Measuring Quality of Life Following Neurosurgical Treatment for Brain Tumour Patients

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Abstract

**Introduction:** Quality of life for brain tumour patients has become an important outcome measure as patient perspectives can evaluate the impact of a diagnosis or treatment. Brain tumour patients experience participation restriction in completing these questionnaires due to multiple factors. The purpose of this literature review was to elicit the factors that influence the clinical utility of HRQoL questionnaires in brain tumour patients.

**Method:** A literature search was conducted on March and October 2018 using the following electronic databases: MEDLINE, EMBASE, and CINAHL. Papers with a publication date between 1998 and 2018 were sought to identify literature that discussed the characteristics of HRQoL questionnaires (EORTC QLQ C-30 and BN20, FACT-Br, and SF-36 Health Survey), its use with brain tumour patients, clinical utility, and factors contributing to its non-completion.

**Findings:** Methodological and patient-related factors in clinical trials that have contributed to non-completion of HRQoL questionnaires in brain tumour patients were identified. Studies have identified important factors that contribute the clinical usefulness of HRQoL questionnaires such as relevance of information, ability to highlight concerns, time to complete and interpret data.

**Conclusion:** At present, there is no gold standard tool that measures quality of life for brain tumour patients. Limited studies evaluate the use of HRQoL questionnaires in brain tumour patients in clinical contexts. Therefore, factors that contribute to clinical utility of HRQoL questionnaires for brain tumour patients facilitated development of criteria to be investigated in a feasibility study to compare three commonly used HRQoL questionnaires.
**TABLE OF CONTENTS**

1. **INTRODUCTION OF TOPIC** ..................................................................................6
   1.1 Search Strategy Used .......................................................................................9

2. **INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH (ICF)** ..........................................................10

3. **DIFFERENCES IN HRQoL QUESTIONNAIRES** .........................................11

4. **HEALTH CARE PROFESSIONALS** .................................................................15

5. **FACTORS RELATED TO NON-COMPLETION OF HRQoL MEASURES** ........16
   5.1 Methodological Factors ..................................................................................16
   5.2 Patient-related Factors ....................................................................................18

6. **NEUROCOGNITIVE DEFICITS** .........................................................................19

7. **CLINICAL USEFULNESS** ..................................................................................21

8. **CONCLUSION** ..................................................................................................22

REFERENCES ...........................................................................................................24

**Section 2: Journal Manuscript**
Measuring Patient Quality of Life Following Neurosurgical Treatment for Brain Tumour: A Feasibility Pilot Study

**Appendix A** – Author Guideline for Quality of Life Research
**Appendix B** – Ethics Amendment Approval
**Appendix C** – Critique Questionnaire for Health Care Professionals
**Appendix D** - Critique Questionnaire for Participants (Post-Op)
**Appendix E** - Critique Questionnaire for Participants (Pre-Op)
**Appendix F** - Cognitive Competence (Pre-op)
**Appendix G** - Cognitive Competence (Post-op)
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Characteristics of EORTC QLQ- C30 and BN20, FACT-Br, and SF-36 Health Survey</td>
<td>14</td>
</tr>
</tbody>
</table>

LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The international classification of functioning, disability, and health</td>
<td>11</td>
</tr>
</tbody>
</table>
SECTION 1: LITERATURE REVIEW

Measuring Quality of Life Following Neurosurgical Treatment for Brain Tumour Patients: a Literature Review

Keyword: Quality of Life, Brain Tumour, patient perspectives, participation

1. Introduction of topic

In 2008, the prevalence of primary brain tumours in Australia was 11.3 cases per 100,000 (Dobes et al., 2011). 93% of primary brain tumours were represented in adults aged ≥ 20 years old, where 42% of these tumours were diagnosed as malignant (Dobes et al., 2011). Although primary brain tumours present to have fairly low incidence rates compared to other cancers, such as breast and lung cancer, malignant brain tumours are associated with high morbidity and mortality (Kamangar, Dores, & Anderson, 2006; Wen & Kesari, 2008). Advancement in anti-cancer treatment, involving neurosurgery, radiotherapy, and chemotherapy, still pose risks of severe side effects (King et al., 2016; Taphoorn et al., 2005). Therefore, there has been an emphasis in using clinical endpoints that look beyond a patient’s overall survival and to measure the quality of life (Efficace & Bottomley, 2002). Acquiring patient perspectives through health-related quality of life questionnaires (HRQoL) questionnaires aim to manage the risks that come
with anti-cancer treatments and its possible detrimental effects on a patient’s health and well-being for the duration of his/her life span (Efficace & Bottomley, 2002).

