Title
A Provider Questionnaire to Identify Barriers to Depression Screening in High-Grade Glioma Patients

Author
Abazari, Shayda Michelle

Publication Date
2022

UNIVERSITY OF CALIFORNIA,
IRVINE

A Provider Questionnaire to Identify Barriers to Depression Screening in High-Grade Glioma Patients

THESIS

submitted in partial satisfaction of the requirements
for the degree of

MASTER OF SCIENCE

in Biomedical and Translational Science

by

Shayda Michelle Abazari

Thesis Committee:
Professor Daniela Bota, Chair
Professor Sherrie Kaplan
Professor Sheldon Greenfield

2022

DEDICATION

To

my father

It was times like this when I thought my father,
who hated guns and had never been to any wars,
was the bravest man who ever lived.

Harper Lee
To Kill A Mockingbird

and my mother

A mother's love for her child is like nothing else
in the world. It knows no law, no pity.
It dares all things and crushes down remorselessly
all that stands in its path.

Agatha Christie
The Last Séance

in recognition of their unwavering support of my academic endeavors

If we knew what it was we were doing,
it would not be called research, would it?

Albert Einstein

TABLE OF CONTENTS

Page

LIST OF FIGURES iv

LIST OF TABLES v

ACKNOWLEDGEMENTS vi

ABSTRACT OF THE THESIS vii

INTRODUCTION 1

BACKGROUND 5

METHODS 13

RESULTS 21

DISCUSSION 26

REFERENCES 33

APPENDIX A: Provider Depression Questionnaire 39

LIST OF FIGURES

Page

Figure 1 Conceptual Model for the Role of Barriers to Depression Screening 14

LIST OF TABLES

Page

Table 1 Summary of Feedback from Key-Informant Interviews 24

ACKNOWLEDGEMENTS

I would like to express my most sincere appreciation and gratitude to my committee chair, Dr. Daniela Bota, for her guidance and mentorship throughout this year. Your support of my ideas in the face of logistical challenges and research obstacles has been invaluable to this process, and I am grateful to have learned from your brilliant insights.

I would like to extend a heartfelt thank you to my committee members, Dr. Sherrie Kaplan and Dr. Sheldon Greenfield, for their encouragement and support throughout this process. Your vast experience and expertise offered me a fresh perspective when I encountered roadblocks on my research journey, and I will forever be grateful for your guidance and optimism.

In addition, thank you to Dr. Thomas Taylor for his assistance in analyzing depressive trends in the glioma literature and for teaching me how to examine such studies in a broader context.

Finally, thank you to the entire team at the University of California, Irvine Medical Center Department of Neuro-Oncology for their contributions to and support of my research. I am very grateful for your patience and guidance throughout this process.

ABSTRACT OF THE THESIS

A Provider Questionnaire to Identify Barriers to Depression Screening in High-Grade Glioma Patients

by

Shayda Michelle Abazari

Master of Science in Biomedical and Translational Science

University of California, Irvine, 2022

Professor Daniela Bota, Chair

Inconsistencies in and barriers to routine depression screening across all medical specialties but neuro-oncology in particular directly contribute to our present inability to clearly identify depression trends in high-grade glioma patients. This gap in knowledge subsequently exacerbates health outcomes in an already at-risk population with poor prognoses. Increased rates of depression screening may reveal these depression trends, but barriers to screening must first be overcome to allow for intervention. In response, we have designed a 20-question, 68-item provider questionnaire to assess attitudes towards, barriers to, and responsibility for depression screening in high-grade glioma patients. Our survey has undergone careful revisions with providers and experts in the field of neuro-oncology. The data collected from the use of this survey will inform our ability to provide recommendations for improving depression screening in neuro-oncology clinics, thereby alleviating the additional burden of depression on high-grade glioma patient health outcomes.

INTRODUCTION

Without mental health screening, there can be no detection, treatment, and prevention of the adverse consequences of depression. In the United States, under-detection of depression in all patients is a critical issue, with some reports suggesting that the rate of screening in primary care could be as low as one to two percent (Akincigil & Matthews, 2017), a stark contrast to the nearly one in five patients who report experiencing depressive symptoms (Villaroel & Terlizzi, 2020). Some studies have shown that the prevalence rate of depression in primary care patients could be as high as 10%, but providers may only recognize depression in 29 to 35% of such cases (Nease & Malouin, 2003). The implication that approximately six cases of depression could go undetected per week in a given family practice (Nease & Malouin, 2003) further underscores the gap between the presence of depressive symptoms and provider recognition. As such, screening for depression can be a critical first step in addressing these shortcomings. Nevertheless, while enacting widespread depression screening on a systemic level is positively associated with higher rates of screening and depression diagnosis in large health care systems, unless this implementation is followed by effective treatment, screening alone is unlikely to improve patient health outcomes (Pfoh et al., 2020). This suggests that the issue of depression under-detection cannot be resolved in isolation, and that depression detection is the first of many critical steps necessary to manage and treat this condition and its symptoms.

In neurology and neuro-oncology, barriers to screening are exacerbated by the frequent presentation of overlapping symptoms. Depression and pain are common symptoms exhibited by neurology outpatients, and patients are often battling such symptoms for a year or longer, which adversely affects their health status over time (Williams et al., 2004). In neuro-oncology patients, the tendency of certain symptoms of depression to actually stem from cancer or its treatment is referred to as "criterion contamination" and creates additional issues for providers attempting to diagnose depression in these patient populations (Rooney et al., 2014), even when screening is conducted in clinical settings.

Neuro-oncology providers often treat patients with gliomas, which refer to tumors of the brain and spinal cord. Astrocytic, oligodendroglial, and ependymal gliomas represent more than 70% of all brain tumor cases, and the most malignant histological type of gliomas are glioblastomas (Oghaki & Kleihues, 2005). Despite improvements in clinical medicine, prognosis continues to be poor for high tumor grade glioma patients, with less than three percent of glioblastoma patients surviving for longer than five years (Oghaki & Kleihues, 2005). With an average incidence rate between 5 and 11 per 100,000 individuals in the United States, gliomas are traditionally more common in developed or industrialized countries (Oghaki & Kleihues, 2005), and the U.S. saw increases in the incidence rate of glioma in the twenty-year period following 1980 (Hess, Broglio, & Bondy, 2004). While this may be in part due to improved detection methods, the clear presence of glioma in the U.S. and its poor prognosis suggest a need to better understand this growing patient population to lighten the severity of their disease burden.

Glioma patients are particularly susceptible to depression, and studies have shown that compared to the general population and other cancer patients, glioma patients experience higher rates of depression (Loughan et al., 2022). There is also a positive association between tumor size and the frequency of depression in glioma, a relationship that might be mediated by other factors but cannot be determined from previous studies due to limitations in methodology (Rooney et al, 2014). Moreover, the majority of brain cancer research to date has focused on patient survival, not quality of life (Arnold, et al., 2008), a fact that is underscored by the traditional underrepresentation of glioma patients in psycho-oncology research despite experiencing considerably high levels of distress (Loughan et al., 2022). Nevertheless, some studies have demonstrated the association between depression and worsened survival independent of time of diagnosis among high-grade glioma patients in particular (Shi et al., 2018), suggesting that the impact of depression on patient outcomes, while still unclear, is certainly not trivial.

Due to the potential impact of depression on high-grade glioma patients' survival and quality of life, it is increasingly important to characterize the potential time course of depression in this patient population, which can prove difficult with the inconsistencies and limitations in the available literature. This dearth of conclusive literature may be in part due to barriers to depression screening in the general population that are heightened in high-grade glioma, suggesting that identifying and alleviating such barriers is an important first step to detecting depression and providing effective treatment. In this context, providers who care for high-grade glioma patients can provide unique insight into the barriers to depression screening that have led to the current gaps in our knowledge of depression trends in glioma. With this information, it will be possible to introduce improved standard of care interventions that include assessing patients' mental health at designated points during the course of their treatment in order to intervene appropriately and enhance health outcomes.

In response to this knowledge gap, this study aims to design a provider questionnaire targeted to understanding the state of depression screening in the high-grade glioma patient population. Our survey will assess provider beliefs, attitudes, and skills in overcoming barriers to depression screening while enabling us to examine general attitudes towards screening, the feasibility of screening in specialty clinics, and the perceived responsibility that primary care and specialists each hold in detecting and managing patients' depression. This is a hypothesis-generating study in which we develop a questionnaire that can be used to in future studies to examine the implications of provider perceptions of barriers to depression screening. With this survey, we seek to understand, in part, why there is a gap in the literature regarding the longitudinal trend in depression in glioma patients, and we intend to place the existing studies in context. Ultimately, by identifying and alleviating barriers to implementing widespread depression screening in clinical practice, we can improve the existing standard of care in neuro-oncology and enhance health outcomes for all glioma, and especially high-grade glioma, patients.

