, compared to no chaplain visits (37). Anxiety, depression, hope, positive and negative religious coping, and religious problem-solving style were measured at baseline (before surgery) and at follow up one and six months after surgery. Chaplain visits to the patients receiving the intervention were structured to include specific questions on distinct, visit-specific themes: the presurgical visit focused on providing care for the patient's self-identified needs, the following visits (over the next seven days) focused in sequence on the patient's hopes, drawing on religious and psychological resources to think about a positive future, and feelings of grief and loss around illness-imposed limitations or other life events. Positive religious coping increased, and negative religious coping decreased in the intervention group compared to the control group. There were no statistically-significant changes in anxiety, depression, hope, or religious problem-solving style. The authors note that their content may not have been sufficiently targeted to anxiety, depression, and hope.

In 2016, Steinhauser et al. evaluated the feasibility of using a chaplain-delivered Caregiver Outlook intervention to address existential and meaning-making issues among family caregivers of seriously ill patients in a single-arm pilot study, with measures for quality of life, anxiety, depression, spiritual well-being, religious coping, caregiving burden, and grief taken at baseline and repeated at six and eight weeks post-intervention (38). The intervention consisted of three structured discussions, typically a week apart, on topics including the caregiver's life story, accomplishments, and cherished times; regrets and issues of forgiveness; and wisdom gained and future goals. The intervention, which consisted of standardized content, was delivered by telephone. At baseline, participants had average or lower-than-average levels of anxiety, depression, and spiritual distress compared to population averages, and outcomes were stable over time. In contrast to positive effects of the Outlook intervention on functional status, anxiety, depression, and preparation for end of life were previously found by Steinhauser et al. in a pilot, randomized controlled study of hospice-eligible, seriously ill patients, the caregiver subjects did not exhibit clinical levels of anxiety or depression. Low baseline levels, along with small sample size, may have contributed to the inability to detect statistically-significant changes in levels of anxiety, depression, or other distress post-intervention (39).

Kestenbaum et al. evaluated pre-to-post differences in well-being, coping, and physical and psychological measures among 31 advanced cancer patients receiving outpatient palliative care (40). Patients received three care sessions over a period of four to six weeks from a professional chaplain using the Spiritual Assessment and Intervention Model (AIM). AIM provides guidance in assessment and a selection of specific

interventions and desired outcomes for three core spiritual needs: meaning and direction, self-worth and belonging to community, and reconciliation/to love and be loved. Although this is one of the few studies in which an intervention was deployed to meet a specific need, the outpatient study population limits generalizability to hospital inpatients. In addition, while the mean anxiety score on the Steinberg Trait Anxiety Scale dropped after the three spiritual care sessions from 43.6 to 41.9, the reduction was not statistically significant ($p = 0.29$).

Although the chaplain-delivered interventions studied by Steinhauser and Kestenbaum were not evaluated in hospitalized patient populations, they do demonstrate the feasibility of delivering and testing the efficacy of chaplain interventions with standardized content. Furthermore, the AIM study tested a *targeted* intervention. Under AIM, chaplains assess the patient's primary spiritual need category, deliver an intervention to address that need, and evaluate the outcome. For example, if a patient is struggling with a decision and has a need for meaning and direction, the chaplain might ask how the patient made difficult decisions in the past, leading to the patient's insight that they have already been consulting with family members, and subsequent relief from realizing that they have access to (and are effectively using) resources. The study conducted by Bay highlights the importance of targeting interventions to specific sources or indicators of distress. Importantly, chaplain effectiveness to date seems to have been tested using only repeated-contact interventions. Most hospital spiritual care consults involve only a single encounter between the chaplain and patient (31, 34). Research on the effectiveness of targeted single-contact, chaplain-delivered bedside interventions is lacking.

Study Aims

The purpose of our study is to lay the groundwork for the development and testing of targeted, chaplain-delivered interventions for distressed and anxious hospital inpatients. Specifically, we aim to answer four research questions. First, what stressors are experienced by hospital inpatients? Second, what is the prevalence of these stressors, and how do they cluster or group together? Third, how are the stressors distributed within the patient population and hospital? Fourth, how are these stressors, along with other demographic, illness, and religious factors, associated with anxiety? This study is part of a larger research program that aims to develop and test targeted, chaplain-delivered interventions to address inpatient distress and anxiety.

METHODS

Study Design and Recruitment

We conducted a cross-sectional study using data collected from August 2017 to January 2018 from patients in two acute-care hospitals in a major metropolitan area in the southeastern U.S. Patients eligible for inclusion in the study were at least 18 years of age, spoke English, and were assigned to an inpatient unit, for example, a renal/nephrology unit or cardiac care unit. Patients were not eligible to participate if they were in temporary treatment or holding units, such as the emergency department, cardiac observation unit, or pre-operative holding area. Patients were also not eligible to participate if they were cognitively impaired, on a ventilator, or assigned to a room where enteric precautions or airborne precautions (use of an N-95 mask requiring fit-testing) were required. Within each unit, patients were recruited randomly by room. Units were selected by the research coordinator for each day's recruitment efforts to achieve good coverage hospital-wide. Patients were recruited and data was collected in a single, approximately 15-minute encounter in the participant's hospital room by an experienced research coordinator or trained research assistant. If a patient were asleep, out of the room, or engaged in discussion with medical staff during the initial recruitment attempt, a maximum of two additional recruitment attempts were made within the same day. If a patient began participating in the survey and data collection was subsequently interrupted, a maximum of two attempts were made to complete the survey during the same day. Patients who did not complete the survey were not included in the analysis.

Survey data were collected and managed using RedCap electronic data capture tools hosted at Emory University. REDCap (Research Electronic Data Capture) is a

secure, web-based application designed to support data capture for research studies, providing: 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.

The study was approved by the Emory University institutional review board. All participants provided written, informed consent.

Measures

Outcome: We measured anxiety using the 6-item State-Trait Anxiety Index (STAI) and, in accordance with common practice, we prorated scores to a 20 – 80 scale and defined clinically-relevant anxiety as a score of 40 or higher (14, 41, 42). Psychometric testing of the of the 20-item state anxiety subscale of the full STAI instrument, from which the 6-item STAI was derived, has confirmed the cut point of 40 to have good sensitivity and specificity (15). Additionally, the 6-item STAI instrument has been validated against the 20-question state subscale of the STAI (43-45), which has been used extensively to measure anxiety in a variety of patient types, see for example Babinska, Bradt, Kepka, and Lane (46-49).

Main Exposure: Endorsement (yes/no) of 41 potential stressors were self-reported verbally by participants and recorded by the researcher in an electronic tablet-administered survey. To ensure that participants' endorsement reflected stressors that were current and non-trivial, we introduced and asked the question as follows: "The goal of my visit today is to better understand things that may be burdening you or weighing on your heart while you have been in the hospital. … I will read you a list of concerns that

other people in the hospital sometimes experience and please tell me, for each one, whether it is something that is a burden to you during this hospitalization." We included all 41 stressors in univariate analysis describing prevalence and distribution of each stressor. However, we removed stressors relating to subjective emotions before conducting bivariate and multivariate analysis and did not consider them exposures when modeling the relationship between stressors and anxiety.

Stressors were selected for the survey from previous studies of distress among hospitalized patients and included isolation, abandonment by God, disconnectedness, meaninglessness, hopelessness, forgiveness, guilt, death anxiety, helplessness/loss of control, uncertainty, anxiety, concern about family, alienation, expressing sadness, questioning meaning in life, insomnia, despair/sadness, isolation, and regret (19, 20, 50). Stressors identified in the literature were supplemented based on a review of chaplains' spiritual assessment documentation tools currently in use in spiritual health departments of several top-rated hospitals in the U.S., including Northwestern Memorial Hospital, Chicago, Illinois; UCLA Health, Los Angeles, California; Duke University Hospital, Durham, North Carolina; Children's Hospital, Greenville Health System, Greenville, South Carolina; Wexner Medical Center, Columbus, Ohio; Froedtert Hospital, Wauwatosa, Wisconsin; and Emory University Hospital, Atlanta, Georgia. Stressors identified from chaplain assessment tools included emotions, separation from sources of support, questions about faith, and the like. Finally, a few items based on the author's experience as a spiritual health provider were added to the list, such as difficulty being away from pets, missing out on important life events, relationship trouble, disruption to self-image and role, and financial stress.

Covariates: Demographic and religious variables were self-reported verbally by participants and recorded by the researcher in a tablet-administered survey. Demographic variables include age in years, sex, race (American Indian/Native Alaskan, Native Hawaiian or Other Pacific Islander, white, African American/Black, Asian, or other), ethnicity (Hispanic, non-Hispanic, unknown), highest degree or level of school completed (grade school, high school or equivalent, some college, Associate degree, Bachelor's degree, Master's degree, Professional degree, Doctorate), and marital status (single, divorced, living with someone, in a relationship, in a relationship but living with someone, married, widowed). The questions on race, ethnicity, and education were added to the survey after data collection had begun. Values for these variables are missing for the first 79 patients surveyed.

Religious variables include religious affiliation (Catholic; Eastern Orthodox; Protestant Christian [including Lutheran, Methodist, Baptist, Episcopal, no specific denomination, and other]; Jewish; Muslim; Hindu; Buddhist; other; and none [including atheist, agnostic, spiritual but not religious, and none of these]); self-rated religiosity on a 0-10 scale, importance of religious or spiritual beliefs in day-to-day life (not at all important, somewhat important, fairly important, very important); whether a faith leader or other religious or spiritual community member had been in to visit during the current hospitalization (yes/no); and whether a chaplain had been requested during the current hospitalization (yes/no).

Data related to the patient's illness condition or course of treatment were collected in several ways. The inpatient unit was recorded by the investigator at the time of survey administration. Study participants self-reported whether the hospitalization included a

surgery or not. The following information was abstracted from patient's medical record: date of admission and date of discharge, from which length of stay (LOS) in days at the time of survey administration and at the time of discharge were calculated; admission through the emergency department (yes/no); and insurance status (Medicaid, Medicare, military Tricare, private, or none). Date of birth was abstracted to confirm patient's age by calculation.

The investigator recorded all patient survey responses, which were verbally confirmed with the patient. A second investigator reviewed 10% of the patient medical records to confirm abstracted data. No errors were identified in the abstracted data used in our analysis, although minor discrepancies were identified in the patients' diagnoses, which were found in multiple locations in the chart and were at times contradictory. Diagnosis was not a variable included in our analysis. A small number of data entry errors for dates were identified during data cleaning, particularly around the December 2017/January 2018 transition; we corrected these in the data set.

Statistical Analysis

Imputation: The STAI 6-item scale was scored by reverse-coding all negatively-worded (anxiety absent) items, summing the values for all six items, and prorating to a 20 – 80 range. We imputed missing STAI data where the value for one of the six questions in the STAI instrument was missing, which was the case for five patients. After reverse-scoring negative items, we replaced the missing value with the mean of the observed values. Only two patients were missing more than one value on the STAI instrument; both were missing all values and were excluded from further analysis. All analyses were conducted using SAS 9.4 (The SAS Institute, Cary, NC) statistical analysis software.

Univariate Analysis: We conducted descriptive analysis of selected patient characteristics, reporting frequency and percentage for categorical variables and mean and standard deviation or median and interquartile range for continuous variables. We examined the prevalence of the top-10 endorsed stressors across unit type to produce a stressor profile characteristic of each unit type.

Variable Exclusion: Of the initial 41 potential stressors, 14 are emotion-based items judged to be components of well-being: anxiety, anger, regret, sadness, self-worth, overwhelmed, loss of control, suffering is meaningless, lost meaning or purpose in life, loneliness, hopelessness, frustration, discouragement, and guilt or shame. To avoid collinearity with our outcome measure of anxiety, itself an indicator of well-being, these 14 stressors were excluded from bivariate or multivariate analyses seeking to quantify the association between stressors and anxiety. They were also excluded from our factor analysis, which was conducted to identify groupings of variables to be used in those analyses. Emotions judged to be situational were retained, *e.g.*, feeling disconnected from family, friends, and communities of support; anger at God or a higher power; worried about who will take care of me. We also eliminated the item "marital troubles" because spouses were often present during data collection, making the answer to this question an untrustworthy data point, and because not all patients were married. We did not include these 15 variables in further analysis.

Factor Analysis: We conducted a factor analysis to reduce the number of exposures by grouping stressors that were endorsed together (or not endorsed together) into factors. These factors were then used in place of the individual stressors in bivariate and multivariate analyses. Stressors that were endorsed by fewer than 10% of participants

were excluded from the factor analysis, because the limited variability would hinder the data decomposition function of the factor analysis (51).

Factor Optimization: Ideally, each factor should represent a plausible theme identifying an underlying construct. To improve the reliability and validity of our factors, we performed a two-step procedure modified from Raubenheimer (52). First, reliability of each factor was improved through an iterative process in which single items were removed from the factor in sequence, conditional on their removal improving the Cronbach's alpha for the remaining items. The item generating the most improvement was removed and Cronbach's alpha was recalculated at each iteration until no further removals would result in an improved Cronbach's alpha. The factor analysis was then rerun with the reduced set of variables, and again single items were removed in sequence from each factor until no further improvement in Cronbach's alpha was possible. This process was repeated until the factor analysis produced a set of factors for which no improvement in alpha could be made through item removal.

In the second step of the factor optimization process, scale validity was improved by removing items that did not load robustly and cleanly on a single factor. Items with a primary factor loading of less than 0.40 were removed, and items for which there was not at least a 0.25 difference in loading between the primary and secondary factors were removed. Our final factors, along with individual stressors that did not load cleanly on a factor but were substantively important to include, were used as exposures in bivariate and multivariate analyses exploring the association between stressors and anxiety.