HRQoL questionnaires are subjective measurements that evaluate a person’s functional, psychological, and social well-being (Yavas et al., 2012). It obtains patient perspectives in their health and well-being in order to assist clinicians in developing a more effective treatment plan (King et al., 2016). These tools are used with cancer patients as it can facilitate assessment of treatment needs, evaluation of treatment outcome, and prediction of response to future treatment (Cella & Tulsky, 1993). This takes a client-centered approach as it highlights patients’ concerns and provides health care professionals information that can facilitate development of more effective treatment plans that best suit patients’ needs (King et al., 2016). These potential outcomes are important as it can provide better health outcomes.

Three common HRQoL questionnaires used for brain tumour patients are the European Organization for Cancer and Treatment of Cancer (EORTC) Quality of Life Questionnaire (QLQ-C30) (Aaronson et al., 1993); the Functional Assessment of Cancer Therapy-General (FACT-G) (Cella et al., 1993); and the 36-Item Short Form (SF-36) Health Survey (Ware & Sherbourne, 1992). EORTC QLQ-BN20 (Osoba et al., 1996) and FACT-Br (Weitzner et al., 1995) are brain-specific modules developed to complement their core questionnaires (EORTC QLQ C-30 and FACT-G) by adding questions that pertain more to brain tumour patients. These questionnaires are widely used and have been tested for validity and reliability for brain tumour patients (Bunevicius, 2017; Osoba et al., 1996; Weitzner et al., 1995). They highlight symptoms, emotional, physiological, social concerns specific to brain tumour patients in order to obtain valuable patient perspectives that may inform clinicians how a diagnosis or a treatment have influenced a patient’s quality of life.
Despite the advantages HRQoL questionnaires can provide clinical trials, multiple challenges have impeded successful use of HRQoL measures in the brain tumour population. Studies have identified methodological and patient-related factors that may be contributing to failed completion of HRQoL questionnaires, such as lack of staff, clinician attitudes, patient motivation, timing of the assessments, and misinterpretation of question (Dirven et al., 2013; King et al., 2016; Walker et al., 2003). In addition to that, several studies have also investigated difficulties health care professionals have in using HRQoL questionnaires (Berry et al., 2011; King et al., 2016). At present, there is no gold standard tool that measures quality of life for brain tumour patients (Dirven et al., 2013). This study therefore proposes to investigate the feasibility of comparing three commonly used HRQoL questionnaires (EORTC QLQ C-30 and BN20, FACT-Br, and SF-36 Health Survey) to identify the most effective and efficient tool for brain tumour patients undergoing neurosurgical treatment.

In order to understand these issues, a literature review on HRQoL questionnaires for brain tumour patients was conducted. This review aims to investigate differences in the commonly used HRQoL questionnaires, methodological, and patient-related factors brain tumour patients experience, barriers contributing to participation restriction of completing HRQoL questionnaires. It also aims to explore health care professionals’ perspectives and attitudes toward administering these questionnaires in order to identify possible barriers and enablers in the clinical utility of HRQoL questionnaires with brain tumour patients undergoing neurosurgical treatment. This review examines the existing literature on the clinical usefulness of HRQoL questionnaires to identify factors that may contribute to increasing participation when acquiring HRQoL data. Identifying an effective and efficient tool for brain tumour patients undergoing neurosurgical treatment can facilitate completion of questionnaires. This is crucial to better
health outcomes as it acquires patient perspectives that inform health care professionals how treatment affects a patient’s quality of life.

For the purpose of this study, reference to FACT-Br includes FACT-G, the core questionnaire. The theoretical framework International Classification of Functioning, Disability, and Health (ICF) (Vargus-Adams & Majnemer, 2014) is also explored to understand how the different factors mentioned above influence brain tumour patients’ participation in completing HRQoL questionnaires.