BACKGROUND

Depression in the General Population

Depression is a leading cause of mental health disease burden both in the United States and worldwide with far-reaching consequences for patient health outcomes. Prevalence rates for depression vary considerably across different geographic locations and different screening instruments, but the prevalence of major depressive disorder in primary care averages between 8 and 14% (Craven & Bland, 2013). Nevertheless, the National Center for Health Statistics found in 2019 that 18.5% of U.S. adults reported experiencing either mild, moderate, or severe symptoms of depression in the past two weeks, with certain gender, age, race, and ethnicity demographics at higher risk for developing depression than others (Villaroel & Terlizzi, 2020). Depression is further associated with adverse outcomes that lower patients' quality of life in addition to increasing their risk of self-harm, reduced lifespan, and development of comorbidities (Akincigil & Matthews, 2017).

Understanding trends and patterns in the presentation of depression symptoms in any population begins with screening and detection. The United States Preventative Services Task Force recommends screening all adults for depression so long as providers are able to not only ensure accurate diagnosis, but also implement effective treatment and regular follow-ups for patients in order to mitigate its effects. While they found insufficient evidence to suggest an ideal time or interval for depression screening, they proposed that a reasonable approach may be to screen all adults who have not undergone depression screening previously while using clinical judgement to identify patients at higher risk for depression who may benefit from additional screening (Siu & USPSTF, 2016). Despite these guidelines, it is reported that family medicine practitioners recognize depression in less than 50% of patients with confirmed major depressive disorder (Craven & Bland, 2013) and that only an estimated one to two percent of the general population is screened for depression by primary care providers (Akincigil & Matthews, 2017), reinforcing the need for improved detection and recognition of depression across all clinical settings.

Barriers to screening in primary care continue to exist and are actively hindering the process of depression treatment. Notably, provider training and experience as well as morale and burnout can directly affect the likelihood of screening patients. Proponents of changing the medical school curriculum to reflect this prevalence of psychosocial problems suggest that primary care providers and many specialists may not have received sufficient training during their medical education and residency to act as the primary mental health providers for the majority of their patients (Smith et al., 2014). These findings underscore the importance of ensuring providers feel comfortable with recognizing signs of depression in order for them to proceed with depression screening and treatment. This also raises the question of who is most qualified to recognize depression and which members of a patient's healthcare team should take responsibility for screening. Furthermore, with up to 60% of physicians reporting symptoms of burnout, low provider morale and high rates of burnout are also associated with poorer quality of care, increased medical errors, and a gradual reduction in ability to express continual empathy for patients (Krasner et al., 2009). Provider burnout is well-documented among health care professionals and may serve as a barrier to screening if it impedes providers' abilities to recognize patient depression in some cases.

In qualitative studies, some primary care providers also report the lack of a clear diagnostic process or test, a vague or subjective symptom complex, and the lack of resources and time as potential barriers to depression screening (Schumann et al., 2012). Others reported that their knowledge of the time it takes to diagnose depression could have an impact on their willingness to tackle the issue during a patient visit (Schumann et al., 2012). These barriers highlight another key set of issues in depression screening, namely that, at times, providers may be stretched too thin to pursue screening for those patients who do not appear to be in dire need.

Depression in Neurology and Oncology

In neurological and neuro-oncological patients, depression screenings encounter additional logistical and symptomatic barriers. Symptom overlap is a frequent concern that contributes to delays in depression screening and diagnosis. In many neurologic disorders, such as Alzheimer's disease, Parkinson's disease, stroke, and multiple sclerosis, screening is further complicated by cognitive impairment and the lack of validated guidelines to diagnose depression in each condition (Raskind, 2008). As such, providers must necessarily utilize screening methods that are able to distinguish between such overlapping symptoms in neurology and oncology patients in particular. Whereas structured clinical interviews by trained mental health specialists are effective means of diagnosing depression, these interviews can be time-consuming and impose burdens on busy specialty clinics (Pranckeviciene & Bunevicius, 2015). In contrast, self-rating depression screening instruments can significantly improve the detection of depression (Pignone, 2002). In fact, despite any symptom overlap, the Patient Health Questionnaire-9, a self-reporting instrument reflective of a DSM-IV depression diagnosis, has proven to have excellent discriminative capacities for assessing depression symptoms in cancer patients (Van der Donk, 2019). Nevertheless, these tools may be underutilized in specialty practice, with fewer than 10% of oncologists reporting the use of such comprehensive self-rating instruments for depression screening in their clinics, opting to trust their own skills or incorporate the two questions of the Patient Health Questionnaire-2 into their assessment instead (Mitchell et al., 2008). As such, the need for improved screening as a means of early detection of all forms of psychosocial distress, including depression, in cancer patients remains a priority research topic in psycho-oncology (Rankin et al., 2011).

Glioma and Depression

Gliomas are tumors that derive from the glial cells of the central nervous system. The World Health Organization assigns gliomas a histopathological grade of I through IV on the basis of malignancy, with grade I lesions being the most benign and grade IV lesions being the most malignant type of gliomas (Jiang & Uhrbom, 2012). High-grade gliomas, including glioblastoma, represent the vast majority of all gliomas and are characterized by their fast proliferation rate that renders the complete excision of the tumor extremely difficult (Wang & Jiang, 2013). Once a high-grade glioma tumor is suspected on the basis of imaging, patients undergo surgery to remove the tumor and confirm the diagnosis histologically followed by standard-of-care chemoradiotherapy and Temozolomide, which has been shown to improve two- and five-year survival rates in glioblastoma patients (Wang & Jiang, 2013). Nevertheless, prognosis remains poor.

Depression is a common and significant complication of glioma that impairs physical and cognitive functioning while reducing patients’ quality of life (Rooney et al. 2011). Given the aggressive nature of such tumors, improving patient quality of life is certainly a valuable outcome (Rooney et al., 2014), but to offer treatment, providers must first identify the presence of depression through effective screening. Barriers to screening and variability in screening instruments have rendered it difficult to determine exactly at which time points and at what severity glioma patients are experiencing depression. In a review of depression studies in adult glioma patients, it was found that the average frequency of depression in studies that used the Hospital Anxiety and Depression Scale (HADS) was 16%, the average frequency in studies that used the Beck Depression Inventory was 39%, and the average frequency in clinical interviews was 15% (Rooney & Grant, 2011). Such variation between instruments can complicate the process of comparing and synthesizing research findings across groups to improve overall care. Thus, the disparity between depression assessment measures and time points for screening across previous studies is a limitation of some meta-analyses in this research area (Shi et al., 2018).

Furthermore, the majority of depression studies in this patient population are small, cross-sectional, or retrospective (Rooney & Grant, 2011). These study designs do not lend themselves to characterizing any changes in depression, as they only provide snapshots of a larger trend and do not explain whether any detected depression is situational or chronic. Large population sizes can be challenging to recruit and retain in high-grade glioma, but it is of note that studies that found depression to be associated with decreased survival did recruit upwards of 500 patients each (Gathinji et al., 2009; Litofsky et al., 2004), suggesting that the smaller patient population in other studies may be contributing to the inconsistencies in results. Even then, researchers found significant gaps between patient self-reports and provider recognition of depression (93% vs. 15% pre-surgery, 94% vs.

22% at three months, and 91% vs. 22% at six months), highlighting a need for the standardization and validation of depression screening (Litofsky et al., 2004). Additionally, due to the difficulties in patient recruitment and high attrition rates, studies often group together patients across glioma types who may have vastly different experiences with depression, which presents an additional challenge to isolating high-grade glioma patient experiences. As a result of these discrepancies, the available literature points to a lack of general consensus regarding depression trends in high-grade glioma as well as a need for increased depression screening in glioma to better understand when to intervene with treatment.