Bivariate Analysis: Differences between patients with low anxiety (STAI score <40) and those with high or clinically-relevant anxiety (STAI score ≥ 40) were analyzed

with the chi-square test for dichotomous variables, analysis of variance (ANOVA) for polytomous variables, and independent t-test for continuous variables. Differences in factor or stressor score across categories of patient characteristics were also analyzed using chi-square, ANOVA, or t-tests as appropriate. Statistical significance was set at an alpha level of 0.05.

Multivariate Analysis: We conducted linear regression to estimate the association of stressors of interest and other covariates with STAI scores. Our initial model included only the distress factors and individual stressors. We then expanded our model through the addition of demographic covariates (age, sex, race, ethnicity, education, marital status, and insurance status), followed by illness-related covariates (LOS to survey, LOS to discharge, whether the participant was a surgical patient or ICU patient, whether admission was through the emergency department, and medical unit type), and finally covariates related to religion and/or spirituality (religious affiliation, self-rated religiosity, importance of religion or spirituality in day-to-day life, whether a visit was received from the patient's faith community, and whether a visit from the chaplain was requested). Where the addition of a block of covariates resulted in a meaningful change (> 10%) to the effect estimate (β) for any distress factor or single stressor, the previous model was rerun with covariates in that block added one at a time to evaluate which were having a mediating effect (resulting in a decreased absolute β value) or a suppressing effect (resulting in an increased absolute β value) on the relationship between that factor or stressor and STAI score.

RESULTS

Recruitment

Figure 1 depicts the study sample recruitment process and outcome. Of 1,601 rooms we approached for participant recruitment, which included both patients and family members, 352 individuals provided consent and were enrolled in the study. Of those enrolled, 276 were patients. Five records were excluded, three because we were missing data on our outcome measure of anxiety, and two that were inadvertent second interviews with patients who had already completed an initial survey. This left 271 patients in the study population available for analysis.

Of the 1,249 individuals not consented into the study, we were missing information on whether the person was eligible for 182. Among those for whom eligibility was known, we recorded either the reason for ineligibility or the reason for not participating for 781 patients. Among the 326 patients for whom a reason for ineligibility was recorded, enteric precautions were required to enter the room (8.6% of cases), airborne precautions were required to enter the room (16.3%), the room was not assigned (22.9%), the patient exhibited cognitive or behavioral issues (23.5%), the patient was on a ventilator (12.5%), or the patient had insufficient command of English (3.5%). Among the 455 eligible patients for whom a reason for not participating was recorded, the patient was asleep (34.2% of cases), out of the room (21.0%), engaged with medical staff (28.5%), too tired (4.7%), in too much pain (4.3%), or busy with visitors (7.3%).

Description of Study Participants

Selected demographic, clinical, and religious characteristics of study participants are presented in Table 1. Compared to the U.S. population, study participants are older

(mean age 53.6 years in the study participants compared to 37.7 years in the U.S. population), more educated (42% have earned a college degree or more compared to 32% in the U.S. population age 25 or older), more likely to be African American or Black (48% compared to 13%), and less likely to be Hispanic or Latino (7% compared to 17%) (53). Study participants are similar to the U.S. population in sex (52% female in the study population compared to 51% in the U.S. population) and marital status (47% compared to 48% married) (53). As expected with a higher mean age, our study population is more likely to be insured through Medicare (39% compared to 14% nationally) and less likely to have private insurance (42% compared to 56% nationally), Medicaid (14% compared to 19%) or no insurance (5% compared to 9%) (54).

Based on inpatient unit type, participants were hospitalized for a wide range of medical issues, most often for surgical services (20%), hematology or oncology (17%), cardiovascular disease (14%) or cardiology (11%). Participants were hospitalized in other unit types in single-digit percentages (general medicine and neurology, 8% each; solid organ transplant, 7%; bone marrow transplant and vascular, 4% each; renal/nephrology, 5%; and vascular, 3%). Overall, 8% of patients were in an intensive care unit (ICU) when enrolled. About four in 10 patients reported that their hospitalization involved a surgery (39%), and nearly half (48%) of all patients were admitted through the emergency department. Median length of stay was 4 days at the time of survey completion (interquartile range [IQR] 2 to 8), and 8 days to the time of discharge (IQR 4 to 13.5).

In many religious measures, our study population was more religious than the country. This is not surprising, because study participants were older than the U.S. average, and older people tend to be more religious than younger people (55). Study

participants were more likely to be Protestant Christian than the U.S. population (80% in the patient population compared to 51% nationally), less likely to be Catholic (7% compared to 22%) or unaffiliated (4% compared to 20%), and more likely to report "other" religion (9% compared to 6%) (56). Religion was also more important to study participants in day-to-day life than in the overall U.S. population (55). Two in three participants reported that religion or spirituality was "very important" in their day-to-day life (67% compared to 53% of the U.S. population), and only 9% said it was "not at all important" or "not very important" (compared to 22% nationally). On a scale of 0 (not religious at all) to 10 (very religious), participants reported a mean rating of 7 (SD = 2.8). Among participants, 39% had received a visit from someone in their faith community, and 21% had requested a chaplain visit during the current hospitalization.

Frequency and Distribution of Stressors

Participants were queried about whether they were experiencing each of 41 stressors to a degree that was burdening them during their hospitalization. Stressors were endorsed at levels ranging from 4.4% for marital troubles and anger at God/Higher Power, to 55.0% for pain (Table 2). Following pain, the most highly endorsed items were feeling frustrated (endorsed by 49.5% of participants), feelings of anxiety (48.3%), inability to sleep (46.1%), feeling overwhelmed (43.5%), fear of the unknown about diagnosis and treatment (42.4%), loss of physical ability or bodily function (42.4%), missing out on important events in life (41.3%), worried about my quality of life (40.8%), and sadness (37.6%).

To understand how stressors vary across unit type, we identified the top 10 stressors for each of the twelve unit types: general medicine, neurology, cardiology,

cardiovascular, pulmonary/respiratory, vascular, solid organ transplant, surgical services, hematology/oncology, bone marrow transplant (for blood cancers), and renal/nephrology. Pain was among the top-three endorsed items in all unit types. Feeling frustrated, anxious, overwhelmed, unable to sleep, and sadness were among the top-10 in at least three quarters of the unit types. Fear of the unknown, worries about quality of life, and distress over missing out on important events in life were among the top-10 endorsed items in at least half of the unit types. Frequency of endorsement of the top-10 items for the neurology and solid organ transplant units are depicted in Figure 2 and provide an example of differences across unit types. These units were selected to illustrate both similarities and differences, as they share nine of their top-10 stressors, yet also have substantial difference in endorsement frequencies and order of stressor endorsement. For example, in the neurology units, the loss of physical ability or bodily function is the most highly-endorsed stressor (77%), followed by the inability to sleep (64%) and pain (59%). On the transplant unit, pain and missing out on life events are the most frequently endorsed stressor (47% each), followed by anxiety (42%). Stressor profiles for each of the 12 unit types are included in Appendix I.

Factor Analysis

We conducted a factor analysis to achieve two goals. First, a reduced number of stressor exposures simplifies bivariate and multivariate analyses and makes the results easier to interpret. Second, by identifying groups of stressors that "travel together" and that may be the result of an underlying cause or process, we enable the development of targeted interventions in a richer context, in which an intervention developed for a single stressor may also address other items in the factor.

We excluded stressors that were endorsed by fewer than 10% of participants from the factor analysis. For the remaining 18 variables, a matrix of tetrachoric correlations was created for use in the factor analysis using the POLYCHORIC option in PROC CORR; tetrachoric correlations are recommended when calculating correlations between binary variables thought to have an underlying linear structure (57, 58). The factor analysis was conducted using the PRINIT method and varimax rotation in PROC FACTOR, with priors = one. Six eigenvalues were above 1.0 and the scree plot showed a marked elbow in the plot beginning at the second factor. We explored the suitability of two-, three-, four-, and six-factor solutions based on face validity, Cronbach's α, and discriminatory power between factors to select the final factor structure. The results of the factor analysis are presented in Table 3 for two-, three-, and four-factor solutions. The six-factor solution was omitted because of space limitations.

In the four-factor solution, one factor included only a single item. Because forcing a solution with six (or more) factors resulted in additional one-item and two-item factors, with no improvement in Cronbach's alpha or face validity, factor schemes with more than four factors were not considered further. Within each of the two- to four-factor schemes, not all items loaded strongly (with a loading factor > 0.40) and cleanly (with at least a 0.25 difference in loadings on the primary and closest secondary factor) (59). For example, item 27, "Worried about who will take care of me" had a loading on the primary and closest secondary factor of 0.58 and 0.46 in the two-factor solution, 0.59 and 0.40 in the three-factor solution, and 0.54 and 0.44 in the four-factor solution. The difference between primary and secondary factors ranged from 0.12 to 0.19, below our desired 0.25 cutoff for clean loading. We applied a modification of the procedure

described by Raubenheimer (52) to each factor scheme to improve factor reliability (that is, to achieve higher item loadings and higher Cronbach's alpha within each factor), and factor validity (by retaining items that load cleanly on a single factor).

Applying this procedure to the two-, three-, and four factor schemes consistently resulted in a "fear" factor consisting of three items: fear of upcoming procedures, fear of death, and fear of the unknown about diagnosis and treatment. These three stressors, relating to uncertainty and discomfort about the future, were strongly correlated regardless of how the factors were parsed. Additionally, we consistently identified an "isolation" factor, consisting of items relating to disconnection and judgment/forgiveness. From the three- and four-factor solutions, we obtained a three-item isolation factor (feeling disconnected from family, friends, and communities of support; no one to talk to about what I'm going through; and feeling that others will or are judging me). From the two-factor solution, we obtained a six-item isolation factor that included those three items plus three more: the need for forgiveness, struggling with disconnection from a Higher Power, and inadequate support from family. In all cases, the factors made sense thematically. We retained the two-factor solution with its three-item fear factor and six-item isolation factor for further analysis; this factor scheme provided the best Cronbach's alphas (0.77 and 0.69, respectively) and had good face validity.

The final factors included an isolation factor with six items (no one to talk to about what I'm going through; feeling disconnected from family, friends, and communities of support; inadequate support from family; struggling with disconnection from Higher Power; need for forgiveness; and feeling that others will or are judging me) and a fear factor with three items (fear of the unknown about diagnosis or treatment; fear

of upcoming procedures, and fear of death). Although the four poorly-endorsed stressors were not included in the factor analysis, they reflected a single, faith-related theme: concerns about the afterlife, questioning my faith, feeling abandoned/punished by God/Higher Power, and anger at God. We combined these into a faith crisis pseudo-factor (Cronbach's $\alpha = 0.50$).

The two factors and one pseudo-factor were scored by summing the number of endorsed items in each. All further analyses were completed using the isolation and fear factors, and the pseudo-factor of faith crisis. To avoid excluding clinically-relevant stressors, the five items within the top-10 endorsed that were not already included in one of the factors (pain, inability to sleep, loss of physical ability or bodily function, missing out on important events in life, and worried about my quality of life) were also included in further analyses.

Patient Characteristics and Stressors

Table 4 presents the scores of the isolation and fear factors and faith crisis pseudo-factor, and the frequency of endorsement for the remaining top-10 endorsed single stressors. The results show statistically-significant crude associations between some of the covariates and the factors/individual stressors, which were determined (unless noted otherwise) based on a t-test of independent means.

In comparison to participants older than 55, participants 55 years old or younger had a significantly higher score on the fear factor (1.18 [SD = 1.16] compared to 0.82 [SD = 0.99], p = 0.005), proportion endorsing pain (0.61 [SD = 0.49] compared to 0.48 [SD = 0.50], p =0 .04), and proportion endorsing inability to sleep (0.52 [SD = 0.50] compared to 0.39 [SD = 0.49], p = 0.03). Participants with a high school education or less

had a higher score on the isolation factor (1.31 [SD = 1.49]) compared to either those with some college (0.70 [SD = 1.13]) or with a college degree or more (0.73 [SD = 1.04]). Based on an analysis of variance, these differences are statistically significant at p = 0.008. A higher score on the isolation factor was also identified for those admitted through the emergency department (1.02 [SD = 1.33] compared to 0.68 [SD = 1.07] for those not admitted through the emergency department, p = 0.02).

A higher score on the faith crisis pseudo-factor is noted for unmarried compared to married participants (0.28 [SD = 0.66] compared to 0.21 [SD = 0.54], p = 0.02); for those whose hospitalization included a surgery (0.25 [SD = 0.73] compared to 0.18 [SD = 0.51] for no surgery, p = 0.02); and those who reported above-mean compared to below-mean self-rated religiosity (0.28 [SD = 0.65] compared to 0.19 [SD = 0.53], p = 0.03). Those who requested a chaplain visit during their hospitalization compared to those who had not made such a request had a statistically significantly higher isolation factor score (1.16 [SD = 1.33] compared to 0.74 [SD = 1.15], p = 0.03), faith crisis pseudo-factor score (0.42 [SD = 0.78] compared to 0.20 [SD = 0.55], p = 0.01), and proportion endorsing pain (0.68 [SD = 0.47] compared to 0.52 [0.50], p = 0.02). There was a statistically-significant difference in the proportion of participants burdened by the loss of physical ability or bodily function across unit type, the highest endorsement of this stressor was in the neurology units (0.77 [SD = 0.43], followed by surgical services (0.55 [SD = 0.50]) and the lowest endorsements were in the vascular units (0.09 [SD = 0.30]) and the bone marrow transplant unit (0.20 [SD = 0.42]). The difference across unit types overall was statistically significant (p = .004) based on an analysis of variance.

Sex, race, ethnicity, insurance status, length of stay (both at time of survey and at time of discharge), religious affiliation, and whether a visit was received from someone in the participant's faith group, were not statistically significantly associated with factor score or stressor endorsement frequency.