1.1 Search strategy used

Three online databases were used to search: MEDLINE, EMBASE, and CINAHL. The keywords used to search these engines were the following: “quality of life” AND “brain tumo?r*” AND “Short Form 36” or “36-Item Short Form Survey” or “EORTC QLQ-BN20” or “European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Brain Cancer” or “FACT-Br” or “Functional Assessment of Cancer Therapy – Brain”. These key terms were used in the English language and only studies in English were screened. This search produced high amounts of duplicates, which were removed. Titles and abstracts were screened in order to remove literature that was not relevant for this study. Literature on the following topics were excluded: pediatrics, quality of life of patient-proxies, effectiveness of anti-cancer treatments, perinatal risks, and Ginko biloba.

2. International Classification of Functioning, Disability, and Health (ICF)

The International Classification of Functioning, Disability, and Health (ICF) is a biopsychosocial framework in which facilitates communication between health care professionals in a multidisciplinary team to describe persons’ function and health (Cieza &
Stucki, 2005). ICF considers factors beyond bodily functions such as health condition, personal, and environmental factors that may be influencing patients’ participation in an activity. WHO (2001) describes the domains “Activities and Participation” as having two qualifiers which consists of performance and capacity. Performance qualifier evaluates how an individual is functioning within their environment, which includes their physical, social, and attitudinal contexts. Capacity qualifier describes a person’s ability to execute an action. This is measured in a standard environment, in which exhibits how a person can adapt to their environment. Figure 1 demonstrates the interdependence of the ICF domains.

The interdependence of environmental factors, personal factors, activities, body functions and structures are used as a framework to understand participation restriction brain tumour patients experience when completing HRQoL questionnaires (activity) in a clinical context. The use of this framework allows for the consideration of the standard environment in which brain tumour patients need to complete HRQoL questionnaires, while understanding their capacity qualifier to execute the activity, in order to facilitate participation. This will be explored in the next sections.
3. Differences in HRQoL Questionnaires

FACT-Br, EORTC QLQ C-30 and BN20, and SF-36 Health Survey have various characteristics and means of presenting well-being. A comparison of the characteristics found in these HRQoL questionnaires are presented in Table 1. EORTC QLQ C-30 and QLQ BN20 assess more functional concerns, as this questionnaire lists 37 out of 50 items specific to this issue (Chow et al., 2014). A study by King, Bell, Costa, Butow, and Oh (2014) compared the responsiveness of FACT-G and EORTC QLQ C-30 in important clinical effects found in a heterogenous group of cancer patients (n=162). The study found EORTC QLQ C-30 to have significantly larger responsive index when assessing for social health domain. This subscale explores how physical condition or medical treatment has interfered with both family life and

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**Figure 1. The International Classification of Functioning, Disability, and Health.**
social activities. This may assist clinicians who may be prioritizing functional endpoints and evaluating how a treatment or diagnosis have influenced a patient’s quality of life.

FACT-Br, which includes FACT- G core questionnaire, addresses more emotional and social issues (Chow et al., 2014). This may be important to brain tumour patients as the diagnosis of malignant brain tumour also affect their families and communities. A descriptive study by Bradley et al. (2007) explored the financial impact primary malignant brain tumour patients experience during treatment and reported of common themes patients stated. Twenty participants reported concerns with the costs associated with medication and healthcare, its negative impact on their family, costs of their disability, and uncertainty for the future. This study highlighted some of the emotional and social concerns brain tumour patients experience as some patients transition to relying on family and/or friends for financial support. This was further explored in a prospective longitudinal study by Bradley et al. (2009), where family caregivers report feeling abandoned when caring for patients with high levels of neuropsychological function. This suggests that caregivers of higher functioning patients do not receive as much support from family and friends due to patients presenting to be well. Therefore, friends and family may not perceive support as being necessary for the caregiver. These perspectives are essential in understanding the changes brain tumour patients and their family and friends may be experiencing in order to secure proper support during treatment to alleviate social and emotional burden patients and their families may experience. Therefore, using HRQoL questionnaires such as FACT-Br, may provide more information on the impact the treatment or the disease has had on the patients’ emotional and social health domains of well-being. This can facilitate discussions around these concerns, which health professionals can utilise to organise proper support to meet the patients’ needs.
SF-36 Health Survey evaluates patient perceptions on broad physical and emotional health domains (Ware & Sherbourne, 1992). The test for validity and reliability were completed on a heterogenous group of patients who have not received adjuvant therapies (Bunevicius, 2017). The SF-36 Health Survey has shown to have ceiling and floor effects for the subscales under role limitations and emotional functioning, which signifies its low sensitivity for functional and emotional functioning in brain tumour patients (Bunevicius, 2017). General questionnaires, such as SF-36 Health Survey, also do not evaluate all areas of well-being and functioning specific to brain tumour patients. However, SF-36 Health Survey assesses how a brain tumour influences broad domains of impairment, which can then be compared with HRQoL across the general population with different disorders (Bunevicius, 2017). In addition to that, SF-36 Health Survey is a general HRQoL questionnaire, which is typically more familiar to health care professionals as these questionnaires are typically used across oncology settings (King et al., 2016).