Moreover, the biological underpinnings of the link between depression and glioma have been studied to some extent, but an improved recognition of depression, most notably through the removal of barriers to screening, may promote even further research in this area. Depressed glioma patients have been shown to exhibit higher levels of proinflammatory cytokines such as interleukin-6 and tumor necrosis factor-α, highlighting the potential of such biomarkers to serve as clinical depression screening instruments in glioma (Li et al., 2022). More broadly, depression is associated with decreased natural killer cell activity as well as the perpetual activation of the hypothalamic-pituitary-adrenal axis and the sympathetic-adrenal-medullary axes, which contribute to impaired immunological functioning (Reiche, Morimoto, & Nunes, 2005). This biological effect can worsen the progression of certain cancer types and may be partially responsible for the link between depression and cancer. Nevertheless, improved understanding of depression in glioma by removing barriers to screening will facilitate additional, targeted research into the biology of depression in glioma.

Addressing the Literature Gap

Despite isolated studies, depressive trends in glioma and especially high-grade glioma remain inconclusive. Without knowledge of the nature and timing of depression in glioma, suitable treatment cannot be administered. In order to elucidate the longitudinal depressive trends in high-grade glioma, there is a need for enhanced depression screening, a solution to which there continue to be a number of barriers. Throughout their disease progression, glioma patients are surrounded by their caregivers, their proxies, and their healthcare team. One study showed that approximately 31% caregivers and 36% of glioma patients were depressed at three months or longer after histopathological diagnosis (Sacher, Meixensberger & Krupp, 2018), suggesting a potential reciprocal impact of depression among patients and caregivers. Patient-proxy perceptions of patients' depression have also been previously surveyed, with results suggesting that proxies reported higher levels of patient depression coupled with more accurate reports of patients' observable behavioral symptoms (Rooney et al., 2013). These findings imply that proxy reports may be beneficial for comparison in depression screening. Yet, provider perspectives on the nature of depression in glioma as well as depression screening are notably missing from the literature and could offer valuable clinical insight into this process.

To address this need, we have designed a provider questionnaire. The purpose of this instrument is to assess provider perceptions of barriers to depression screening, and it is intended to function as a first step in the process of detecting and overcoming barriers to treating depression. This questionnaire has been tailored to the needs and presentations of glioma patients specifically, and our target audience are providers who care for high-grade glioma patients in any clinical context but especially neuro-oncology. With the data gathered from this survey, we hope to screen more patients and connect them to options and resources that will help them manage their depression, such as support groups, therapy, psycho-educational materials, or pharmacotherapy drugs.

Thus, given that previous studies have failed to identify glioma depression trends due to inconsistencies in screening patterns and that this lack of knowledge is a critical issue that is negatively impacting patient health outcomes, we are in great need of such a questionnaire. By surveying glioma providers about depression screening, we can better understand the predominant and substantial barriers to screening that impede our ability to intervene appropriately to treat depression. This approach is imperative because a clear understanding of barriers from the view of the providers who treat these patients on a daily basis will enable the implementation of widespread screening in hopes of alleviating the burden of depression on patient health outcomes.

METHODS

To develop this survey instrument, the following steps were taken. First, our literature review revealed that the effective management of depression in high-grade glioma involves the initial detection of depression followed by timely treatment. Depression is detected through a number of screening measures, but barriers to screening often prevent this recognition of depression. Furthermore, once a patient is screened, there are a number of barriers to treatment that render it difficult to successfully manage depression once it is detected. For the purposes of this instrument, we chose to focus on the initial barriers to depression screening that hinder this process in its entirety, an area in which neuro-oncology providers may be able to provide unique insight.

From the literature, we next developed our conceptual model. Barriers to depression screening, whether real or perceived, impact our ability to detect depression in glioma patients. Depression screening, in turn, has a direct association with depression treatment, but barriers to treatment can affect the strength of this relationship. Moreover, background and demographic characteristics of providers as well as variations in clinical environments present potential covariates that can impact the strength of the relationship between barriers to screening and depression screening as well as depression screening and depression treatment in high-grade glioma patients. The nature of such relationships is presented in Figure 1.

Modeled after the barriers noted in our conceptual framework, our draft survey contained three sections directly assessing provider perceptions of barriers to depression for a total of 62 items. Sections one and two were designed to be applicable to any provider and patient type, while second three is specific to high-grade glioma. Section 1, entitled

"Your Current Practice Environment," contained three scale and two single item questions on provider morale and burnout for a total of 15 items. Section 2 asked about "Patient Depression" and contained four scale and six single item questions asking about general perceptions of depression screening for a total of 26 items. Section 3 focused on "Patient Depression in Glioma" and contained three scale and three single item questions for a total of 21 items. All response options to questions in these sections were presented on Likert scales ranging from five to seven points. Section 4 was a "Background" section that contained seven additional demographic questions regarding providers' role, length of experience, clinical setting, employment type, gender, race, and ethnicity.

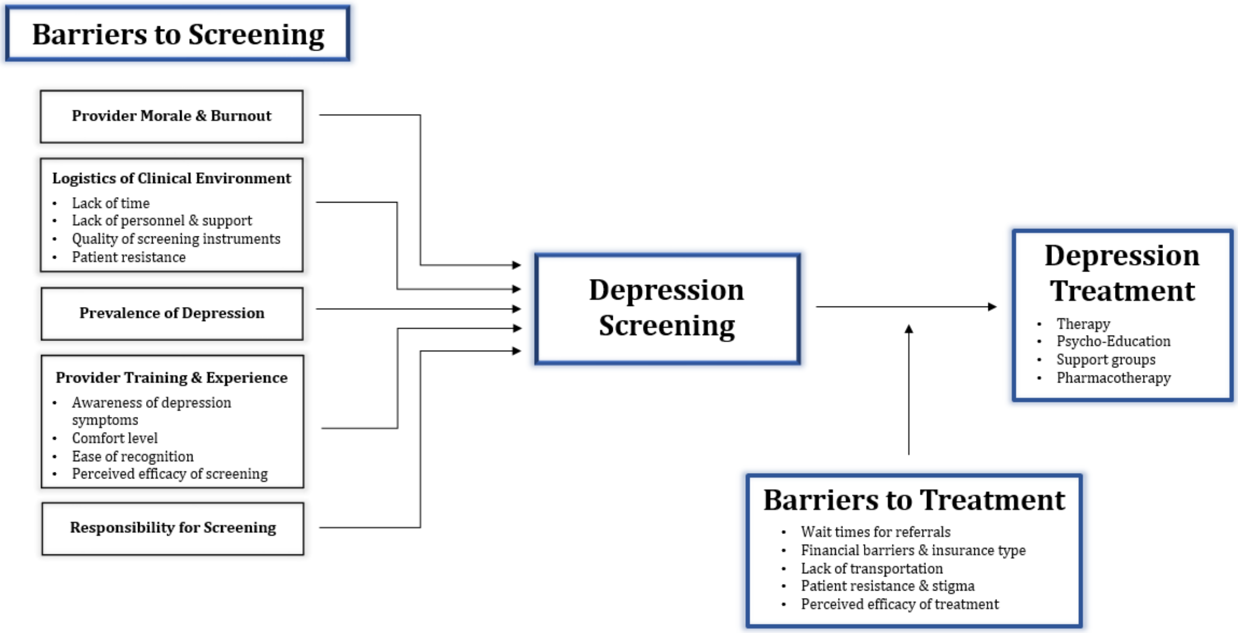

Figure 1: Conceptual Model for the Role of Barriers to Depression Screening

Study Constructs

Provider Morale and Burnout

Provider morale and burnout were measured using 15 items that asked about providers' current clinical environment, satisfaction with their professional life, and general morale. These morale and satisfaction items were taken with permission from the MEDSTAT Quality Catalyst Program Physician Survey (Kaplan, Greenfield et al., 1996; Kaplan, Sullivan et al., 1996), a measure that has successfully been used to assess physician burnout and morale with a high degree of accuracy. Clinical practice items asked about providers' overall work situation, ability to provide patient care in a stress-free environment, adequacy of support staff, restrictions on providers' time, and maintaining quality of care within such time constraints. Satisfaction with work-life balance and obligations of professional life were estimated by items that asked about time for leisure and general life enjoyment, time for family and personal life, interpersonal aspects of professional life, and overall quality of life. Both sets of scale questions were presented on a five-point scale, with responses ranging from "Very Satisfied" to "Very Dissatisfied." Satisfaction was also evaluated through items that asked whether their practice makes them feel good about themselves, their likelihood in questioning whether the demands from their practice are worth the toll they take on them, and whether they often think about leaving clinical practice, with each item presented on a five-point scale ranging from "Strongly Agree" to "Strongly Disagree." Finally, Current morale and change in morale over the last year were assessed on two seven-point scales ranging from "Extremely high, couldn't be better" to "Extremely low" and "It's gotten a whole lot better" to "It's gotten a whole lot worse," respectively.