Patient Characteristics and Anxiety

Table 5 presents the distribution of clinically-relevant ("high") and sub-clinical ("low") levels of anxiety across patient characteristics, based on a cut-point of <40 and ≥40 on the STAI 6-item scale. Continuous variables are presented as mean and standard deviation in low and high categories of anxiety and were compared for statistical significance using the independent means t-test. Categorical variables are presented as the percentage of participants in that category in low and high categories of anxiety and were compared for statistical significance using a chi-square test for dichotomous variables and ANOVA for polytomous variables.

The difference in percentage of participants with high versus low anxiety is statistically significant across categories of importance of religion or spirituality in day-to-day life, and for whether the participant requested a chaplain during the hospitalization. Those who rated the importance of religion or spirituality in their life as not very important were more likely to have high anxiety (68%, n = 15) compared to those who rated religion as fairly important (38%, n = 24) or very important (36%, n = 65). Very few participants rated religion as not important at all (2% [n = 4] of low-anxiety participants and none of the high-anxiety participants). Among participants who requested a visit from the chaplain during the hospitalization, 51% had high anxiety, whereas among those who did not make such a request, 36% had high anxiety. Isolation,

fear, and faith crisis scores and the percentage of participants endorsing pain, inability to sleep, loss of physical ability or bodily function, missing out on important events in life, and worried about my quality of life are statistically significantly higher among those with high anxiety compared to those with low anxiety (p-values range from <0.0001 to 0.0007). Mean STAI score is statistically significantly higher for those endorsing compared to not endorsing each of the 41 stressors (not shown).

Multivariate Regression Modeling

We performed linear regression of STAI score on factors and single stressors, adding covariates to sequential models in blocks: demographics, illness covariates, and religious covariates. To simplify and improve the interpretability of the models, we restricted our exposures to the fear and isolation factors, faith crisis pseudo-factor, and the remaining top-10-endorsed single stressors that were not already included in one of the factors. Although including only the single items in the top-10 endorsed is somewhat arbitrary, few participants (2%) who endorsed at least one stressor were not represented in the factors and top-10 items (Figure 3). Results of the linear regression modeling are presented in Table 6. We first discuss the results broadly, followed by a more detailed evaluation of model-to-model changes.

In all four models, the isolation factor, fear factor, pain, inability to sleep, and worries about quality of life were significantly associated with STAI score; higher factor scores and more frequent endorsement of single items are associated with higher STAI score. Presence on a cardiology or hematology/oncology unit, and requesting a chaplain visit during the hospitalization are also positively and significantly associated with STAI score in all models in which these covariates were included. None of the demographic

covariates is consistently associated with STAI; Hispanic or Latino ethnicity was significant in Model II only (β = 8.5 [SD = 4.0, *p* = 0.04], meaning that Hispanic patients have, on average, a STAI score 8.5 points higher than non-Hispanic patients), although this association became insignificant once the illness and religious covariates were added to the model (β = 6.23 [SD = 5.0, *p* = 0.21). Although many of the statistically-significant variables remained so through all models, their degree of association with STAI varied from model to model, suggesting that among the added block of covariates was one or more that has a mediating or suppressing effect on the association. For each factor or individual stressor that exhibited a 10% or greater change in β from one model to the next, we reran the regression while adding a single variable at a time from the next block of covariates. A change in factor or stressor β of at least 10% occurred only between Models I and II; thus, only the demographic variables were added singly. These model-to-model changes are depicted in Table 7 and described as follows.

The association of the isolation factor with STAI is mediated by being of Hispanic or Latino ethnicity, which remained positively associated with STAI score in all models, although only significantly in model I. From model I to II, which represents the addition of all demographic covariates in a block, the β for the isolation factor drops from 3.41 (SD = 0.76. p = <.0001) to 2.51 (SD = 0.92, p = .007). However, with the addition of ethnicity alone to model I, the β for the isolation factor drops to 2.71 (SD = 0.89, p = .003), explaining 79% of the change from model I to model II.

The association of the inability to sleep and worries about quality of life with STAI is suppressed by being of Hispanic or Latino ethnicity, which itself was positively associated with STAI score). From model I to II, the β for inability to sleep rises from

4.56 (SD = 1.67, p = .007) to 5.70 (SD = 2.13, p = .008), and the β for quality of life rises from 4.39 (SD = 1.88, p = .02) to 6.68 (SD = 2.35, p = .005). However, with the addition of ethnicity alone to model I, the β for the stressor inability to sleep rises to 5.16 (SD = 2.04, P = .012), explaining 53% of the change from Model I to Model II, and the β for worries about quality of life rises to 5.59 (SD = 2.25, p = .014), explaining 52% of the change. Insurance status also acts as a suppressor of the association of quality of life with STAI, although to a lesser degree than ethnicity. Patients with private insurance or Medicare had, on average, STAI scores that were 6.6 and 3.5 points lower, respectively, compared to patients with no insurance. Patients on Medicaid had an average STAI score 1.7 points higher than those with no insurance. When insurance status alone is added to model I, the β for worries about quality of life increases to 4.97 (SD = 1.89, p = .0009), explaining 25% of the change in the association of quality of life with STAI from model I to model II.

In the final model, with all covariates added (model IV in Table 6), several exposures and covariates remain statistically significantly associated with STAI score, including: the isolation factor (β = 2.20, SD = 1.03, p = 0.03), fear factor (β = 2.67, SD = 1.22, p = 0.03), pain (β = 4.78, SD = 2.28, p = 0.04), being on a cardiology unit (β = 12.23, SD = 5.85, p = 0.04) or hematology/oncology unit (β = 13.82, SD = 5.79, p = 0.02), and having requested a visit from a chaplain during the hospitalization (β = 6.79, SD = 2.81, p = 0.02).

DISCUSSION

This cross-sectional study explores the prevalence, grouping, and distribution of stressors among 271 hospitalized patients, the association between those stressors and anxiety as measured by the STAI 6-item instrument, and the mediating or suppressing effect of patient characteristics on the association between stressors or groups of stressors (factors) and anxiety.

Among our study participants, the 10 most commonly-endorsed stressors, hospital-wide, were pain, feeling frustrated, feeling anxiety, inability to sleep, feeling overwhelmed, fear of the unknown about diagnosis and treatment, loss of physical ability and bodily function, missing out on important events in life, worried about my quality of life, and sadness. Stressor profiles varied between unit type; however, some stressors were prevalent in all or most unit types, including pain (among the top-three endorsed items in all unit types) and feeling frustrated, anxious, overwhelmed, unable to sleep, and sadness (present in at least three quarters of the unit types).

Previous research examining the prevalence of specific stressors is limited, and the research that has been done is inconsistent. Three of the 17 fears and emotional or physical conditions identified by Feuchtinger et al. among 24 pre-surgical patients scheduled for coronary artery bypass surgery mapped fairly directly onto stressors in our study: pain, loss of physical ability or bodily function (or fears of same), and fear of death (60). Four of eight concerns identified by Shah et al. among 226 hospitalized patients receiving their initial palliative care consult mapped onto our stressors: pain, loss of physical ability or bodily function ("physical distress" in the study by Shah et al.), fear of death, and conflicts (or "distress") with staff (61). For each stressor that was measured in

both our study and one or more of these previous studies, the prevalence of the stressor identified in our study was higher than that identified in the other studies. Although this inconsistency may be due, in part, to the fact that those studies were conducted on different patient populations compared to the hospital-wide population we studied, the way patients were queried was arguably a larger explanatory factor. The previous studies asked only open-ended questions about patients' fears or other things that were bothering them. Stressors and emotional conditions were then categorized qualitatively based on open-ended responses. In contrast, our study included a structured questionnaire that asked patients about the presence of specific stressors. Thus, it is likely that we captured a greater proportion of patients experiencing those stressors compared to studies that relied on the patient bringing them up without prompts.

In one cross-sectional study that employed a similar approach to our own, 169 cancer patients undergoing chemotherapy in an outpatient unit in Portugal were asked whether they were experiencing any of 40 specific characteristics of spiritual distress using a structured questionnaire. Fifteen of the items in their questionnaire were identical or similar to stressors in the current study (20). The Portuguese chemotherapy outpatient population was different from our U.S.-based, hospital-wide inpatient sample, and on average was older, more often female, more often married, and much more Roman Catholic than ours. Perhaps not surprisingly given these differences, the prevalence of individual survey items endorsed by patients varied widely between their study and ours, with their values ranging from approximately one-fifteenth to more than twice the prevalence identified in our study. Despite these differences, three of the four most-frequently endorsed items in their outpatient study were among the most-frequently

endorsed items in our study (anxiety, inability to sleep, and fear of the unknown), suggesting that these stressors may be commonly experienced across populations. The large difference between the proportion of patients in our study endorsing *feeling disconnected from family, friends, and communities of support* compared to patients in their study is understandable given the difference in patient type (inpatient vs. outpatient). It is likely that inpatients would be more greatly burdened by being separated from their sources of support than outpatients, who are more likely to return to a supportive environment after their treatment.

Our results also differed from those of a cross-sectional study that explored similar research questions as ours: the prevalence of distress, its association with anxiety, and how anxiety is distributed across diagnosis category among 189 inpatients in an Italian hospital (3). Roselli et al. administered the Needs Evaluation Questionnaire (NEQ), which included three needs roughly corresponding to our stressors: I need my symptoms (pain, nausea, insomnia, etc.) to be better controlled (this maps imperfectly onto pain in our study); I need economic help (maps onto financial distress); and I need to be more reassured by my relatives (maps onto insufficient support from family). The patients in our study more frequently reported pain and financial distress (an additional 13% to 15% endorsed each of these items in our study compared to the work by Roselli et al.), and less frequently reported inadequate family support (a difference of 12% in endorsement frequency). It is noteworthy that inadequate family support seems to be a greater stressor among American patients compared to the patients surveyed in Portugal or Italy. This may be in part a consequence of U.S. culture, where families are often scattered across wide geographical areas, and future research may test the relative

contributions to feelings of inadequate family support from physical barriers such as distance or lack of transportation rather than relational barriers such as family conflict or dysfunction. These data are also important for those who develop interventions for hospital distress, as they indicate that culture and illness context are important.

The results of our factor analysis suggest thematic groupings of stressors into factor categories of isolation and fear, as well as an ad-hoc grouping of poorly endorsed items into a faith crisis pseudo-factor. Others have thematically grouped stressors expressed by patients through qualitative methods. For example, Feuchtinger et al. grouped patients fears and anxieties into broad categories of fears; negation of fears; and other emotional and physical conditions, which included items as divergent as positive emotions, negative emotions, sleep problems, and pain – items that we know from our factor analysis are not likely to fall within the same thematic group (60). In a meta-analysis on distress expressed by lung cancer patients, a greater number of themes were identified, and their correspondence to our single-stressor or distress factor categories was more mixed. For example, Refsgaard and Frederickson identified eight themes: guilt, blame, shame, and stigmatization; hope and despair; loneliness; change in self-image and self-worth; uselessness and dependency; uncertainty and worries; anxiety and fear; and loss (62). Many of these are broad categories that include multiple stressors, for example, their category “change in self-image and self-worth” encompasses two of our stressors, difficulty accepting how I appear, and feelings of low self-worth, which did not group together in our factor analysis. An analysis of palliative care patient responses to the question “What bothers you the most?” shows this same tendency to group concerns in broad thematic categories without statistical evidence that they are connected. Two of the

categories identified by Shah et al. are particularly broad: “emotional, spiritual, existential, or nonspecific distress,” and “relationships” (61). Both categories encompass multiple items in our own study that we showed through factor analysis to be independent of a cohesive theme. Our study contributes to the overall understanding of patient distress by evaluating relationships among stressors quantitatively. For example, we identified a substantial number of individual stressors that did not strongly or cleanly load onto any factor, even if they appeared on their face to be related to a common theme. The degree to which stressors covary or appear independent could be obscured by a solely qualitative process for determining distress themes, which group items based on face validity only, without regard for the strength with which they appear together in the data.

Like others, we found stressors, whether expressed as multi-item factors or as single stressors, to be significantly associated with anxiety (21). Our findings are also consistent with a study of 282 patients in a Brazil hospital by Gullich et al. that clinically-relevant levels of anxiety are more prevalent among women and young people (11). Results from bivariate analysis were similar in both the Gullich study and our own, although they found bivariate association between these covariates and anxiety to be significant for sex ($p = 0.001$) and marginally-significant for age ($p = 0.06$), while the current study shows marginal significance for both sex ($p = 0.08$) and age ($p = 0.10$). Interestingly, in the adjusted models, Gullich’s findings for the association between sex and age were both statistically significant ($p = 0.0001$ for sex, $p = 0.04$ for age), while in the current study, adjusted values are no longer significant or marginally-significant ($p = 0.24$ for sex, $p = 0.94$ for age). Major differences in our models may help explain this change, for example Gullich et al. included very different covariates from ours: variables

related to tobacco and alcohol consumption, the place of appointment of the patient's external primary health-care provider, previously diagnosed comorbidities, whether a medical student had been present during in-hospital caregiving, and for how many minutes the student was present. Further, in their step-wise construction of a final model, only covariates with $p \leq 0.2$ were retained. Nevertheless, our findings on the lack of association between other demographic variables and anxiety further echoed Gullich's results. Also consistent with Gullich's results, we found no statistically-significant association between race, religion, marital status, education, or length of stay and anxiety. Both we and Gullich found a marginally-significant association between socioeconomic status and anxiety. This consistency is further noteworthy given differences in methodologies for categorization. Gullich and colleagues categorized by income quartile and we categorized by the proxy variable insurance status. We identified a statistically-significant association between anxiety and two additional patient characteristics: the patient's self-rated importance of religion or spirituality in day-to-day life (greater importance of religion being associated with lower anxiety), and whether the patient requested a chaplain visit during the hospitalization (higher anxiety among those requesting a chaplain). Gullich et al. found a statistically-significant association between anxiety and previously diagnosed chronic conditions of diabetes, systemic arterial hypertension, obesity, and cardiac disease; however, it was not clear whether these chronic pathologies were related to their current hospitalization. In contrast, we did not identify a statistically-significant association between anxiety and unit type. Our use of unit type as a proxy for diagnosis does not allow a direct comparison with Gullich's categorization, especially for diabetes, hypertension, and obesity which are conditions

likely to be found throughout hospital units. Our use of unit type (rather than diagnosis) is reasonable for our longer-term goal of developing, deploying, and testing chaplain-delivered interventions, as chaplains commonly deliver care within assigned clinical areas and not by a diagnosis such as obesity. Nevertheless, analysis of the distribution of stressors by diagnosis may further enrich our overall understanding of the patient experience and distribution of stressors through the patient population.