FACT-Br, EORTC QLQ C30 and BN20, and SF-36 Health Survey emphasize well-being in different ways and can be chosen as the appropriate tool depending on what the clinician and/or researcher need to evaluate. FACT-Br enables clinicians to acquire more social and emotional issues from brain tumour patients. EORTC QLQ C-30 and BN20 are able to evaluate more of brain tumour patients’ functional concerns. SF-36 Health Survey allows for a broader assessment of health domains that enable clinicians to compare brain tumour patients’ concerns to the general population. Each of these HRQoL questionnaires acquire valuable patient perspectives and may inform clinicians how a diagnosis or treatment have influenced a patient’s quality of life. This can serve as a tool to facilitate better communication between patient and physician to provide feedback and plan for treatment plans that best suit patient needs.
Table 1. Characteristics of EORTC QLQ- C30 and BN20, FACT-Br, and SF-36 Health Survey

<table>
<thead>
<tr>
<th>Validity</th>
<th>EORTC QLQ-C30 and BN20</th>
<th>FACT-Br</th>
<th>SF-36 Health Survey</th>
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<tr>
<td>Reliability</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Core Questionnaire Domains</td>
<td>physical function, emotional function, pain, fatigue, appetite, dyspnea, constipation, sleep, global QoL</td>
<td>physical function, social/family, emotional, functional well-being</td>
<td>physical function, social functioning, role limitation (due to physical problems), mental health, vitality, pain, general health perception</td>
</tr>
<tr>
<td>Brain-specific Subscales</td>
<td>future uncertainty, visual disorder, motor dysfunction, communication deficit, brain specific symptoms (e.g. seizures, headaches, weakness of legs)</td>
<td>concentration, memory seizures, eyesight, hearing, speech, personality, expression of thoughts, weakness, coordination, headaches</td>
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4. Health Care Professionals

HRQoL questionnaires aim to increase awareness in a patients’ physical, social, and psychological well-being in order to assess how a treatment or diagnosis have affected their overall health. A randomized controlled trial by Detmar, Muller, Schornagel, Wever, and Aaronson (2002) showed that the intervention group, who used HRQoL questionnaires, had an increase of at least 10% in physician awareness of patients’ concerns in regards to pain, fatigue, daily activities, social activities, and feelings. This finding was not statistically significant from the control group. However, 97% of patients in the intervention group reported that the HRQoL summary provided to physicians were an accurate depiction of their functioning and well-being. This is crucial to patient-physician communication as 79% of the participants also believed that the HRQoL summary enhanced their clinicians’ recognition of their health problems. In addition, physicians in this study reported that the HRQoL summary facilitated communication in regards to psychosocial issues and unexpected symptoms. Similarly, a randomized trial by Berry et al. (2011) demonstrated there was no significant difference between the control group and the intervention group, who had HRQoL summary provided to clinicians. However, some clinicians in this study (n=113) responded to a questionnaire, where 64.4% of the clinicians reported that the HRQoL summary facilitated their interview and 53.6% agreed the HRQoL data assisted in identifying areas of referral. These studies may not have demonstrated direct correlation between HRQoL summaries and patient-physician communication. However, it has exhibited clinicians’ attitude towards the usefulness of HRQoL questionnaires.