Logistics of Clinical Environment

We measured the logistics of providers' clinical environment using nine items that sought to understand if providers' general busyness, the quality of existing depression screening measures, general patient resistance to screening, or lack of personnel or support were key barriers to depression screening for providers. Busyness, depression instrument quality, and patient resistance were assessed through items that asked whether not having enough time allocated per patient, poor or ineffective screening tests, or patient's resistance to mental health screening interfered with a provider's ability to care for their patients' mental health needs. These items were presented on a five-point scale with options ranging from "Doesn't Interfere At All" to "Interferes A Great Deal." The same scale was used to evaluate three items that measured the lack of personnel or support, whereby providers were asked if the lack of referral options, insufficient staff to link patients with mental health resources, or not having enough qualified staff to do adequate screening interfered with their ability to take care of their patients' mental health needs. The availability of and need for support was also assessed through three single item questions. The first asked how much support is available for managing moderate to severe depression in patients at providers' current clinical practice with five response options ranging from "A great deal of support" to "No support at all." The second asked how helpful it would be to have someone who regularly screened for mental health problems on a seven-point scale ranging from "Extremely helpful" to "Extremely unhelpful." The third asked if the provider's institution should employ a qualified health professional to screen all patients for depression, with five responses ranging from "Definitely Yes" to "Definitely Not."

Prevalence of Depression

The prevalence of depression, or rather providers' perceptions of whether or not high-grade glioma patient require regular screening for depression, was evaluated by eight items. First, the survey asked whether depression interfered with optimal management of glioma patients' care and health outcomes, and the five responses to this question ranged from "Definitely Yes" to "Definitely Not." Next, providers were asked whether patients should be assessed for potential mental health problems at the time of diagnosis, at the time of any surgery, before beginning any radiotherapy or chemotherapy, during treatment (maintenance Temozolomide), any time post-treatment, or at every visit. Response options were presented on a five-point scale ranging from "Definitely Yes" to "Definitely Not" with an additional option to select "not applicable" for each item. Lastly, providers were asked what proportion of patients develop some depressive symptoms over the course of their treatment for high-grade glioma in their experience as a clinician, and the five options ranged from "Almost all patients" to "Almost no patients."

Provider Training and Experience

A provider's training and experience affects their awareness of the presence of depression symptoms, their comfort level with detecting and diagnosing depression, their ease of recognition of depressive symptoms, and their perceived efficacy of screening. Thus, our questionnaire included 24 items to assess the extent to which providers' reports of these characteristics create additional barriers to depression screening.

Awareness of depression symptoms was estimated by five items pertaining to a question that asked how often providers discuss the following with their patients: financial problems related to health care, family or relationship problems, sexual functioning or problems, coping with general physical illness or symptoms, and coping with mental health problems or symptoms. Response options consisted of a five-point scale ranging from “Always” to “Never.”

Providers’ comfort level with depression management was assessed by a total of eight items in a number of ways. First, providers were asked to rate their skills when managing the mental health of patients or mild to moderate cases of depression themselves on a five-point scale ranging from “Excellent” to “Poor.” Next, providers were asked how much experience they have taking care of or treating moderate to severe depression in patients, with the five response options stretching from “A great deal of experience” to “No experience at all.” Finally, because comfort levels contribute to provider confidence, the survey then asked providers to report how confident they are in their ability to manage the treatment of patients who screened positive for depression and have a poor social support network at home, financial problems, complex illness, neurological illness, or cancer. This five-item cluster required a response ranging from “Very Confident” to “Not Very Confident” on a five-point scale.

Recognition of the signs of depression, particularly in a patient population experiencing a number of overlapping symptoms, can be difficult, and providers’ attitudes towards ease of recognition were assessed with four items. The survey asked how easy it is to recognize depression in patients in general and in high-grade glioma specifically, with both items presenting five response options ranging from “Very Easy” to “Very Difficult.” Providers were also asked to rate their skills with recognizing their patients’ mental health problems or signs of depression ranging from “Excellent” to “Poor.”

The perceived efficacy of screening stems from a provider's training and clinical experience and is directly relevant to the likelihood of the provider to administer or request depression screening for a patient. As a result, provider attitudes towards perceived efficacy were assessed using seven items in our questionnaire. Providers were asked how easy it is to get mental healthcare for a patient who has screened positive for depression on a five-point scale ranging from "Very Easy" to "Very Difficult." Providers were also asked how likely they are to ask their high-grade glioma patients about depression or depressive symptoms under the following circumstances: at the time of initial diagnosis, if they or a loved one bring it up, at every visit, when there is a change in treatment strategy, if they report problems coping with physical illness or symptoms, or if their physical demeanor or body language has changed since their last visit. For these six items, providers could indicate the likelihood of their discussion of depression on a scale ranging from "Very Likely" to "Very Unlikely."

Responsibility for Screening

While providers may be aware of the importance and value of depression screening, our survey also explored the possibility that a lack of clearly designated roles and a sense of personal responsibility for screening may contribute an additional barrier to the process. As such, providers were asked which members of the patient's healthcare team hold responsibility for regularly screening high-grade glioma patients for depression. Listed healthcare team members included mental health professionals, primary care providers, neuro-oncologists, nurses, medical assistants, and nobody. Providers were asked to indicate the extent to which each role is responsible for screening on a five-point scale ranging from "Definitely Yes" to "Definitely Not."

Key-Informant Interviews

Once our constructs and items were finalized, we conducted key-informant interviews with a panel of experts in the field of neuro-oncology. Such informants were providers at the University of California, Irvine Medical Center (UCIMC) who have previously cared for high-grade glioma patients, ranging from attending physicians to mental health professionals. Our panel of experts were asked to use their qualitative judgement to evaluate the comprehensiveness and relevance of our proposed survey in the context of the field of neuro-oncology. These glioma providers were both representative of our target population and also independent of the process of developing the instrument. Qualitative data from these key-informant interviews was collected and presented in our results. This data informed our ability to refine our questionnaire in preparation for reliability and validation statistical analyses in future studies.

RESULTS

Key-Informant Interview Findings

Key-informant interviews provided feedback in the following areas. Under the logistics of clinical environment construct, there were six items presented in response to the question asking about the extent to which each of the following interfere with providers' abilities to take the best care of their patients' mental health needs. Providers suggested rewording two of the items for clarity in additional to adding "waiting times for referral options" as a factor that interferes with taking care of patients' mental health needs. This did not overlap with the existing item of "lack of referral options." Providers also suggested acknowledging potential financial barriers to screening by adding "lack of reimbursement."

For the five items assessing awareness of depressive symptoms under the provider training and experience construct, some providers observed that asking whether each factor was discussed with patients during office visits was unrealistic given that providers see high-grade glioma patients regularly and their status may not have changed from visit to visit. Other providers suggested also asking how often barriers to treatment, such as transportation or care coordination, as well as general coping with patients' diagnosis are discussed. Given malignant glioma patients may only experience a life expectancy of 12 to 18 months following diagnosis, providers stressed the importance of checking in regularly with patients during office visits to be aware of any potential depressive symptoms.

Also under the provider training and experience construct was the five-item question assessing providers' comfort levels with depression by asking about their confidence in managing patient treatment if certain subgroups screened positive for depression. Providers voiced the apparent redundancy among “patients with complex illness,” “patients with neurological illness,” and “patients with cancer” for high-grade glioma patients. They believed that these items would not provide any additional insight as to providers’ comfort levels. Other relevant subgroups that some felt were missing from the question included “patients with family conflict,” “patients with language barriers,” and “patients with impaired cognitive function.”

For the six-item perceived efficacy of screening question asking about providers’ likelihood to ask high-grade glioma patients about depression under certain circumstances, it was suggested to add “if their disease has progressed” as one of the conditions. The same suggestion was offered for the six-item question under the prevalence of depression construct asking at which time points high-grade glioma patients should be screened for potential mental health problems. Providers explained that disease progression can be marked by a series of personality or mood changes that could be indicative of depression.

For the background questions, providers suggested delineating the difference between medical training and medical practice when asking providers about their experience level. They also suggested adding “Other” and “Decline to state” options to the race and ethnicity questions in an effort to be as inclusive as possible and preserve anonymity.