We conducted multivariate linear regression analyses to determine the association of distress exposures, including the isolation and fear factors, faith crisis pseudo-factor, and five individual stressors, with anxiety as measured by STAI score. We first modeled the exposures alone and then in subsequent models added demographic, illness, and religious covariates in blocks. Our final model identified statistically-significant adjusted associations between STAI score and the isolation and fear factors, pain, worries about quality of life, treatment on a cardiology or hematology/oncology unit, and having requested a chaplain visit during the hospitalization. We found ethnicity and insurance status to mediate or suppress the associations between STAI score and three of the factors/individual stressors: Hispanic or Latino ethnicity mediates the association between STAI score and the isolation factor and suppresses the association of STAI score with the inability to sleep; and both ethnicity and insurance status suppress the association of STAI score with worries about quality of life. While the causal relationships among these variables are not fully understood, these results suggest that ethnicity and insurance status, or perhaps socioeconomic status more generally, are important patient characteristics to consider when examining or designing interventions for anxiety or other distress.

Results of the current study add substantially to an understanding of stressors and anxiety among hospitalized patients and provide a solid foundation for the development of targeted interventions to be delivered by the chaplain at the bedside.

Strengths and Limitations

Major strengths of this study include the quantitative approach and analytical rigor employed in determining thematic distress factors and evaluating the association between stressors and anxiety. The inclusion of patients from all inpatient units provides a fuller picture of anxiety among patients than is available from previous studies, many of which have been limited to cancer, palliative care, cardiac, or surgical patients. This fuller understanding of the nature and distribution of stressors within the hospital will assist both in developing interventions that can be used across a wide range of patient types, and in deploying spiritual care resources strategically to segments of the patient population or areas of the hospital carrying the most distress.

This study, like all cross-sectional studies, is limited by the absence of longitudinal data. Moreover, the inclusion of patients from a single hospital system in a single part of the country limits generalizability. The use of a binary yes/no option when asking patients if they were burdened by each stressor limited the degree of nuance we were able to capture. Our data would have been richer, and the degree of distress would have been more readily calculable, had we asked about each stressor on a Likert-type scale. Enabling a range of answers to each stressor question would have allowed the creation of a more nuanced score, both of single stressors and within each identified factor.

In addition, the potential for selection bias is present in of our study. Patients who were in a great deal of pain, or those who were more heavily medicated and therefore sleepy or not at their cognitive best, may have been underrepresented in our sample. It is possible that the patients experiencing the most distress were those whom we were unable to approach for recruitment, or who were least likely to enroll when approached. Our prevalence of stressors and our estimates of the association between factors/individual stressors and STAI score may therefore be underestimated.

Future Directions

There is a recognized need within the chaplaincy field for additional research on the effectiveness of chaplaincy interventions and development of best practices (63). Our evaluation of the types and distribution of stressors will enable the prioritization and development of interventions targeted to address the most common stressors. By identifying the type and frequency of stressors on each unit type (which could also be done across other divisions, for example among patients in an ICU compared to those not in an ICU), we are able to identify a stressor profile for each patient group of interest. Such profiles may help guide the development and deployment of chaplain interventions, and foster awareness of issues that may be identified during the spiritual assessment. Earlier researchers have noted that an elevated level of baseline distress, such as anxiety, is important when testing the efficacy of chaplain interventions (38). As a practical matter of study design, our work helps identify which subsets of the hospital inpatient population are experiencing high numbers of stressors, and thus informs which might be chosen for testing the efficacy of new (or old) interventions.

Our Spiritual Health Department and research team are engaged in the design of further studies in which we will test the benefits of cognitively-based compassion training (CBCT) on chaplain residents, and the effects of compassion-based interventions on patient outcomes. The current study provides a rich context in which to develop and test these new interventions.

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TABLES

Table 1. Selected Characteristics of 271 Study Participants Hospitalized in Two Southeastern U.S. Acute-Care Hospitals

Characteristics	N[a,b] or Mean	%[a] or SD
Age (Mean, SD)	53.6	16.2
Sex (% female)	141	52
Race[b] (%)		
White	88	46
African American/Black	93	48
Other	12	6
Ethnicity (% Hispanic/Latino)[b]	13	7
Education[b] (%)		
High school or less	61	32
Some college	50	26
Degree or more	81	42
Marital status (% married)	127	47
LOS, d (median, IQR)		
At time of survey	4	2 - 8
At time of discharge[c]	8	4 – 13.5
Insurance Status (%)		
None	14	5
Medicaid	37	14
Medicare	101	39
Private	108	42
Surgical patient (% yes)[d]	105	39
ICU patient (% yes)	22	8
Emergency department admission (% yes)	126	48
Medical unit type (%)		
General medicine	23	8
Neurology	22	8
Cardiology	29	11
Cardiovascular	39	14
Pulmonary/Respiratory	7	3
Vascular	11	4
Solid organ transplant	19	7
Surgical services	53	20
Hematology/oncology	45	17
Bone marrow transplant	10	4
Renal/nephrology	13	5
Religious affiliation (%)		
Catholic	18	7
Protestant	214	80
Other	24	9
None	12	4
Self-rated religiosity, 0-10 (mean, SD)	7.0	2.8
Importance of rel/spirituality day-to-day (%)		
Not at all important	4	1
Not very important	22	8
Fairly important	63	24
Very important	179	67

Visit from faith community (% yes)	105	39
Requested visit from chaplain (% yes)	57	21
Factor score or % endorsing		
Isolation (scored 0 – 6)	0.83	1.20
Fear (scored 0 – 3)	1.01	1.10
Faith crisis (scored 0 – 4)	.25	0.6
Pain	149	55
Inability to sleep	125	46
Loss of physical ability or bodily function	115	42
Missing out on important events in life	112	41
Worried about my quality of life	110	41
Total number of stressors endorsed	10.4	7.9

Abbreviations: N, number of patients; SD, standard deviation; LOS, length of stay; IQR, interquartile range; ICU, intensive care unit

[a]Mean and SD or median and IQR for continuous variables; percent and frequency (N) for categorical variables

[b]Race, ethnicity, and education added late to survey, 29% missing; all other variables <5% missing

[c]At the time of dataset completion, discharge date was unavailable for 11 patients (< 5% missing)

[d]Of 101 patients who reported whether surgeries were required or elective, 89% were required

Table 2. Stressor Endorsement among 271 Study Participants Hospitalized in Two Southeastern U.S. Acute-Care Hospitals

Item No.	Stressor	% Endorsing (n = 271)	Excluded from Analysis
1	Pain	55.0	
2	Feelings of anxiety	48.3	a
3	Feelings of anger	23.3	a
4	Feelings of regret	19.6	a
5	Feelings of sadness	37.6	a
6	Feelings of low self-worth	13.7	a
7	Difficulty accepting how I appear toward others because of my illness	20.7	
8	Feeling overwhelmed	43.5	a
9	Feelings like I've lost control	36.5	a
10	Feeling disconnected from my family, friends, communities of support	28.4	
11	No one to talk to about what I'm going through	15.9	
12	Feeling that my suffering is meaningless	12.2	a
13	Feelings that I've lost meaning or purpose in life	10.7	a
14	Loneliness	26.6	a
15	Difficult to be away from pets	25.1	
16	Feeling hopeless	14.0	a
17	Feeling frustrated	49.5	a
18	Feeling discouraged	30.6	a
19	Sense of guilt or shame	13.7	a
20	Feeling that others will or are judging me	15.5	
21	Need for forgiveness	12.9	
22	Fear of upcoming procedures	32.5	
23	Fear of death	25.8	
24	Fear of the unknown about diagnosis and treatment	42.4	
25	Worried about my quality of life	40.6	
26	Worried about who will take care of my family if I can't	33.2	
27	Worried about who will take care of me	24.4	
28	Loss of physical ability or bodily function	42.4	
29	Missing out on important events in life	41.3	
30	Struggling with disconnection from Higher Power	10.7	
31	Feeling abandoned or punished by God	5.2	b
32	Questioning my faith	6.3	b
33	Anger at God/Higher Power	4.4	b
34	Concerns about the afterlife	8.9	b
35	Conflicts with hospital staff	14.8	
36	Guilt over being a "burden" to family members	35.8	
37	Inadequate support from family	11.1	
38	Other family members ill or in trouble	22.9	
39	Marital troubles	4.4	c
40	Inability to sleep	46.1	
41	Financial stress	34.7	

a: Non-situational emotions were excluded from further analysis to avoid the circular condition in which measures of well-being are modeled as predictors of an outcome (anxiety) that is also a measure of well-being

b: Items endorsed below 10% were excluded from the factor analysis due to low variability. These items were excluded from the factor analysis only.

c: Applies to only a subset of the study population (those who are married)

Table 3. Results of factor analysis of 22 stressors endorsed by > 10% of Study Participants Hospitalized in Two Southeastern U.S. Acute-Care Hospitals, for Two-, Three- and Four-factor Solutions

	Item Loadings on Factor[a,b]								
	2-Factor Solution		3-Factor Solution			4-Factor Solution			
Stressor	**F1**	**F2**	**F1**	**F2**	**F3**	**F1**	**F2**	**F3**	**F4**
Cronbach's α	**.77**	**.69**	**.75**	**.70**	**.46**	**.77**	**.69**	**.48**	**N/A**
1-Pain	14	**24**	-14	22	**55**	-11	22	**41**	22
7-How I appear toward others because of my illness	**49**	39	**45**	33	29	**48**	31	27	9
10-Feeling disconnected from family, friends, support	**68**	25	**76**	17	13	**85**	10	20	-3
11-No one to talk to about what I'm going through	**81**	20	**77**	10	34	**74**	11	22	31
15-Difficult to be away from pets	21	**30**	19	**27**	16	23	20	**39**	-17
20-Feeling that others will or are judging me	**60**	29	**57**	21	27	**63**	21	19	10
21-Need for forgiveness	**60**	28	**46**	20	46	**46**	23	25	33
22-Fear of upcoming procedures	4	**77**	4	**75**	21	6	**73**	25	1
23-Fear of death	17	**73**	18	**70**	19	16	**75**	6	21
24-Fear of the unknown about diagnosis and treatment	15	**81**	24	**79**	8	26	**77**	15	-3
25-Worried about my quality of life	36	**59**	56	**59**	-10	53	**55**	3	-1
26-Who will take care of my family if I can't	**35**	25	**46**	22	-2	**40**	27	-19	28
27-Worried about who will take care of me	**58**	46	**59**	40	23	**54**	44	3	38
28-Loss of physical ability or bodily function	**39**	38	29	33	**37**	23	32	**35**	28
29-Missing out on important events in life	**62**	47	**56**	39	37	**50**	36	38	30
30-Struggling with disconnection from Higher Power	**61**	10	42	0	**52**	25	3	19	**96**
35-Conflicts with hospital staff	**36**	8	19	2	**41**	18	-4	**55**	8
36-Guilt over being a "burden" to family members	38	**49**	45	**45**	10	**47**	43	12	4
37-Inadequate support from family	**67**	16	**56**	8	38	**53**	8	31	28
38-Other family members ill or in trouble	**45**	33	31	26	**44**	32	22	**54**	9
40-Inability to sleep	25	**41**	14	**37**	35	15	**36**	33	12
41-Financial stress	34	**39**	26	**34**	31	25	**37**	15	27

[a]Factor analysis conducted in SAS using method = prinit, rotation = varimax, and priors = one, with Heygood option

[a]Loadings on primary factor are in bold

Table 4a. Factor or Stressor Score by Patient, Illness, and Religious Characteristics for Thematic Factors on Isolation, Fear, and Faith Crisis and for the Remaining Top-10-endorsed Stressors