Despite the potential advantages HRQoL questionnaires can provide patient-physician communication, it is limited by attitudes toward focusing on physical concerns. A study by Lauzon et al. (2013) assessed health care professionals’ perspectives on which HRQoL issues
were most relevant to patients with brain metastases using the FACT-Br. This study reported that health care professionals tend to prioritize issues concerning physical manifestations over psychosocial concerns. Similarly, another study by Detmar, Aaronson, Wever, Muller, and Schornagel (2000) surveyed oncologists to evaluate their attitude on HRQoL concerns and patients’ characteristics. This study found oncologists highlighting physical aspects of patients’ health as they found physical concerns to be their responsibility. However, in order to obtain a comprehensive understanding of a patients’ health and well-being, health care professionals need to address both physical and psychosocial health domains (Lauzon et al., 2013).

5. Factors Related to Non-Completion of HRQoL Measures

Research has shown that there is a significant issue of incompletion of HRQoL questionnaires in the brain tumour population (Leung et al., 2014; Tsay, Chang, Yates, Lin, & Liang, 2012). Studies have investigated methodological and patient-related factors contributing to failed completion of HRQoL questionnaires (Dirven et al., 2013; S. King et al., 2016). The following subsections investigates these issues.

5.1 Methodological factors

A prospective study with malignant glioma patients by Walker et al. (2003) investigated the reasons for their high amounts of missing data for their HRQoL measures. This study found that their greatest cause of missing data was due to administrative failure, which had an average of 72.2% of their case. The administrative factors consisted of administering the HRQoL questionnaire the wrong time. This study suggested that providing the questionnaires at the incorrect time can prevent successful HRQoL data collection due to little explanation provided to patients and therefore affect the completion or accuracy of the HRQoL data. In addition to that, Dirven et al. (2013) emphasized the importance of correct timing when a HRQoL questionnaire
is administered due to the impact time has on the interpretation of HRQoL data. This was demonstrated in a retrospective study by Hakamies-Blomqvist et al. (2001) where findings showed a statistical significance in the difference of HRQoL mean scores between the correct and incorrect time the questionnaire was administered. This suggested that incorrect timing of HRQoL questionnaires in oncological trials can produce unreliable measures and validity of QoL outcomes after a treatment.

Limited time can also play an important role in the administration and interpretation of HRQoL questionnaires. A study by King et al. (2016) interviewed professionals experienced in either quality of life and/or brain cancer research where they reported issues in lack of time to administer and interpret the HRQoL questionnaires. This was further explored in a feasibility study by Snyder et al. (2013) where clinicians’ attitudes in the use of HRQoL questionnaires through a Patient Viewpoint website were investigated. Clinicians report of the difficulties they experience in translating HRQoL scores and needing further explanation on what HRQoL item content and score mean.

Methodological factors such as administrative issues, time of assessment, and interpretation of data have shown to contribute to incompletion and unsuccessful use of HRQoL data. Administrative factors such as, instructions provided to patients and time of assessment, affect the reliability and validity of the measures. Therefore, sufficient training of staff and a specific time window of when assessments are given, should be implemented in order to acquire accurate HRQoL measures (Dirven et al., 2013). Providing training or support for clinicians can also facilitate interpretation of patients’ responses in HRQoL questionnaires (King et al., 2016). Incorrect timing of assessment and lack of support to successfully interpret HRQoL measures
serve as barriers in the usefulness of HRQoL questionnaires as these factors can affect measures produced.