Other general concerns brought forward in our interviews included the potential lack of a gold standard with which to compare this survey as well as concerns about provider honesty and truthfulness in responding to questions. This is due to the fact that providers felt as though the neuro-oncology community is quite small and certain respondents may feel obligated to present their practice in a positive light. The survey typically took 10 to 20 minutes to complete, but at least one provider expressed that the survey was “a bit too long” for busy practitioners. Providers were generally in favor of streamlining the process of depression screening and maximizing efficiency by perhaps having clinical support staff administer the screenings instead. However, they also explained that they do not feel most patients would screen positive at time of diagnosis and that regular screening would be needed. Overall, support for the measure and its implications was generally positive, and providers demonstrated curiosity about the survey’s potential results. No trends or associations were observed between the feedback received and the types of provider roles. The feedback from our key-informant interviews is summarized by construct, question, and proposed changes in Table 1.

Refining the Provider Questionnaire

In response to interview feedback, the following changes were made to the survey instrument. First, the anonymity of the survey was re-emphasized in the instructions to address any concerns about provider privacy. Next, the question regarding how often providers discuss each of the following with patients during office visits was revised to say “how often do you discuss or are you aware of changes to…” in an effort to be mindful of the frequency in which providers see their patients. We also added two additional items: coping with barriers to treatment and coping with their diagnosis.

For the question assessing the sources of interference with patients’ mental health needs, the item about referral options was clarified to be “referral options to mental health services.” “Waiting times for referral options” and “lack of reimbursement” were both added to the existing six items to better capture different barriers to screening that may be contributing to the lack of clear depressive trends.

Construct	Question	Changes Proposed
Logistics of Clinical Environment	How much do each of the following interfere with your ability to take the best care of your patients' mental health needs?	• Rewording "not enough time allocated per patient" • Rewording "lack of referral options" • Add "waiting for referral options" • Add "lack of reimbursement"
Provider Training and Experience	How often do you discuss each of the following with patients during office visits?	• Add "coping with barriers to treatment" (ex: transportation) • Add "coping with their diagnosis" • Revise question stem because certain topics not discussed during every visit
Provider Training and Experience	How confident are you that if a patient in the following subgroups screened positive for depression, you could manage their treatment successfully?	• Redundancy between "complex illness," "neurological illness," and "cancer" • Add "patients with family conflict" • Add "patients with language barriers" • Add "patients with impaired cognitive function"
Provider Training and Experience	How likely are you to ask your patients with high-grade glioma about depression or depressive symptoms under the following circumstances?	• Add "if their disease has progressed"
Provider Training and Experience	At what time in the patients' treatment for high-grade glioma should patients be assessed for potential mental health problems?	• Add "if their disease has progressed"
Background	How long have you been in practice?	• Distinguish between medical training and medical practice
Background	What is your race?	• Add "Other" • Add "Decline to State"
Background	What is your ethnicity?	• Add "Other" • Add "Decline to State"

Table 1: Summary of Feedback from Key-Informant Interviews

The question asking about providers' confidence in managing patients' treatment in certain subgroups following a positive screen for depression was revised to remove the three items deemed "redundant" by our experts. Instead, those three items were replaced with the “family conflict,” “language barriers,” and “impaired cognitive function” patient subgroups to align better with concerns raised in our key-informant interviews.

The question asking if the provider’s institution should provide a qualified health professional to screen all patients for depression held subtle but important differences from the earlier question asking how helpful it would be to the provider’s ability to find and address mental health problems to have someone who regularly screened for them over the course of their treatment. However, in the interest of time, the former question was removed entirely. Instead, the latter question was adapted and revised to state “…mental health problems if your institution provided a qualified health professional to regularly screen for depression over the course of patients’ treatment?”

“If their disease has progressed” was added as an option to both the perceived efficacy of screening question and the prevalence of depression question as previously described. Additionally, a “social worker” item was added to the question asking whose responsibility it is to regularly screen high-grade glioma patients for depression. The “Background” section questions were also modified to clarify “years since training” under length of practice time, and “Other” and “Decline to state” options were included under race and ethnicity, as well.

As a result of these changes, our final product had 20 questions and 68 items, and could be completed in approximately 10 to 20 minutes (see Appendix A).

DISCUSSION

Survey Development Findings

The revisions made to our depression screening questionnaire as a result of our key-informant interviews were beneficial in a number of ways. First, minor rewordings for clarity ensured that our survey used language consistent with providers' clinical experiences and thereby more effectively maintained respondents' interest and attention throughout the questionnaire. Next, asking providers if they discuss barriers to treatment or coping with patients' diagnoses during office visits were more direct and effective means of assessing psychosocial health as it pertains to glioma and thereby important additions to the survey. Moreover, reducing redundancy between items was important and offered an opportunity for providers to suggest other vulnerable subgroups who may face additional barriers to depression screening. Lastly, perceiving disease progression as a distinct turning point in high-grade glioma patients' treatment offered a realistic view of the trajectory of illness in malignant glioma while simultaneously presenting a critical opportunity for depression screening and intervention.

Moreover, expanding the survey breadth by including the additional item of "lack of reimbursement" was an important step in understanding how providers perceive the role of financial barriers to depression screening. Historically, inadequate reimbursement was a barrier to routine depression screening in primary care, but the 2010 Affordable Care Act now requires private insurance companies to cover preventative depression screening while the Centers for Medicare and Medicaid Services announced reimbursement for depression screening for Medicare beneficiaries in 2011 (Akincigil & Matthews, 2017). As a result of these systemic changes, we anticipate that the rate of screening has increased and will continue to increase. Thus, using our survey instrument to understand the extent to which providers continue to perceive lack of reimbursement as a barrier aligns with the literature and will directly address this gap in knowledge.

Providers' concerns regarding the criterion validity of the questionnaire were also important and were intended to be addressed in the following ways. While a gold standard for provider perceptions of barriers to screening in high-grade glioma does not exist, neurologists' reports of barriers to screening in other neurological diseases, such as epilepsy (Gandy et al., 2020), and oncologists' reports of barriers to mental health screening (Granek et al., 2018) are well-documented and offer many common viewpoints. As such, provider perceptions gathered from our survey can be evaluated against such findings given their overlap with neuro-oncology and glioma specifically. Additionally, not only were our provider morale and burnout questions taken from an existing validated questionnaire, but neuro-oncology provider burnout and career satisfaction have also been studied extensively, most recently in a survey for the Society for Neuro-Oncology whereby participants reported a 63% burnout rate (Yust-Katz et al., 2020). As such, our findings can be compared to existing findings to ensure that our providers' experiences and attitudes are representative of the general population.

Limitations

Some potential limitations of our key-informant interviews were that only a small number of providers were interviewed and all providers were affiliated with the same academic institution, so their opinions and experiences may not necessarily be representative of the entire population of providers working with high-grade glioma patients. This may partially explain the lack of an observed trend between feedback received and provider role type in our key-informant interviews. To an extent, our qualitative data from the interviews may also have been subject to selection bias given that providers who chose to participate may hold different views on depression screening than providers who chose not to participate. Despite these potential limitations, the providers we interviewed were integral to our refinement of the measure and provided unique and valuable perspectives on the nature of depression screening in high-grade glioma patients.

A limitation of our screening instrument was that we did not stratify barriers by demographics that may disproportionately impact rates of depression screening. While it is understood that having access to resources and referrals to treatment options such as therapy can vary by insurance type, the questionnaire does not differentiate between the circumstances unique to each patient but rather asks generally if support is available for depression management. Thus, further investigation into access to depression treatment options for patients is needed following the identification of barriers to screening from our survey. Another potential limitation of administering such a questionnaire could be social desirability bias in the sense that providers may feel obligated to overestimate their ability to manage barriers to depression screening. In an effort to overcome this bias, we have designed this questionnaire such that responses will be collected anonymously to encourage providers to reflect honestly and thoughtfully on their perception of depression screening.

Future Testing

In order to test the validity and reliability of our measure in a future study, we would conduct a pilot test whereby we administer this survey to a large sample of high-grade glioma providers. Survey responses collected on a five- or seven-point scale would be standardized to a 100-point scale using the formula of the observed individual scale or item value subtracted by the minimum scale value divided by the difference between the maximum and minimum values, with the result being multiplied by 100. Factor analysis would be then be conducted to assess construct validity. Each factor would represent a latent construct, and the extent to which each of our items correlates with each latent construct (or factor) would be assessed. We would then evaluate the discriminant validity of the subscales and eliminate any survey variables with very little or very high association with other items, as needed. Principal component analysis would be also be used to cluster and reduce variables estimating these underlying constructs. Finally, the reliability of the measure would be assessed using Cronbach's alpha on the refined scales.