Characteristics	Isolation (scored 0 – 6)			Fear (scored 0 - 3)			Faith Crisis (scored 0-4)			Pain (scored 0-1)		
	Mean	**SD**	***p*[a]**	**Mean**	**SD**	***p*[a]**	**Mean**	**SD**	***p*[a]**	**Mean**	**SD**	***p*[a]**
Age			.12			**.005**			.31			**.04**
Young (≤ 55)	.94	1.22		1.18	1.16		.28	.68		.61	.49	
Old (> 55)	.72	1.18		.82	.99		.21	.52		.48	.50	
Sex			.13			.07			.80	.50	.52	.12
Female	.94	1.23		1.14	1.14		.26	.67		.58	.49	
Male	.72	1.17		.89	1.03		.24	.54		.49	.50	
Race			.93			.55			.51			.76
White	.88	1.14		1.20	1.08		.26	.69		.57	.50	
African American/Black	.95	1.36		1.13	1.15		.31	.66		.60	.49	
Other	.92	1.08		.83	1.11		.08	.29				
Ethnicity Hispanic or Latino			.99			.82			.49			.82
Yes	.92	1.44		1.23	1.36		.15	.38		.62	.51	
No	.92	1.24		1.14	1.11		.28	.67		.58	.49	
Education			**.008**			.80			.87			.83
High school or less	1.31	1.49		1.08	1.07		.30	.64		.61	.49	
Some college	.70	1.13		1.10	1.16		.30	.79		.58	.50	
Degree or more	.73	1.04		1.20	1.12		.25	.58		.56	.50	
Marital status			.27			.27			**.02**			.24
Yes	.75	1.13		.93	1.09		.21	.54		.51	.50	
No	.91	1.26		1.08	1.10		.28	.66		.58	.49	
Insurance Status (%)			.27			.08			.45			.22
None	.57	1.16		.86	.86		.21	.58		.64	.50	
Medicaid	1.14	1.34		1.43	1.14		.41	.80		.65	.48	
Medicare	.84	1.14		.90	1.09		.22	.56		.55	.50	
Private	.72	1.18		.98	1.09		.24	.61		.47	..50	
LOS at time of survey			.20			.34			.11			.45
≤ median = 4	.74	1.18		1.07	1.09		.19	.52		.52	.50	
> median = 4	.93	1.23		.94	1.10		.31	.69		.59	.50	
LOS at time of discharge			..82			.96			.34			.08
≤ median = 8	.85	1.26		.99	1.06		.22	.56		.49	.50	
> median = 8	.81	1.13		1.00	1.03		.29	.68		.60	.49	
Surgical patient			.42			.72			**.02**			.19
Yes	.76	1.13		1.04	1.12		.25	.73		.60	.49	
No	.88	1.24		.99	1.08		.18	.51		.52	.50	
ICU patient			.20			.30			.63			.97
Yes	.55	1.06		1.27	1.24		.32	.72		.55	.51	
No	.86	1.21		.98	1.08		.24	.60		.55	.50	
ED admission			**.02**			.50			.13			.90
Yes	1.02	1.33		.96	1.09		.31	.69		.55	.50	
No	.68	1.07		1.05	1.10		.19	.54		.54	.50	
Unit			.70			.19			.55			.74
General medicine	.87	1.22		.61	.84		.04	.21		.6	.5	
Neurology	.95	1.09		1.27	1.20		.32	.72		.6	.5	
Cardiology	1.00	1.22		1.07	1.22		.17	.47		.5	.5	
Cardiovascular	.72	1.28		1.13	1.06		.26	.50		.5	.5	
Pulmonary/respiratory	.71	1.25		1.43	1.40		.57	.98		.7	.5	
Vascular	.73	1.27		.55	.82		.45	1.0		.5	.5	
Transplant	.89	1.52		.95	1.03		.26	.45		.5	.5	
Surgical services	.96	1.30		1.23	1.20		.25	.65		.5	.5	
Hematology/oncology	.58	.84		.93	1.10		.18	.58		.6	.5	
Bone marrow transplant	.40	.70		.90	.88		.30	.67		.5	.5	
Renal/nephrology	1.31	1.49		.46	.66		.46	.88		.8	.4	
Religious affiliation (%)			.62			.73			.18			.12
Catholic	.50	.71		.94	1.11		.06	.24		.39	.50	
Protestant	.87	1.24		1.00	1.08		.25	.62		.54	.50	
Other	.75	1.11		.92	1.25		.46	.78		.58	.50	
None	.92	1.44		1.33	.98		.17	.39		.83	.39	

Characteristics	Isolation (scored 0 – 6)			Fear (scored 0 - 3)			Faith Crisis (scored 0-4)			Pain (scored 0-1)		
	Mean	**SD**	***p*[a]**	**Mean**	**SD**	***p*[a]**	**Mean**	**SD**	***p*[a]**	**Mean**	**SD**	***p*[a]**
Self-rated religiosity (0-10)			.20			.74			**.03**			.82
≤ median = 8	.91	1.25		1.06	1.11		.28	.65		.59	.49	
> median = 8	.74	1.11		.93	1.07		.19	.53		.47	.50	
Importance of R/S			.23			.93			.66			.93
Not at all important	0	0		.75	.96		0	0		.50	.58	
Not very important	1.18	1.50		1.05	1.17		.36	.66		.59	.50	
Fairly important	.73	1.05		.97	1.11		.27	.68		.52	.50	
Very important	.86	1.22		1.04	1.09		.23	.59		.56	.50	
Visit from faith group			.95			.80			.99			.19
Yes	.83	1.16		1.03	1.16		.25	.60		.60	.49	
No	.84	1.23		.99	1.06		.25	.62		.52	.50	
Requested chaplain			**.03**			.71			**.01**			**.02**
Yes	1.16	1.33		1.05	1.11		.42	.78		.68	.47	
No	.74	1.15		.99	1.09		.20	.55		.52	.50	
STAI Score			**a**			**a**			**a**			**a**
< 40	.46	.84		.67	.89		.10	.35		.46	.50	
≥ 40	1.43	1.43		1.54	1.18		.49	.82		.70	.46	

Abbreviations: LOS, length of stay; ICU, intensive care unit.

a: p-value <0.0001 (not included in table due to space limitations)

Table 4b. Factor or Stressor Score by Patient, Illness, and Religious Characteristics for Thematic Factors on Isolation, Fear, and Faith Crisis and for the Remaining Top-10-endorsed Stressors

Characteristics	Can't Sleep (scored 0 – 1)			Loss of Function (scored 0-1)			Missing Events (scored 0-1)			QOL (scored 0-1)		
	Mean	**SD**	***p*[a]**	**Mean**	**SD**	***p*[a]**	**Mean**	**SD**	***p*[a]**	**Mean**	**SD**	***p*[a]**
Age			**.03**			.20			.10			.24
Young (≤ 55)	.52	.50		.46	.50		.46	.50		.44	.50	
Old (> 55)	.39	.49		.38	.49		.36	.48		.37	.48	
Sex			.51			.69			.92			.53
Female	.48	.50		.42	.49		.42	.49		.39	.49	
Male	.44	.50		.44	.50		.41	.49		.43	.50	
Race			.55			.65			.69			.55
White	.50	.50		.47	.50		.47	.50		.48	.50	
African American/Black	.51	.50		.44	.50		.45	.50		.42	.50	
Other	.67	.49		.58	.51		.58	.51		.33	.49	
Ethnicity Hispanic or Latino			.84			.57			.96			.89
Yes	.54	.52		.38	.51		.46	.52		.46	.52	
No	.51	.50		.47	.50		.47	.50		.44	.50	
Education			.19			.39			.43			.26
High school or less	.61	.49		.51	.50		.43	.50		.38	.49	
Some college	.46	.50		.38	.49		.42	.50		.40	.49	
Degree or more	.50	.50		.47	.50		.52	.50		.51	.50	
Marital status			.06			.79			.11			.70
Yes	.40	.49		.43	.50		.46	.50		.39	.49	
No	.51	.50		.42	.49		.37	.48		.42	.49	
Insurance Status (%)			.26			.62			.71			.18
None	.64	.50		.57	.51		.43	.51		.29	.47	
Medicaid	.51	.51		.43	.50		.49	.51		.43	.50	
Medicare	.40	.49		.41	.49		.38	.49		.34	.47	
Private	.47	.50		.39	.49		.41	.49		.47	.50	
LOS at time of survey			.28			.56			.09			.09
≤ mean = 8 days	.43	.50		.40	.49		.36	.48		.35	.48	
> mean = 8 days	.49	.50		.44	.50		.46	.50		.45	.50	
LOS at time of discharge			.76			.32			.15			.36
≤ mean = 8 days	.45	.50		.39	.49		.36	.48		.37	.48	
> mean = 8 days	.44	.50		.45	.50		.45	.50		.43	.50	
Surgical patient			.27			.17			.92			.51
Yes	.42	.50		.48	.50		.41	.49		.38	.49	
No	.49	.50		.39	.49		.42	.49		.42	.50	
ICU patient			.95			.48			.34			.68
Yes	.45	.51		.50	.51		.32	.48		.36	.49	
No	.46	.50		.42	.49		.42	.49		.41	.49	
ED admission			.80			.76			.59			.83
Yes	.45	.50		.41	.49		.43	.50		.40	.49	
No	.47	.50		.43	.50		.40	.49		.41	.49	
Unit			.23			**.004**			.85			.81
General medicine	.30	.47		.26	.45		.26	.45		.30	.47	
Neurology	.64	.49		.77	.43		.41	.50		.45	.51	
Cardiology	.52	.51		.38	.49		.38	.49		.52	.51	
Cardiovascular	.51	.51		.46	.51		.38	.49		.36	.49	
Pulmonary/respiratory	.57	.53		.43	.53		.43	.53		.43	.53	
Vascular	.45	.52		.09	.30		.36	.50		.36	.50	
Transplant	.32	.48		.37	.50		.47	.51		.42	.51	
Surgical services	.47	.50		.55	.50		.49	.50		.47	.50	
Hematology/oncology	.48	.51		.36	.48		.40	.50		.31	.67	
Bone marrow transplant	.50	.53		.20	.42		.60	.52		.50	.53	
Renal/nephrology	.15	.38		.38	.51		.38	.51		.38	.51	
Religious affiliation (%)			.61			.17			.30			.53
Catholic	.61	.50		.50	.51		.44	.51		.56	.51	
Protestant	.45	.50		.39	.49		.39	.49		.39	.49	
Other	.46	.51		.58	.50		.58	.50		.46	.51	
None	.42	.51		.58	.51		.50	.52		.42	.51	

Characteristics	Can't Sleep (scored 0 – 1)			Loss of Function (scored 0-1)			Missing Events (scored 0-1)			QOL (scored 0-1)		
	Mean	**SD**	***p*[a]**	**Mean**	**SD**	***p*[a]**	**Mean**	**SD**	***p*[a]**	**Mean**	**SD**	***p*[a]**
Self-rated religiosity (0-10)			.82			.75			.77			.28
≤ mean =	.50	.50		.46	.50		.45	.50		.48	.50	
> mean	.39	.49		.37	.48		.37	.48		.28	.45	
Importance of R/S			.54			.24			.56			.07
Not at all important	.25	.50		0	0		.25	.50		.25	.50	
Not very important	.59	.50		.55	.51		.55	.51		.64	.49	
Fairly important	.46	.50		.43	.50		.40	.49		.46	.50	
Very important	.46	.50		.42	.50		.41	.49		.37	.48	
Visit from faith group			.91			.39			.16			.24
Yes	.46	.50		.46	.50		.47	.50		.36	.48	
No	.46	.50		.40	.49		.38	.49		.43	.50	
Requested chaplain			.40			.16			.29			.77
Yes	.51	.50		.51	.50		.47	.50		..39	.49	
No	.45	.50		.40	.49		.39	.49		.41	.49	
STAI Score			**b**			**a**			**a**			**a**
< 40	.38	.49		.32	.47		.30	.46		.28	.45	
≥ 40	.59	.49		.59	.49		.59	.49		.60	.49	

Abbreviations: SD, standard deviation; QOL, quality of life; LOS, length of stay; ICU, intensive care unit; ED, emergency department, R/S, religion or spirituality; STAI, State Trait Anxiety Index 6-Item score, 20 – 80

a: p-value <0.0001 (not included in table due to space limitations)

b: p-value = 0.0007 (not included in table due to space limitations)

Table 5. Distribution of Clinically-relevant Anxiety across Demographic, Illness, and Religious Patient Characteristics among 271 Study Participants Hospitalized in Two Southeastern U.S. Acute-Care Hospitals

Characteristics	Low Anxiety (STAI < 40)		High Anxiety (STAI ≥ 40)		
	N[a,b] or Mean	%[a] or SD	N[a,b] or Mean	%[a] or SD	*p*[c]
Age	54.9	16.5	51.5	15.6	.10
Sex					
Female	78	56	61	44	.08
Male	86	67	43	33	
Race					
White	47	53	41	47	.52
African American/Black	56	60	37	40	
Other	8	67	4	33	
Ethnicity					
Hispanic/Latino	5	38	8	62	.16
Not Hispanic/Latino	105	59	74	41	
Education (% completing some college or less)					
High school or less	36	59	25	41	.68
Some college	26	52	24	48	
Degree or more	48	59	33	41	
Marital status					
Married	75	59	52	41	.49
Unmarried	91	63	53	37	
Insurance Status (%)					
None	9	64	5	36	.07
Medicaid	16	43	21	57	
Medicare	64	63	37	37	
Private	73	68	35	32	
LOS, d					
At time of survey	5.2	30.3	9.4	28.3	.26
At time of discharge[d]	11.1	35.4	12.2	14.1	.72
Surgical patient[e]					
Yes	66	63	39	37	.67
No	100	60	66	40	
ICU patient					
Yes	13	59	9	41	.83
No	153	61	96	39	
Emergency department admission (% yes)					
Yes	75	60	51	40	.53
No	88	63	51	37	
Medical unit type (%)					
General medicine	19	83	4	17	.18
Neurology	11	50	11	50	
Cardiology	16	55	13	45	
Cardiovascular	25	64	14	36	
Pulmonary/Respiratory	4	57	3	43	
Vascular	9	82	2	18	
Solid organ transplant	15	79	4	21	
Surgical services	29	55	24	45	
Hematology/oncology	23	51	22	49	
Bone marrow transplant	7	70	3	30	
Renal/nephrology	8	62	5	38	
Religious affiliation (%)					