5.2 Patient-related factors

Patient related factors consist of patient motivation, misunderstanding of questions, and incorrect completion of questions (Dirven et al., 2013). However, these factors can be addressed by methodological factors mentioned above. Walker et al. (2003) highlighted the importance of having trained individuals to administer HRQoL questionnaires in order to provide full explanation of the importance and correct use of these questionnaires. Other studies have agreed that patient related factors are less problematic than methodological factors (Bernhard, Gusset, & Hürny, 1998; Moinpour & Lovato, 1998). This stayed consistent with the findings in the study that assessed practical problems with quality of life assessments in patients with malignant glioma (Walker et al., 2003). As mentioned earlier, 72.2% of missing data was due to administrative failure, where only 6.1% of it is due to patient refusal. Another longitudinal study by Ahlner-Elmqvist et al. (2009) evaluated patients with malignant disease (n=297) to investigate non-compliance in the completion of HRQoL questionnaires and found most of their participants able to complete questionnaires until death. This study suggested that having family or caregiver support when completing questionnaires may facilitate compliance. However, this study did not include all of potential participants that met eligibility criteria in the original study. The complete group of participants are demonstrated in the study by Ahlner-Elmqvist et al. (2008) where additional participants (n=180) with malignant tumours did not participate in the study due to more advanced diseases and were closer to death. This suggests that the evaluation made of the incompletion of HRQoL questionnaires was due to a positive bias. Therefore, the
other participants who were not able to participate due to more advanced disease were not represented.

6. Neurocognitive deficits

Brain tumour is a disease characterized by severe symptoms and are often influenced by both tumour and anti-cancer treatments (Reijneveld, Sitskoorn, Klein, Nuyen, & Taphoorn, 2001; Taphoorn, Sizoo, & Bottomley, 2010). These pose risks of fatigue, anxiety, depression, and neurocognitive deficits (Boele et al., 2014; Mainio, Hakko, Niemelä, Koivukangas, & Räsänen, 2005; Struik et al., 2009). Cognitive dysfunction can affect an individual’s language, memory, attention, executive functions, and speed of information processing which may ultimately decrease a person’s functional independence. This impairment becomes a disability that can affect return to work, interpersonal relationships, and leisure activities (Zucchella, Bartolo, Di Lorenzo, Villani, & Pace, 2013). Apart from this being associated with negatively affecting quality of life, neurocognitive deficits may also prevent accurate patient-reported outcomes through HRQoL questionnaires (Ediebah et al., 2017). These patients are often excluded from clinical trials as evaluation of their HRQoL data may produce bias. As a result, HRQoL data are usually acquired in conjunction with HRQoL estimates provided by a patient’s proxy, also known as a partner, close relative, or friend.

HRQoL is a subjective measure, typically obtained through self-reports, as it is viewed that patients are the best judge of their quality of life (Yavas et al., 2012). However, gathering proxy estimates of a patient’s HRQoL may be required when a patient’s self-report is absent or unreliable (King et al., 2016). A cross-sectional study done by Ediebah et al. (2017) compared patient and patient by proxy HRQoL data in low-grade glioma patients (n= 246) who were
disease-free for at least one year following diagnosis and primary treatment. This study found that patient and patient by proxy ratings shared similar scores on HRQoL scales in SF-36 Health Survey and EORTC QLQ-BN20 except for physical functioning and symptoms scales found in the questionnaires (e.g. physical functioning, communication deficit, visual disorder). This study also found that the scores in best agreement between the patient and patient by proxy were physical and emotional concerns affecting one’s role. However, the findings of this study also showed statistically significant differences between patient (with cognitive impairment) and patient by proxy responses on scales measuring visual disorder, headaches, itchy skin, and bladder control. This study suggests that patient with low grade glioma and patient by proxy HRQoL scores generally have high levels of agreement. However, patients with neurocognitive deficits tend to have lower levels of agreement with patient by proxy ratings of HRQoL scores. Good patient and proxy agreement stayed consistent with a previous study by Giesinger et al. (2009) that investigated the level of agreement between patients with primary brain tumours and their proxy when rating patients’ HRQoL and symptoms. This study found good rater agreement between the patient and proxy for most physical symptoms (e.g. physical functioning, sleeping disturbances, appetite loss, constipation, financial impact). Lower agreements were found on social and psychological aspects (e.g. social functioning, cognitive functioning, emotional functioning, fatigue, pain, seizures). This study suggests that despite some differences in patient and proxy rating of patients’ HRQoL measures, including proxy rating is a feasible strategy to obtain information about a patient’s quality of life and symptom burden if patients are unable to provide the information themselves.