Recommendations for Future Screening

With the successful implementation of our survey, we believe that it is possible to overcome many barriers to depression screening in high-grade glioma. Future clinical trials with widespread implementation of depression screening across all time points may help establish when intervention and screening are most critical. Given our discussions with high-grade glioma providers and their perceptions of depression in newly-diagnosed patients, we concur with other recommendations in the literature to allow a minimum of one month from the time of glioma diagnosis to diagnose depression if symptoms do not appear initially severe (Rooney et al., 2014). This allows for any initial shock or acute sadness that may be attributed to receiving their diagnosis to diminish before assessing chronic psychological health. While this is a critical distinction that accounts for much of the variability between studies in the current literature, it is worth noting that an initial screening assessment at time of diagnosis may a valuable baseline with which to compare any future increases in depressive symptoms. In the eyes of the patient, it may also demonstrate empathy and support from the healthcare team if the assessment is framed as a mental health “check-in” to avoid the stigma associated with a formal depression diagnosis.

Whereas primary care patients may not follow up with their providers on a regular basis, high-grade glioma patients see their neuro-oncology providers more consistently. As such, implementing depression screening into every visit or at least once a month for glioma patients may be more feasible for neuro-oncology clinics than primary care clinics. While challenges such as patients who travel for their care or patients who do not follow up with the same provider present valid obstacles, the gradual standardization of depression screening across neuro-oncology and beyond could mitigate this effect by ensuring that all patients are being screened accurately and regularly to avoid slipping through any cracks in our multifaceted healthcare system. Moreover, with the increasing number of telehealth options, it may be possible to ask trained support staff or associated mental health professionals to administer screening as a routine part of the pre-visit preparation, offering an online self-reporting depression survey or screening patients over the phone. This would allow for the seamless integration of routine screening into clinical practice without disrupting the workflow of the providers or straining clinic resources by taking up additional space.

Nevertheless, there is a need for formal guidelines and recommendations for depression screening in specialty practice as an adjunct to the recommendations put forth by the United States Preventative Services Task Force. From the available literature, it is clear that inconsistencies in depression screening in specialties such as neurology and oncology persist, in part, due to the absence of formal guidelines tailored to individual complex illnesses. Because provider awareness of depression, ease of recognition, and comfort level with managing depression can vary considerably, formal recommendations integrated into the clinical training curriculum could be an important step to encouraging depression screening among all providers.

Implications for Depression Treatment

While our survey used providers' responses to recognize and eventually overcome barriers to screening, there remains the continued issue that screening alone will not improve outcomes without timely treatment. Even in primary care, there remains a gap between diagnosis and treatment, with most studies reporting treatment rates of 60% or less with inadequate levels of follow-up (Craven & Bland, 2013). Historically, it has been challenging to determine if this gap is due in part to providers not agreeing with the available information, lacking the knowledge or skills to proceed with treatment, or believing that the patient is not in need of or willing to seek treatment (Craven & Bland, 2013). Our provider questionnaire may shed some light on these theories with its particular focus on provider comfort levels with depression and perceived efficacy of depression screening. Nevertheless, future research must be conducted on systemic and individual barriers to depression treatment implementation in order to continue the progress initiated by our provider questionnaire and to translate this knowledge into measurable changes in patient health outcomes.

Conclusion

As a result of this study, we created a 20-question, 68-item survey instrument that can be distributed to high-grade glioma providers to better understand their perceptions of barriers to depression screening. Based on preliminary qualitative data from key-informant interviews, it is likely that this survey will address these barriers and promote the identification of depression trends, which is the first step to managing and treating depression in high-grade glioma patients. Ultimately, this provider depression screening questionnaire has clear potential to incorporate widespread depression screening into the neuro-oncological standard of care practice as part of a concerted effort to improve outcomes and quality of life for malignant glioma patients.

REFERENCES

Akincigil, A., & Matthews, E. B. (2017). National rates and patterns of depression screening in primary care: results from 2012 and 2013. *Psychiatric Services*, *68*(7), 660-666. DOI: 10.1176/appi.ps.201600096

Arnold, S. D., Forman, L. M., Brigidi, B. D., Carter, K. E., Schweitzer, H. A., Quinn, H. E., ... & Raynor, R. H. (2008). Evaluation and characterization of generalized anxiety and depression in patients with primary brain tumors. *Neuro-oncology*, *10*(2), 171-181. DOI: 10.1215/15228517-2007-057

Craven, M. A., & Bland, R. (2013). Depression in primary care: current and future challenges. *The Canadian Journal of Psychiatry*, *58*(8), 442-448. DOI: 10.1177/070674371305800802

Gandy, M., Modi, A. C., Wagner, J. L., LaFrance Jr, W. C., Reuber, M., Tang, V., ... & Michaelis, R. (2021). Managing depression and anxiety in people with epilepsy: A survey of epilepsy health professionals by the ILAE Psychology Task Force. Epilepsia open, 6(1), 127-139. DOI: 10.1002/epi4.12455

Gathinji, M., McGirt, M. J., Attenello, F. J., Chaichana, K. L., Than, K., Olivi, A., ... & Quinones-Hinojosa, A. (2009). Association of preoperative depression and survival after resection of malignant brain astrocytoma. *Surgical neurology*, *71*(3), 299-303. DOI: 10.1016/j.surneu.2008.07.016

Granek, L., Nakash, O., Ariad, S., Shapira, S., & Ben-David, M. (2018). Oncologists' identification of mental health distress in cancer patients: strategies and barriers. European Journal of Cancer Care, 27(3), e12835. DOI: 10.1111/ecc.12835

Hess, K. R., Broglio, K. R., & Bondy, M. L. (2004). Adult glioma incidence trends in the United States, 1977–2000. *Cancer: Interdisciplinary International Journal of the American Cancer Society*, *101*(10), 2293-2299. DOI: 10.1002/cncr.20621

Jiang, Y., & Uhrbom, L. (2012). On the origin of glioma. *Upsala journal of medical sciences*, *117*(2), 113-121. DOI: 10.3109/03009734.2012.658976

Kaplan, S. H., Greenfield, S., Gandek, B., Rogers, W. H., & Ware Jr, J. E. (1996). Characteristics of physicians with participatory decision-making styles. *Annals of internal medicine, 124*(5), 497-504. DOI: 10.7326/0003-4819-124-5-199603010-00007

Kaplan, S. H., Sullivan, L. M., Dukes, K. A., Phillips, C. F., Kelch, R. P., & Schaller, J. G. (1996). Sex differences in academic advancement—results of a national study of pediatricians. *New England Journal of Medicine, 335*(17), 1282-1290. DOI: 10.1056/NEJM199610243351706

Krasner, M. S., Epstein, R. M., Beckman, H., Suchman, A. L., Chapman, B., Mooney, C. J., & Quill, T. E. (2009). Association of an educational program in mindful communication with burnout, empathy, and attitudes among primary care physicians. *JAMA*, *302*(12), 1284-1293. DOI: 10.1001/jama.2009.1384

Li, H., Shi, X., Yang, F., Zhang, X., & Li, F. (2022). Blood Inflammatory Cytokines as Predictors of Depression in Patients With Glioma. *Frontiers in psychiatry*, *13*. DOI: 10.3389/fpsyt.2022.930985

Litofsky, N. S., Farace, E., Anderson, F., Meyers, C. A., Huang, W., Laws, E. R. (2004). Depression in patients with high-grade glioma: results of the Glioma Outcomes Project. *Neurosurgery*, *54*(2), 358-367. DOI: 10.1227/01.NEU.0000103450.94724.A2

Loughan, A. R., Willis, K. D., Braun, S. E., Rodin, G., Lanoye, A., Davies, A. E., ... & Thacker, L. (2022). Managing cancer and living meaningfully (CALM) in adults with malignant glioma: a proof-of-concept phase IIa trial. *Journal of Neuro-Oncology*, *157*(3), 447-456. DOI: 10.1007/s11060-022-03988-8

Mitchell, A. J., Kaar, S., Coggan, C., & Herdman, J. (2008). Acceptability of common screening methods used to detect distress and related mood disorders—preferences of cancer specialists and non-specialists. *Psycho-Oncology: Journal of the Psychological, Social and Behavioral Dimensions of Cancer*, *17*(3), 226-236. DOI: 10.1002/pon.1228

Nease, D. E., & Malouin, J. M. (2003). Depression screening: a practical strategy. *Journal of Family Practice*, *52*(2), 118-126.