Characteristics	Low Anxiety (STAI < 40)		High Anxiety (STAI ≥ 40)		
	N[a,b] or Mean	%[a] or SD	N[a,b] or Mean	%[a] or SD	*p*[c]
Catholic	8	44	10	56	.36
Protestant	132	62	82	38	
Other	17	71	7	29	
None	8	67	4	33	
Self-rated religiosity (0-10)	7.2	2.8	6.7	2.8	.24
Importance of rel/spirituality day-to-day (%)					
Not at all important	4	100	0	0	**.01**
Not very important	7	32	15	68	
Fairly important	39	62	24	38	
Very important	114	64	65	36	
Visit from faith community					
Yes	65	62	40	38	.86
No	101	61	65	39	
Requested visit from chaplain					
Yes	28	49	29	51	**.04**
No	136	64	75	36	
Factor score or item fraction					
Isolation (scored 0 – 6)	.46	.84	1.43	1.43	**<.0001**
Fear (scored 0 – 3)	.67	.89	1.54	1.18	**<.0001**
Faith crisis (scored 0 – 4)	.10	.35	.49	.82	**<.0001**
Pain	76	46	73	70	**.0001**
Inability to sleep	63	38	62	59	**.0007**
Loss of physical ability or bodily function	53	32	62	59	**<.0001**
Missing out on important events in life	50	30	62	59	**<.0001**
Worried about my quality of life	47	28	63	60	**<.0001**
Total number of stressors endorsed	6.6	5.0	16.5	8.0	**<.0001**
STAI score	26.6	6.3	54.1	11.6	**<.0001**

Abbreviations: STAI, State Trait Anxiety Index 6-Item score, 20 – 80; N, number of patients; SD, standard deviation; *p*, p-value; LOS, length of stay; ICU, intensive care unit

[a]Mean and SD for continuous variables; percent and frequency (N) for categorical variables

[b]Race, ethnicity, and education added late to survey, 29% missing; all other variables <5% missing

[c]On the basis of independent *t*-test for continuous variables and chi-square test for categorical variables

[d]At the time of dataset completion, discharge date was unavailable for 11 patients (< 5% missing)

[e]Of 101 patients who reported whether surgeries were required or elective, 89% were required

Table 6. Summary of Results from Linear Regression Modeling of Anxiety as Measured by the State Trait Anxiety Index 6-Item Instrument on Stressors among Hospitalized Patients, Controlling for Demographic, Illness, and Religious Covariates

Covariate	Model I n = 271 (R^2 = .37)			Model II n = 189[1] (R^2 = .48)			Model III n = 178 (R^2 = .52)			Model IV n = 175 (R^2 = .55)		
	β	**SE**	**p**	**β**	**SE**	**p**	**β**	**SE**	**p**	**β**	**SE**	**p**
Factors and Stressors												
Isolation factor	3.41	0.76	**<.0001**	2.51	0.92	**0.01**	2.60	1.00	**0.01**	2.20	1.03	**0.03**
Fear factor	2.72	0.85	**0.002**	2.68	1.06	**0.01**	2.63	1.17	**0.03**	2.67	1.22	**0.03**
Faith crisis pseudo-factor	1.39	1.43	0.33	0.85	1.57	0.59	1.01	1.76	0.57	1.18	1.80	0.51
Pain	4.81	1.62	**0.003**	5.24	2.04	**0.01**	4.85	2.21	**0.03**	4.78	2.28	**0.04**
Inability to sleep	4.56	1.67	**0.01**	5.70	2.13	**0.01**	5.28	2.28	**0.02**	4.35	2.35	0.07
Loss of function	2.78	1.76	0.12	2.85	2.13	0.18	4.03	2.52	0.11	3.82	2.57	0.14
Missing out on life events	0.67	1.96	0.73	2.04	2.41	0.40	0.18	2.57	0.94	-0.05	2.62	0.98
Quality of life	4.39	1.88	**0.02**	6.68	2.35	**0.01**	6.97	2.50	**0.01**	7.13	2.69	**0.01**
Demographic Covariates												
Age				0.07	0.07	0.31	0.05	0.08	0.58	0.01	0.09	0.94
Sex (reference = female)				-3.73	2.00	0.06	-3.03	2.21	0.17	-2.65	2.26	0.24
Race (reference = white) [a]												
African American/Black				-0.05	2.10	0.98	-0.40	2.33	0.86	-1.51	2.49	0.55
Other				-0.81	4.14	0.85	0.76	4.62	0.87	0.27	4.94	0.96
Ethnicity (ref = not Hispanic/Latino)[a]				8.46	3.99	**0.04**	8.71	4.62	0.06	6.23	4.98	0.21
Education (ref = high school or less) [a]												
Some college				-0.75	2.61	0.77	-3.09	2.90	0.29	-3.59	3.11	0.25
Degree (Associate's degree or higher)				1.46	2.36	0.54	1.18	2.55	0.64	0.39	2.68	0.89
Marital status (ref = single)				3.20	2.09	0.13	3.41	2.41	0.16	3.80	2.48	0.13
Insurance status (ref = no insurance)												
Medicaid				1.73	4.26	0.68	3.17	4.77	0.51	3.00	4.84	0.54
Medicare				-3.47	3.86	0.37	-3.21	4.29	0.46	-2.84	4.38	0.52
Private				-6.56	3.77	0.08	-5.52	4.27	0.20	-5.25	4.40	0.23
Illness Covariates												
LOS to survey, d							-0.05	0.19	0.80	-0.13	0.20	0.51
LOS to discharge, d							-0.04	0.13	0.74	0.00	0.13	0.98
Surgical patient							2.19	2.63	0.41	1.35	2.72	0.62
ICU patient							2.49	4.52	0.58	4.00	4.58	0.38
Admitted through ED							0.78	2.59	0.76	0.97	2.72	0.72
Unit type (ref = general medicine)												
Neurology							0.13	6.81	0.98	-0.82	7.14	0.91
Cardiology							12.11	5.73	**0.04**	12.23	5.85	**0.04**
Cardiovascular							6.05	5.60	0.28	6.11	5.82	0.30
Pulmonary/respiratory							5.19	7.17	0.47	2.04	7.47	0.79
Vascular							9.75	7.42	0.19	6.91	7.61	0.37

Covariate	Model I n = 271 (R^2 = .37)			Model II n = 189[1] (R^2 = .48)			Model III n = 178 (R^2 = .52)			Model IV n = 175 (R^2 = .55)		
	β	**SE**	**p**	**β**	**SE**	**p**	**β**	**SE**	**p**	**β**	**SE**	**p**
Transplant							5.21	5.84	0.37	5.65	5.96	0.35
Surgical services							6.66	5.33	0.21	7.46	5.63	0.19
Hematology/oncology							13.69	5.54	**0.01**	13.82	5.79	**0.02**
Bone marrow transplant							7.51	6.86	0.28	4.78	7.29	0.51
Renal/nephrology							14.37	10.64	0.18	15.90	11.20	0.16
Religious Covariates												
Religious Affiliation (ref = none)												
Catholic										8.86	5.82	0.13
Protestant										2.97	4.51	0.51
Other										-1.77	5.74	0.76
Self-rated religiosity										0.23	0.46	0.61
Importance of religion (ref = not at all)												
Somewhat important										4.60	8.68	0.60
Fairly important										-0.89	7.79	0.91
Very important										-0.32	8.01	0.97
Visit from faith leader or member										-0.46	2.50	0.85
Requested visit from chaplain										6.79	2.81	**0.02**

Abbreviations: n, number of patients; SE, standard error; LOS, length of stay; ICU, intensive care unit; ED, emergency department; ref, reference;

[a]Race, ethnicity, and education added late to survey, 29% (n = 79) missing; all other variables <5% missing

Table 7. Results of Linear Regression Modeling Showing which Single Covariates Increase or Decrease Statistically-Significant βs by 10% or More when Added to Model I, Explaining Through a Mediation or Suppression Effect the Change in β between Model I and Model II

Exposures for which β changes ≥ 10%	**Model I Factors/Stressors Only[a]**			**Model II Add All Demographic Covariates[b]**			**Model I + Single Demographic Covariate Added**					
							Hispanic/Latino Ethnicity			**Insurance Status**		
	β	**SE**	**p**	**β**	**SE**	**p**	**β**	**SE**	**p**	**β**	**SE**	**p**
Isolation factor	3.41	0.76	**<.0001**	2.51[c]	0.92	**0.007**	2.71 [c]	0.89	**0.003**			
Inability to sleep	4.56	1.67	**0.007**	5.7 [d]	2.13	**0.008**	5.16 [d]	2.04	**0.012**			
Quality of life	4.39	1.88	**0.020**	6.68 [d]	2.35	**0.005**	5.59 [d]	2.25	**0.014**	4.97 [d]	1.89	**0.009**

[a]Model I includes STAI as outcome, and the following exposures: isolation factor, fear factor, faith crisis pseudo-factor, pain, inability to sleep, loss of physical ability or bodily function, missing out on important life events, and worried about my quality of life

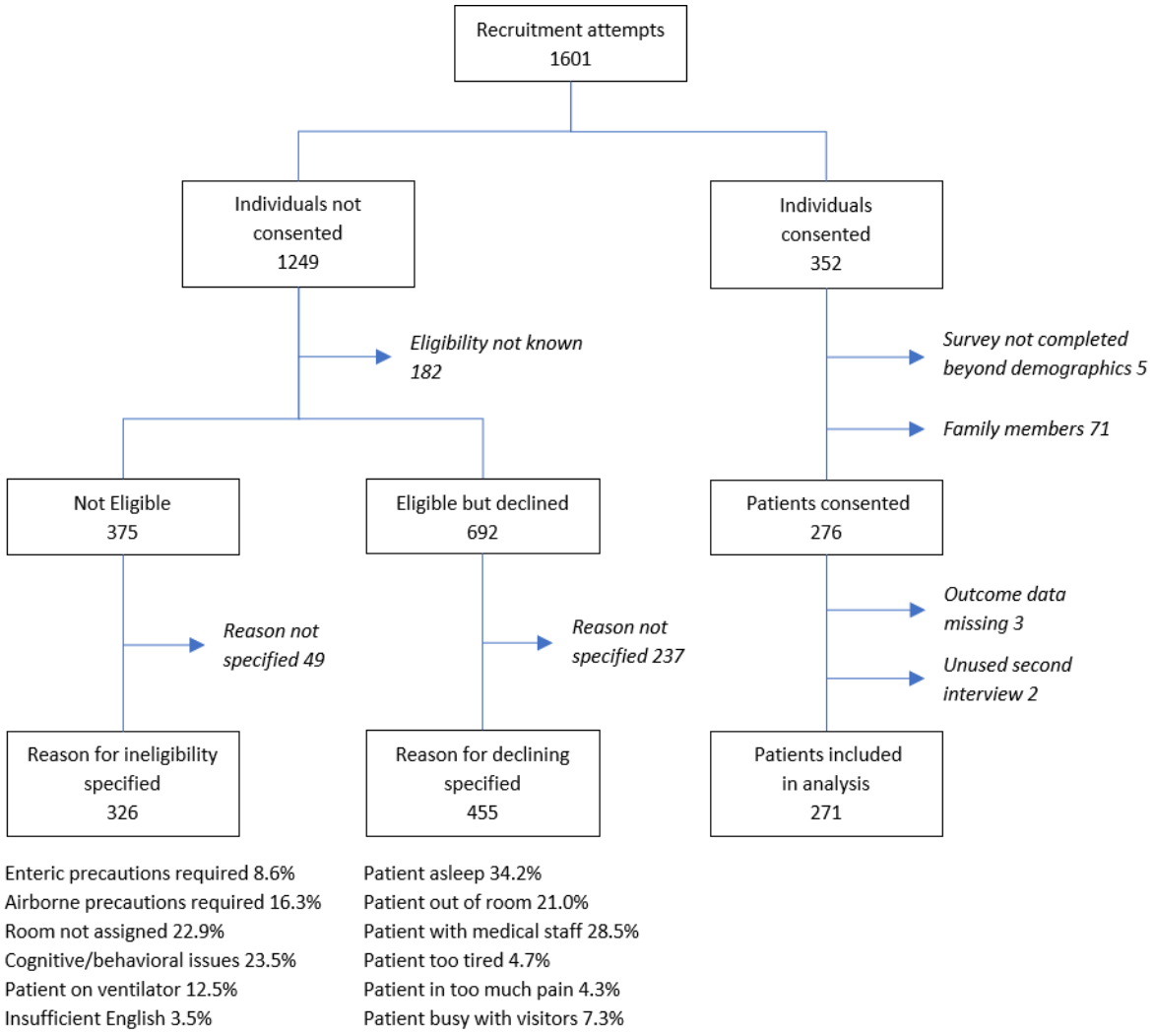
[b]Model II includes STAI as outcome, Model I exposures, and the following demographic covariates: age, sex, race, ethnicity, education, marital status, and insurance status

[c]Compared to the exposure's β in Model I, a lower β suggests a mediating effect by the added covariate(s)

[d]Compared to the exposure's β in Model I, a higher β suggests a suppression effect by the added covariate(s)