Ohgaki, H., & Kleihues, P. (2005). Epidemiology and etiology of gliomas. *Acta neuropathologica*, *109*(1), 93-108. DOI: 10.1007/s00401-005-0991-y

Pfoh, E. R., Janmey, I., Anand, A., Martinez, K. A., Katzan, I., & Rothberg, M. B. (2020). The impact of systematic depression screening in primary care on depression identification and treatment in a large health care system: A cohort study. *Journal of general internal medicine*, *35*(11), 3141-3147. DOI: 10.1007/s11606-020-05856-5

Pignone, M. P., Gaynes, B. N., Rushton, J. L., Burchell, C. M., Orleans, C. T., Mulrow, C. D., & Lohr, K. N. (2002). Screening for depression in adults: a summary of the evidence for the US Preventive Services Task Force. *Annals of internal medicine*, *136*(10), 765-776. DOI: 10.7326/0003-4819-136-10-200205210-00013

Pranckeviciene, A., & Bunevicius, A. (2015). Depression screening in patients with brain tumors: a review. *CNS oncology*, *4*(2), 71-78. DOI: 10.2217/cns.14.60

Rankin, N. M., Butow, P. N., Price, M. A., & Evans, A. (2011). Views of psycho-oncology health professionals on priority psycho-oncology research questions. *Supportive Care in Cancer*, *19*(8), 1133-1141. DOI: 10.1007/s00520-010-0922-x

Raskind, M. A. (2008). Diagnosis and treatment of depression comorbid with neurologic disorders. *The American journal of medicine*, *121*(11), S28-S37. DOI: 10.1016/j.amjmed.2008.09.011

Reiche, E. M. V., Morimoto, H. K., & Nunes, S. M. V. (2005). Stress and depression-induced immune dysfunction: implications for the development and progression of cancer. *International Review of Psychiatry*, *17*(6), 515-527. DOI: 10.1080/02646830500382102

Rooney, A. G., Brown, P. D., Reijneveld, J. C., & Grant, R. (2014). Depression in glioma: a primer for clinicians and researchers. *Journal of Neurology, Neurosurgery & Psychiatry*, *85*(2), 230-235. DOI: 10.1136/jnnp-2013-306497

Rooney, A. G., Carson, A., & Grant, R. (2011). Depression in cerebral glioma patients: a systematic review of observational studies. *Journal of the national cancer institute*, *103*(1), 61-76. DOI: 10.1093/jnci/djq458

Rooney, A. G., McNamara, S., Mackinnon, M., Fraser, M., Rampling, R., Carson, A., & Grant, R. (2013). Screening for major depressive disorder in adults with glioma using the PHQ-9: a comparison of patient versus proxy reports. Journal of Neuro-Oncology, 113(1), 49-55. DOI: 10.1007/s11060-013-1088-4

Sacher, M., Meixensberger, J., & Krupp, W. (2018). Interaction of quality of life, mood and depression of patients and their informal caregivers after surgical treatment of high-grade glioma: a prospective study. Journal of Neuro-Oncology, 140(2), 367-375. DOI: 10.1007/s11060-018-2962-x

Schumann, I., Schneider, A., Kantert, C., Löwe, B., & Linde, K. (2012). Physicians' attitudes, diagnostic process and barriers regarding depression diagnosis in primary care: a systematic review of qualitative studies. *Family practice*, *29*(3), 255-263. DOI: 10.1093/fampra/cmr092

Shi, C., Lamba, N., Zheng, L. J., Cote, D., Regestein, Q. R., Liu, C. M., ... & Broekman, M. L. D. (2018). Depression and survival of glioma patients: a systematic review and meta-analysis. *Clinical Neurology and Neurosurgery*, *172*, 8-19. DOI: 10.1016/j.clineuro.2018.06.016

Siu, A. L., Bibbins-Domingo, K., Grossman, D. C., Baumann, L. C., Davidson, K. W., Ebell, M., ... & US Preventive Services Task Force. (2016). Screening for depression in adults: US Preventive Services Task Force recommendation statement. *JAMA*, *315*(4), 380-387. DOI: 10.1001/jama.2015.18392

Smith, R. C., Laird-Fick, H., D'Mello, D., Dwamena, F. C., Romain, A., Olson, J., ... & Frankel, R. (2014). Addressing mental health issues in primary care: an initial curriculum for medical residents. *Patient Education and Counseling*, *94*(1), 33-42. DOI: 10.1016/j.pec.2013.09.010

van der Donk, L. J., Bickel, E. A., Krijnen, W. P., Tovote, K. A., Sanderman, R., Schroevers, M. J., & Fleer, J. (2019). The value of distinct depressive symptoms (PHQ-9) to differentiate depression severity in cancer survivors: An item response approach. *Psycho-oncology*, *28*(11), 2240-2243. DOI: 10.1002/pon.5192

Villarroel, M. A., & Terlizzi, E. P. (2020). *Symptoms of depression among adults: United States, 2019*. Hyattsville, MD, USA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics.

Wang, Y., & Jiang, T. (2013). Understanding high grade glioma: molecular mechanism, therapy and comprehensive management. *Cancer letters*, *331*(2), 139-146. DOI: 10.1016/j.canlet.2012.12.024

Williams, L. S., Jones, W. J., Shen, J., Robinson, R. L., & Kroenke, K. (2004). Outcomes of newly referred neurology outpatients with depression and pain. *Neurology*, *63*(4), 674-677. DOI: 10.1212/01.WNL.0000134669.05005.95

Yust-Katz, S., O'Brien, B., Vera, E., Acquaye, A., Weller, M., & Armstrong, T. (2020). Burnout and career satisfaction in neuro-oncology: a survey of the Society for Neuro-Oncology and the European Association of Neuro-Oncology memberships. Neuro-oncology, 22(6), 838-850. DOI: 10.1093/neuonc/noz229

APPENDIX A: Provider Depression Questionnaire

Depression Screening Questionnaire

Instructions

Please complete the entire questionnaire as carefully as you can.

Please answer every question.

Some questions may seem redundant. There are subtle but important differences among the questions, so it is very important that you answer each one.

This questionnaire contains 4 sections. Because your careful attention to each question will help us gather the most accurate information, please take breaks between sections if you feel tired.

You will remain anonymous and all of your answers will be kept strictly confidential. If you have any questions about this study or this questionnaire, please contact our research team.

THANK YOU FOR YOUR TIME AND COOPERATION.

Section 1: Your Current Practice Environment

The following questions ask about your current practice environment and professional life.

1. How satisfied or dissatisfied are you with your current practice situation for each of the following:

[Circle one for each item]

	Very Satisfied	Somewhat Satisfied	So-So	Somewhat Dissatisfied	Very Dissatisfied
a. Your overall work situation	1	2	3	4	5
b. Your ability to provide patient care in a stress-free environment	1	2	3	4	5
c. Adequacy of support staff	1	2	3	4	5
d. Amount of time you have with each patient	1	2	3	4	5
e. Amount of time you have between patients (e.g., to chart, make calls, etc.)	1	2	3	4	5
f. Maintaining quality of care while staying on time	1	2	3	4	5

2. How satisfied or dissatisfied are you with each of the following:

[Circle one for each item]

	Very Satisfied	Somewhat Satisfied	So-So	Somewhat Dissatisfied	Very Dissatisfied
a. Time you have for leisure and general life enjoyment	1	2	3	4	5
b. Time you have for your family and personal life	1	2	3	4	5
c. Interpersonal aspects of your professional life	1	2	3	4	5
d. Your overall quality of life	1	2	3	4	5

3. Thinking about all aspects of your professional life, how would you rate your current morale?

[Circle one for each item]

Extremely high, couldn't be better…………….1
Very high…………………………………………………2
On the high side………………………………………3
Neither high nor low……………………………..….4
On the low side……………………………………..….5
Very low……………………………………………….….6
Extremely low…………………………………………….7

4. Over the past year, has your morale gotten better or worse?

[Circle one for each item]

It's gotten a whole lot better……………………….1
It's gotten a lot better………………….………………2
It's gotten somewhat better…………………………3
It hasn't changed…………………………..………….…..4
It's gotten somewhat worse…………….………..….5
It's gotten a lot worse………………………….….……6
It's gotten a whole lot worse……………………….7

5. The following statements are about personal values with respect to your medical practice. There are no right or wrong answers. Please indicate how much you agree or disagree with each item.