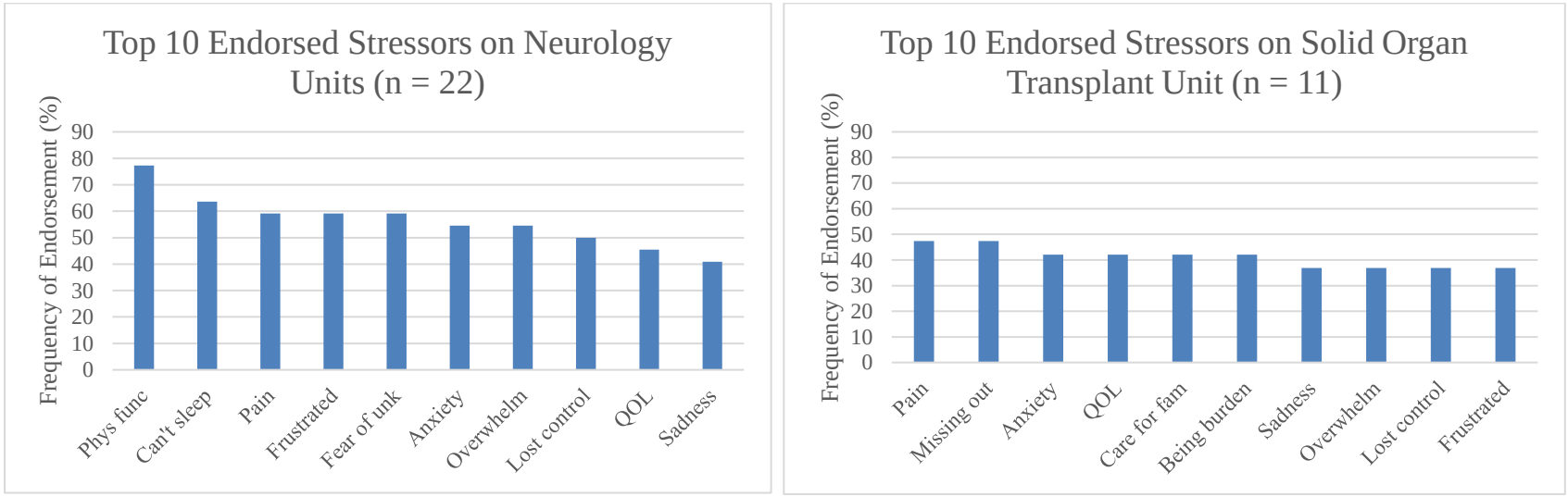
FIGURES

Figure 1. Flow of Participants through the Recruitment Process[a]



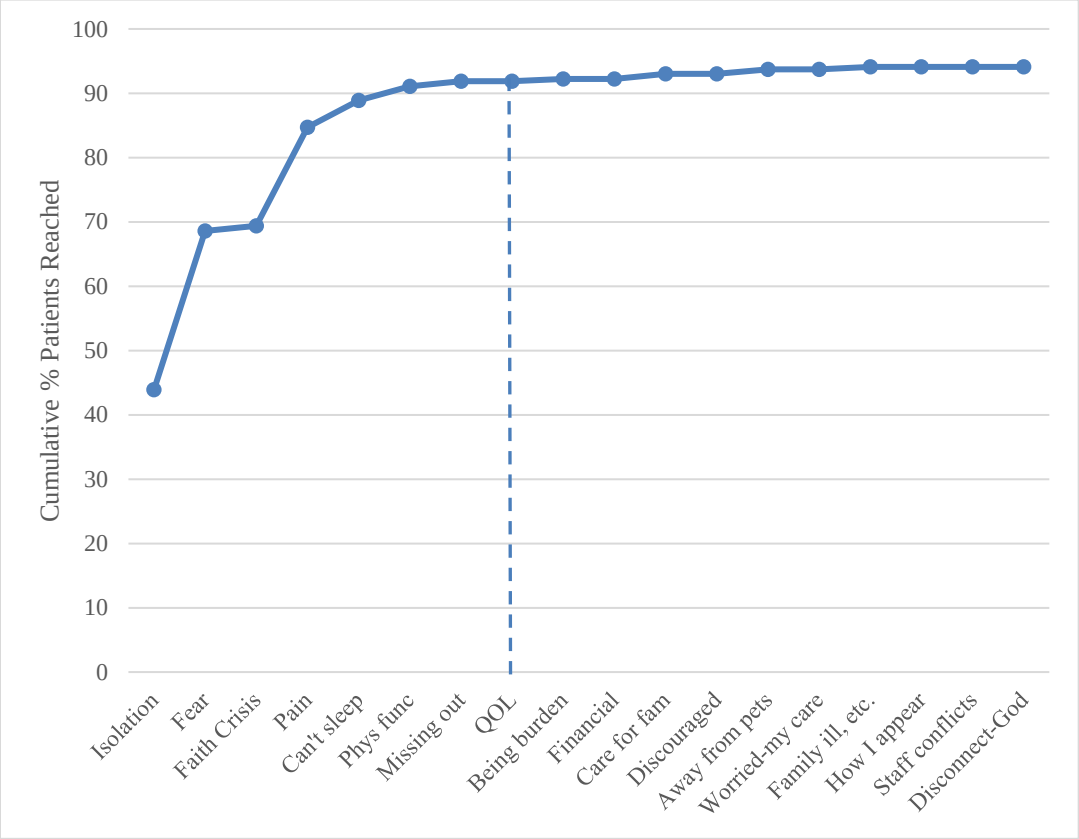
[a]Number of individuals is given at each step

Figure 2. Top-10 Stressors and Frequency of Endorsement for Hospitalized Patients in Two Southeastern U.S. Acute-care Hospitals, on Neurology and Solid-organ Transplant Units



[a]Neurology units include the neurosurgical intensive care unit, the neurological critical care intermediate (step-down) unit, and the medical neurological unit.

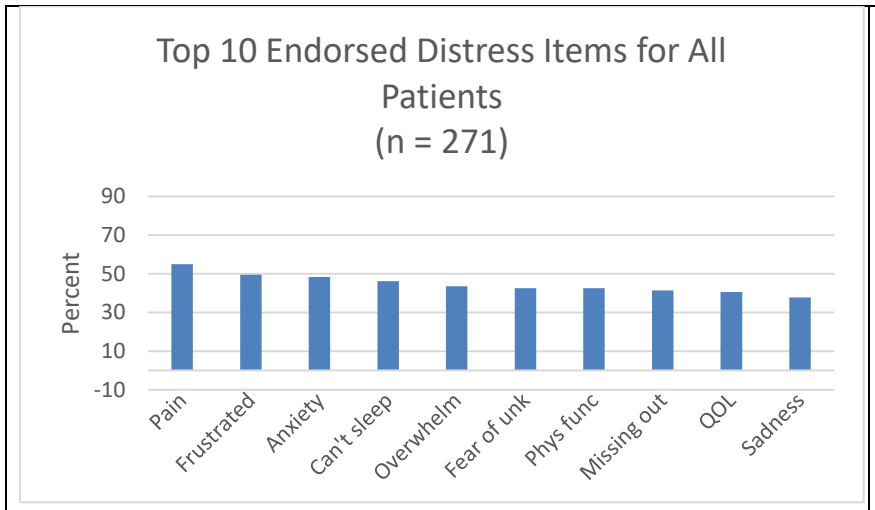
Figure 3. Cumulative Percent of 271 Patients Hospitalized in Two Southeastern U.S. Acute-Care Hospitals Reached[a] by Targeting Interventions to an Increasing Number of Distress Factors and Single Stressors, in Order of Frequency of Endorsement[b]

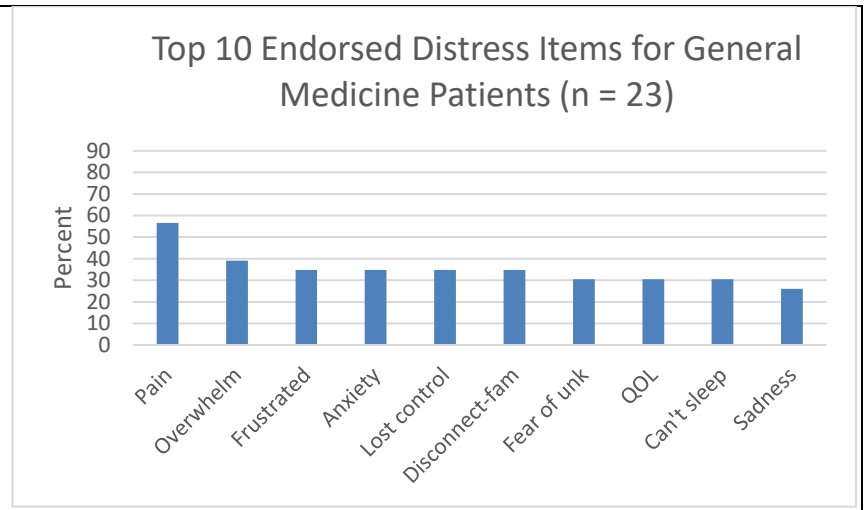


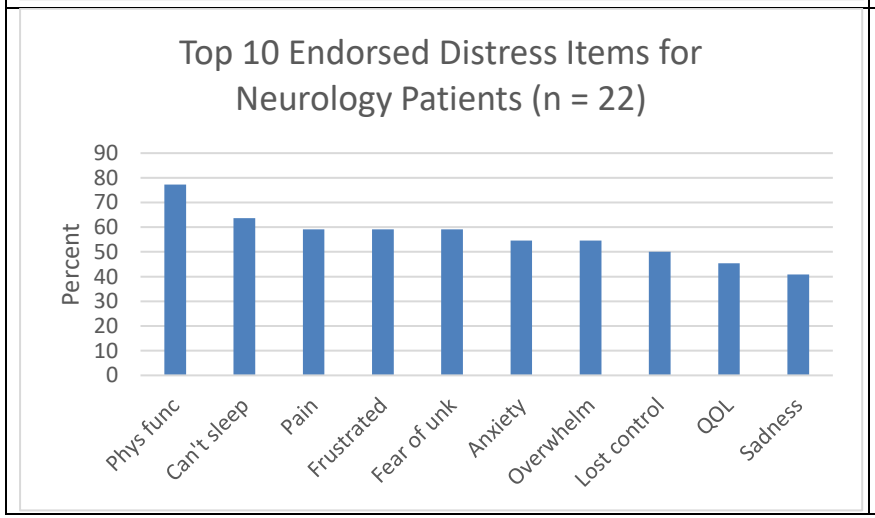
[a]Cumulative percent of patients reached by interventions does not total 100% because some patients endorsed no stressors
[b]Dotted line marks the 10th most frequent stressors endorsed (five of the top-10 endorsed items are included in one of the factors)

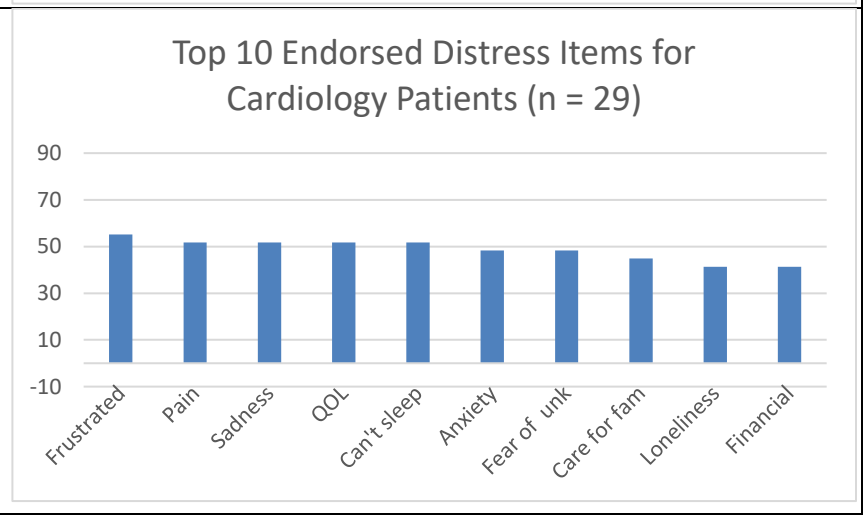
APPENDIX I

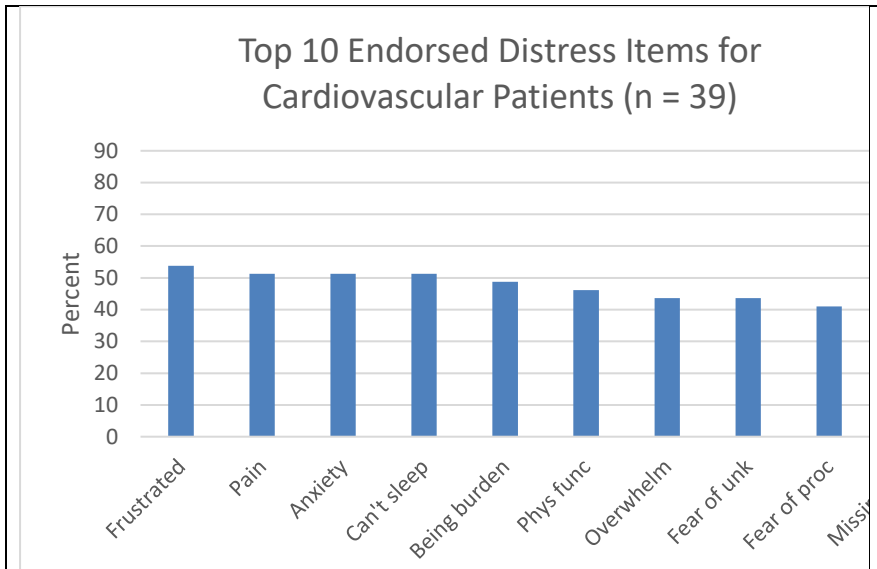
FREQUENCY OF ENDORSEMENT FOR THE TOP-TEN STRESSORS BY UNIT TYPE: A UNIT-BY-UNIT STRESSOR PROFILE