[Circle one for each item]

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
a. My practice makes me feel good about myself	1	2	3	4	5
b. I often find myself questioning whether the demands from my practice are worth the toll they take on me	1	2	3	4	5
c. These days, I often think about leaving clinical practice	1	2	3	4	5

Section 2: Patient Depression

The following questions ask about depression screening for patients in your practice. There are no right or wrong answers. We are only interested in your perceptions or impressions.

1. How easy or difficult is it to recognize depression in patients in general?

[Circle one for each item]

Very easy……………………………………….…..1
Somewhat easy………………………………….2
So-So…………………………………….……….….3
Somewhat difficult…………….……………..….4
Very difficult…………………………………..…..5

2. Overall, how would you rate your skills in the following areas:

[Circle one for each item]

	Excellent	Very Good	Good	Fair	Poor
a. Recognizing your patients' mental health problems	1	2	3	4	5
b. Managing the mental health problems of most of your patients yourself	1	2	3	4	5
c. Recognizing the signs of depression in your patients	1	2	3	4	5
d. Managing mild or moderate cases of depression yourself	1	2	3	4	5

3. How much experience have you had taking care of or treating moderate to severe depression in patients?

[Circle one for each item]

A great deal of experience…………………….1
A lot of experience……………………………….2
Some experience…………………………….…….3
Very little experience…………….…………..….4
No experience at all…………………………….….5

4. How much support is available for managing patients with moderate to severe depression at your current practice situation?

[Circle one for each item]

A great deal of support……………………..1
A lot of support…………………………….…2
Some support…………………………….…….3
Very little support ……………..………..…..4
No support at all………………………………5

5. How often do you discuss or are you aware of changes to each of the following with patients during office visits?

[Circle one for each item]

		Always	Usually	Sometimes	Rarely	Never
a.	**Financial problems related to health care**	1	2	3	4	5
b.	**Family or relationship problems**	1	2	3	4	5
c.	**Sexual functioning or problems**	1	2	3	4	5
d.	**Coping with general physical illness or symptoms**	1	2	3	4	5
e.	**Coping with mental health problems or symptoms**	1	2	3	4	5
f.	**Coping with barriers to treatment (e.g., transportation, care coordination, etc.)**	1	2	3	4	5
g.	**Coping with their diagnosis**	1	2	3	4	5

6. In busy practices these days, it is often difficult to address all of the patients' needs. How much do each of the following interfere with your ability to take the best care of your patients' mental health needs?

[Circle one for each item]

	Doesn't Interfere At All	**Interferes A Little**	**Interferes Some**	**Interferes A Lot**	**Interferes A Great Deal**
a. Not enough time allocated per patient	1	2	3	4	5
b. Lack of referral options to mental health services	1	2	3	4	5
c. Waiting times for referral options	1	2	3	4	5
d. Insufficient staff to link patients with mental health resources	1	2	3	4	5
e. Not enough qualified staff to do adequate screening	1	2	3	4	5
f. Lack of reimbursement for screening	1	2	3	4	5
g. Poor or ineffective screening tests	1	2	3	4	5
h. Patient resistance to mental health screening	1	2	3	4	5

7. How helpful would it be to your ability to find and address mental health problems if your institution provided a qualified health professional to regularly screen for depression over the course of patients' treatment?

[Circle one for each item]

Extremely helpful	1
Very helpful	2
Somewhat helpful	3
Neither helpful nor unhelpful	4
Somewhat unhelpful	5
Very unhelpful	6
Extremely unhelpful	7

8. If a patient screened positive for depression, how easy is it to get care for their mental health problems?

[Circle one for each item]

Very easy	1
Somewhat easy	2
So-So	3
Somewhat difficult	4
Very difficult	5

9. How confident are you that if a patient in the following subgroups screened positive for depression, you could manage their treatment successfully?

[Circle one for each item]

	Very Confident	**Somewhat Confident**	**So-So**	**Somewhat Not Confident**	**Very Not Confident**
a. Patients with a poor social support network at home	1	2	3	4	5
b. Patients with financial problems	1	2	3	4	5
c. Patients with family conflict	1	2	3	4	5
d. Patients with language barriers	1	2	3	4	5
e. Patients with impaired cognitive function	1	2	3	4	5

Section 3: Patient Depression in Glioma

The following questions ask about depression screening for high-grade glioma patients in your practice. There are no right or wrong answers. We are only interested in your perceptions or impressions.

1. How easy or difficult is it to recognize depression in high-grade glioma patients?

[Circle one for each item]

Very easy…………………………………………..1
Somewhat easy……………………………….…2
So-So…………………………………….………….3
Somewhat difficult…………….……….…..4
Very difficult……………………………….…..5

2. How likely are you to ask your patients with high-grade glioma about depression or depressive symptoms under the following circumstances?

[Circle one for each item]

	Very Likely	**Somewhat Likely**	**Neither Likely Nor Unlikely**	**Somewhat Unlikely**	**Very Unlikely**
a. At the time of initial diagnosis	1	2	3	4	5
b. If they or a loved one bring it up	1	2	3	4	5
c. At every visit	1	2	3	4	5
d. When there is a change in treatment strategy	1	2	3	4	5
e. If they report problems coping with physical illness or symptoms	1	2	3	4	5
f. If their physical demeanor or body language has changed since the last visit	1	2	3	4	5
g. If their disease has progressed	1	2	3	4	5

3. Does depression interfere with optimal management of high-grade glioma patients' care and health outcomes?

[Circle one for each item]

Definitely yes………………………………………….1
Probably yes…………………………………….……….2
So-So…………………………………………………..…….3
Probably not…………………………………….……….4
Definitely not………………………………………….5

4. At what time in the patients' treatment for high-grade glioma should patients be assessed for potential mental health problems?

[Circle one for each item]

	Definitely Yes	**Probably Yes**	**So-So**	**Probably Not**	**Definitely Not**	**N/A**
a. At the time of diagnosis	1	2	3	4	5	6
b. At the time of any surgery	1	2	3	4	5	6
c. Before beginning any radiotherapy/chemotherapy	1	2	3	4	5	6
d. During treatment (maintenance Temozolomide)	1	2	3	4	5	6
e. Any time post-treatment	1	2	3	4	5	6
f. At every visit	1	2	3	4	5	6
g. If their disease has progressed	1	2	3	4	5	6

5. In your experience, what proportion of patients develop some depressive symptoms over the course of their treatment for high-grade glioma?

[Circle one for each item]

Almost all patients………………………….1
Many patients………………………………2
Some patients……………………………..…3
A few patients…………………..…………..4
Almost no patients…………………….…..5

6. Whose responsibility is it to regularly screen for depression in high-grade glioma patients?

[Circle one for each item]

	Definitely Yes	Probably Yes	So-So	Probably Not	Definitely Not
a. Mental health professionals	1	2	3	4	5
b. Social workers	1	2	3	4	5
c. Primary care providers	1	2	3	4	5
d. Neuro-oncologists	1	2	3	4	5
e. Nurses	1	2	3	4	5
f. Medical Assistants	1	2	3	4	5
g. Nobody	1	2	3	4	5

Section 4: Background

The following questions ask about you and your clinical background and experience.

1. Are you:

[Circle one for each item]
An attending or faculty physician…………….1
A fellow…………………………………………………2
A resident…………………………………………….3
A nurse practitioner………………………………..4
Other……………………………………………………5

2. How long have you been in practice since training?

__ __ [Enter number of years]

3. Do you primarily practice in:

[Circle one for each item]
An academic medical center……………………..1
A community hospital………………………………2
A solo or group private practice……………….3
Other……………………………………………………..4

4. Are you in practice:

[Circle one for each item]
Full time………………………………………………..1
Part time……………………………………………….2

5. Do you identify as:

[Circle one for each item]
Female……………………………………………………1
Male………………………………………………………2
Other……………………………………………………..3
Decline to state……………………………………..4

6. What is your race?

[Circle one for each item]

White……………………………………………………….1
African American…………………….………………2
Asian…………….……………………………….…………3
Native American or American Indian………..4
Alaskan Native or Pacific Islander….…….…..5
Other……………………………………………………..6
Decline to state………………………………………7

7. What is your ethnicity?

[Circle one for each item]

Hispanic……………………………………………….….1
Non-Hispanic.…………………………………….……2
Other……………………………………………………..3
Decline to state………………………………………4