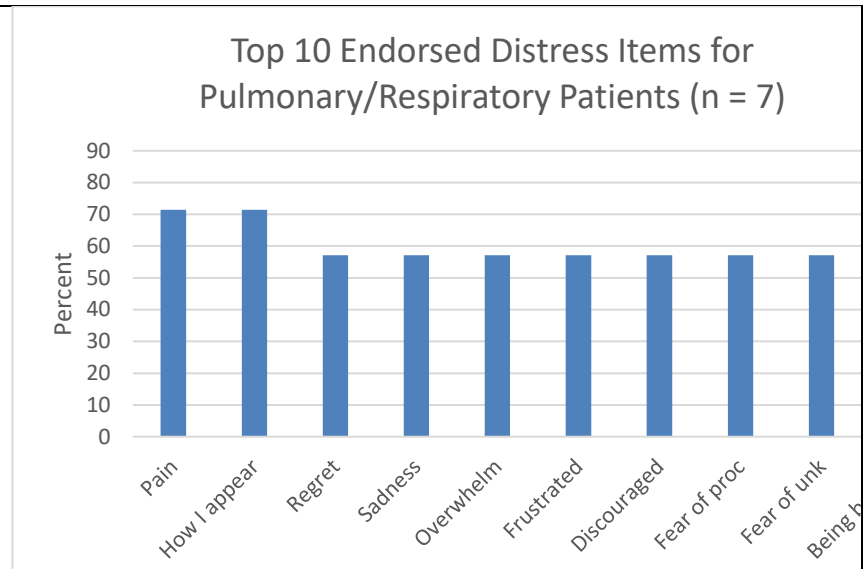

Top 10 Endorsed Distress Items for All Patients
(n = 271)
Percent
90
70
50
30
10
-10
Pain
Frustrated
Anxiety
Can't sleep
Overwhelm
Fear of unk
Phys func
Missing out
QOL
Sadness

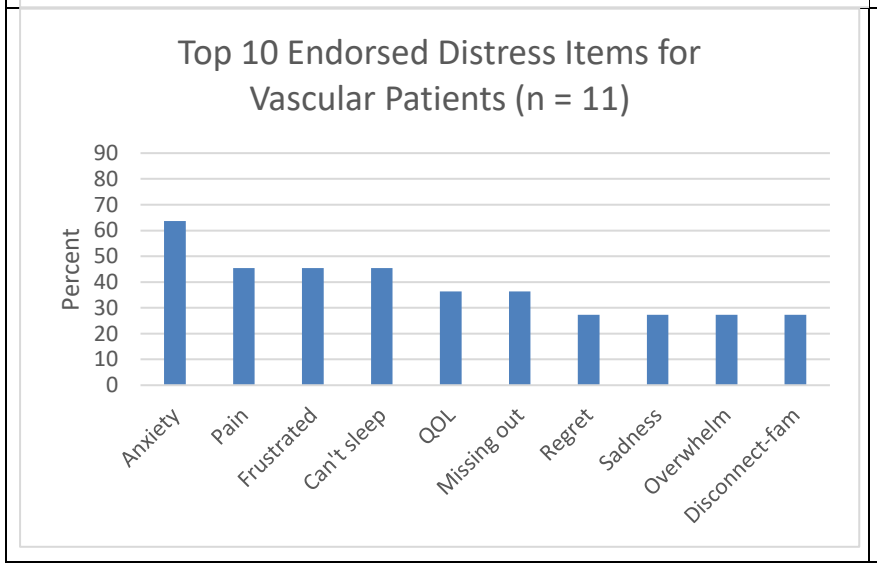

Top 10 Endorsed Distress Items for General Medicine Patients (n = 23)
Percent
90
80
70
60
50
40
30
20
10
0
Pain
Overwhelm
Frustrated
Anxiety
Lost control
Disconnect-fam
Fear of unk
QOL
Can't sleep
Sadness

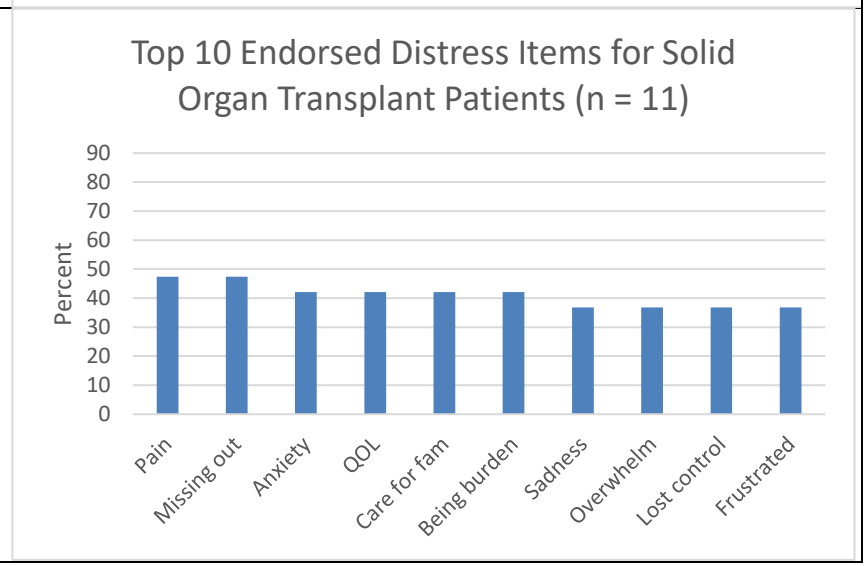

Top 10 Endorsed Distress Items for Neurology Patients (n = 22)
Percent
90
80
70
60
50
40
30
20
10
0
Phys func
Can't sleep
Pain
Frustrated
Fear of unk
Anxiety
Overwhelm
Lost control
QOL
Sadness

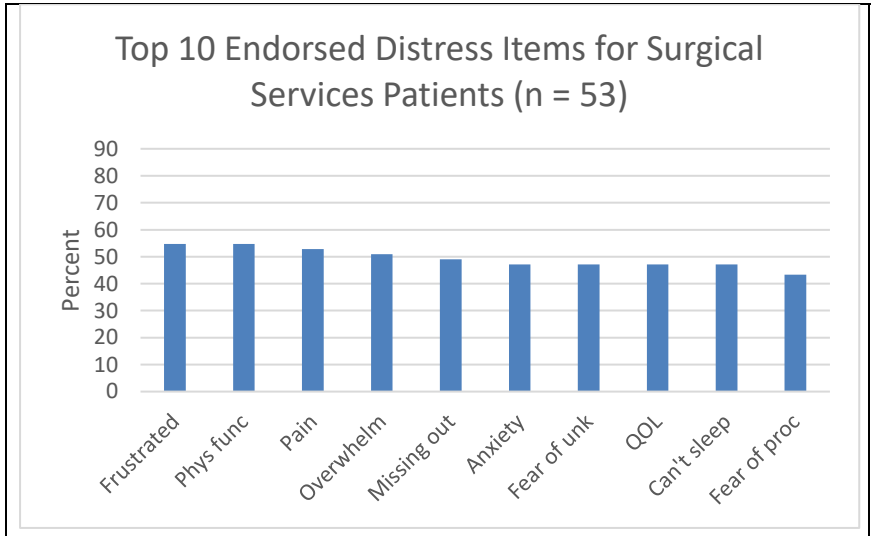

Top 10 Endorsed Distress Items for Cardiology Patients (n = 29)
90
70
50
30
10
-10
Frustrated
Pain
Sadness
QOL
Can't sleep
Anxiety
Fear of unk
Care for fam
Loneliness
Financial

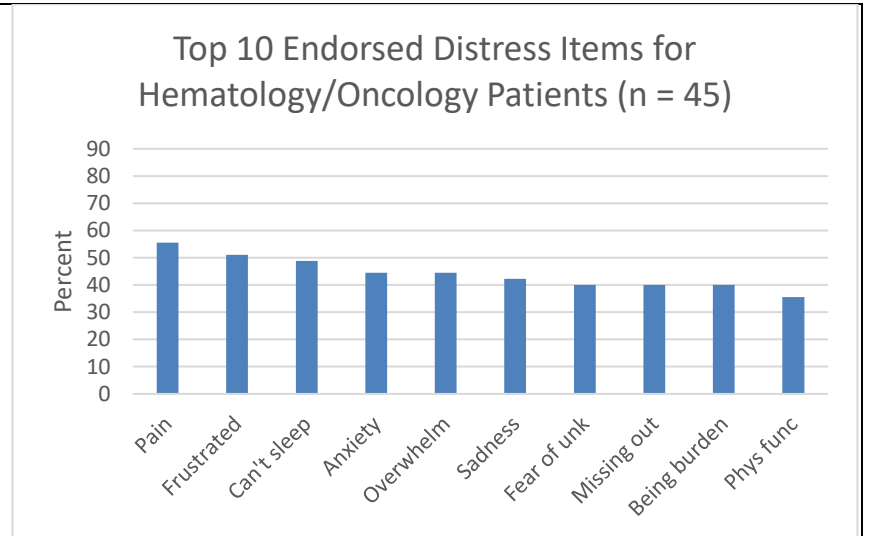

Top 10 Endorsed Distress Items for Cardiovascular Patients (n = 39)
Percent
90
80
70
60
50
40
30
20
10
0
Frustrated
Pain
Anxiety
Can't sleep
Being burden
Phys func
Overwhelm
Fear of unk
Fear of proc

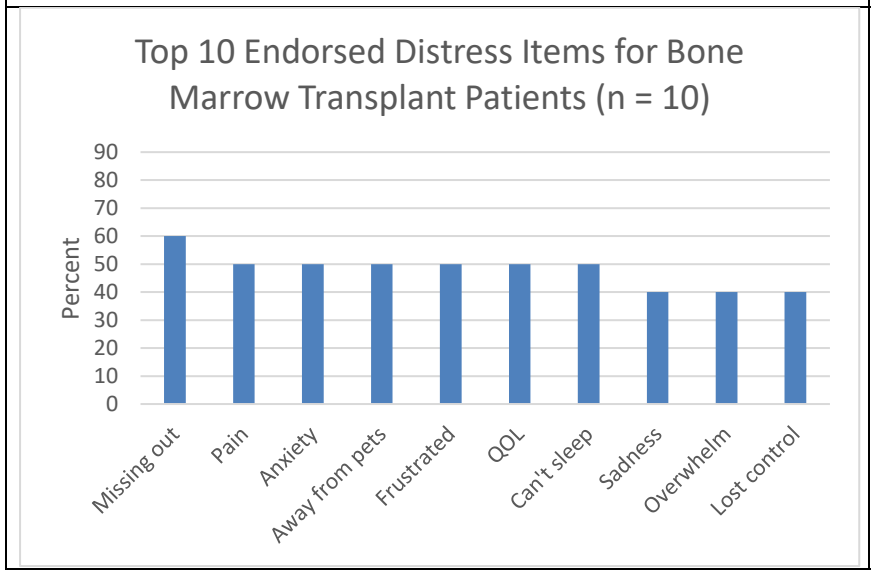

Top 10 Endorsed Distress Items for Pulmonary/Respiratory Patients (n = 7)
Percent
90
80
70
60
50
40
30
20
10
0
Pain
How I appear
Regret
Sadness
Overwhelm
Frustrated
Discouraged
Fear of proc
Fear of unk

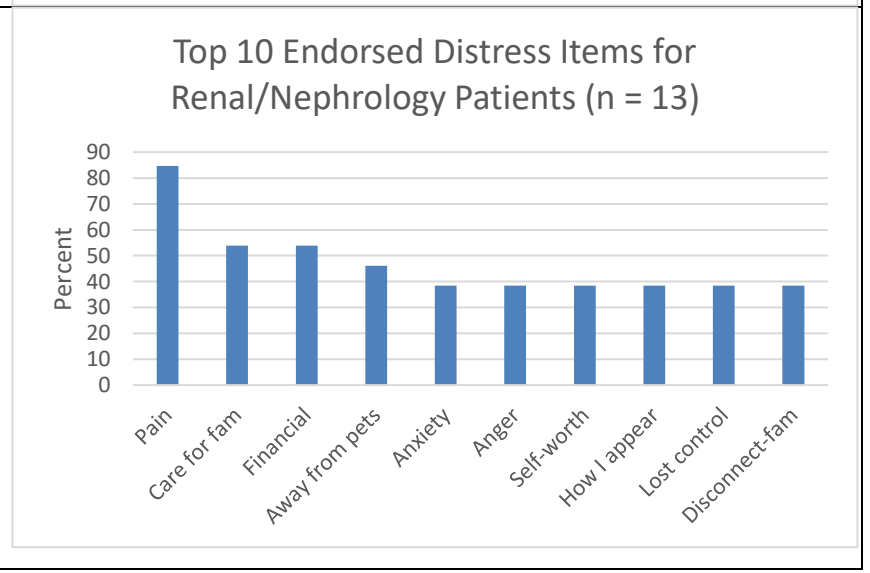

Top 10 Endorsed Distress Items for Vascular Patients (n = 11)
Percent
90
80
70
60
50
40
30
20
10
0
Anxiety
Pain
Frustrated
Can't sleep
QOL
Missing out
Regret
Sadness
Overwhelm
Disconnect-fam


Top 10 Endorsed Distress Items for Solid Organ Transplant Patients (n = 11)
Percent
90
80
70
60
50
40
30
20
10
0
Pain
Missing out
Anxiety
QOL
Care for fam
Being burden
Sadness
Overwhelm
Lost control
Frustrated


Top 10 Endorsed Distress Items for Surgical Services Patients (n = 53)
Percent
90
80
70
60
50
40
30
20
10
0
Frustrated
Phys func
Pain
Overwhelm
Missing out
Anxiety
Fear of unk
QOL
Can't sleep
Fear of proc


Top 10 Endorsed Distress Items for Hematology/Oncology Patients (n = 45)
Percent
90
80
70
60
50
40
30
20
10
0
Pain
Frustrated
Can't sleep
Anxiety
Overwhelm
Sadness
Fear of unk
Missing out
Being burden
Phys func


Top 10 Endorsed Distress Items for Bone Marrow Transplant Patients (n = 10)
Percent
90
80
70
60
50
40
30
20
10
0
Missing out
Pain
Anxiety
Away from pets
Frustrated
QOL
Can't sleep
Sadness
Overwhelm
Lost control


Top 10 Endorsed Distress Items for Renal/Nephrology Patients (n = 13)
Percent
90
80
70
60
50
40
30
20
10
0
Pain
Care for fam
Financial
Away from pets
Anxiety
Anger
Self-worth
How I appear
Lost control
Disconnect-fam