The discrepancies between patient and proxy ratings have produced different views in its usefulness as it has the potential to produce inaccurate and biased data (Kommer et al., 1997).
However, some may argue that when neurocognitive dysfunction starts to impact accuracy of HRQoL measurements, taking proxy reported HRQoL ratings may be considered as the most reliable information on patients’ quality of life (Ediebah et al., 2017). This can facilitate improving accuracy of HRQoL data for patients with cognitive deficits or reduction of missing data when acquiring HRQoL questionnaires (Dirven et al., 2013). However, the use of proxies to obtain HRQoL questionnaires need to differentiate between proxy-patient (from patient’s viewpoint) or proxy-proxy (from proxy’s viewpoint) perspective that is being represented in HRQoL measures due to possible differences between the two.

7. Clinical Usefulness

HRQoL questionnaires have become important measures for brain tumour patients as it acquires patient perspectives on how a treatment or diagnosis have affected the patient’s quality of life. Studies have demonstrated the increase use HRQoL questionnaires with brain tumour patients in clinical trials, however there has been limited use in clinical contexts (King et al., 2016). Barriers to routine clinical use need to be investigated to understand possible factors that may be contributing to its limited use. Chen, Li, and Kochen (2005) describes a HRQoL measure having clinical usefulness when it meets the following characteristics: valid, reliable, responsive, and able to be interpreted. The meaning of clinical utility is further explained as questionnaires having the capacity to be conducted in a simple and quick manner, easy to score/interpret, and provide useful information (Chen, Li, & Kochen, 2005; King et al., 2016; Lauzon et al., 2013). However, barriers to routine clinical use of HRQoL questionnaires include cost, feasibility, and clinical relevance (Chen et al., 2005).
8. Conclusion

The literature review conducted highlighted personal and environmental factors that can serve as barriers and enablers for brain tumour patients when completing HRQoL questionnaires, which may affect participation. However, as explained earlier, brain tumour patients experience a variety of symptoms and acquire different levels of cognitive capacity that may also hinder successful execution of completing HRQoL questionnaires within the parameters set by their standardized contexts. With limited studies on the clinical utility of HRQoL questionnaires in brain tumour patients, a feasibility study to compare three commonly used questionnaires (EORTC QLQ C-30 and QLQ BN20, FACT-Br, and SF-36 Health Survey) is required to understand the clinical usefulness of each one. This will facilitate identification of a HRQoL questionnaire that may be the most effective and efficient questionnaire for brain tumour patients undergoing neurosurgical treatment.

Due to the multiple factors that contribute to clinical utility, we propose to focus on evaluating brain tumor patients’ perspectives on constructs that were suggested to be important influencers in the clinical usefulness of HRQoL questionnaires in brain tumour patients (Ahlner-Elmqvist et al., 2009; Lauzon et al., 2013; Walker et al., 2003). These factors consist of the following criteria: (1) relevance, (2) ability to highlight most concerns, (3) ease of language, (4) time to complete, and (5) assistance required. We also propose to investigate health clinicians’ attitudes towards the clinical utility of questionnaires to further assess the usefulness of the three HRQoL questionnaires. Criteria to be explored were based on factors that contribute to clinical usefulness (Chen et al., 2005). These factors include the following items: (1) relevance of information, (2) usefulness of data, and (3) ability to predict a patient’s participation in activities.
This study aims to investigate the feasibility of comparing three commonly used HRQoL questionnaires to identify the most effective and efficient tool for brain tumour patients undergoing neurosurgical treatment. Evaluating its clinical utility aims to explore possible barriers and enablers in the completion of HRQoL questionnaire with brain tumour patients in order to provide support that facilitate participation in this activity.
References:


King, S., Exley, J., Parks, S., Ball, S., Bienkowska-Gibbs, T., MacLure, C., ... Marjanovic, S. (2016). The use and impact of quality of life assessment tools in clinical care settings for cancer patients, with a


SECTION 2: JOURNAL MANUSCRIPT

Measuring Patient Quality of Life Following Neurosurgical Treatment for Brain Tumour: A Feasibility Pilot Study

TARGET JOURNAL: Quality of Life Research Journal
See Appendix A for Author Guidelines

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Abstract

Purpose: The purpose of this study is to investigate the feasibility of comparing three HRQoL questionnaires to identify which is the most effective and efficient tool for brain tumour patients undergoing neurosurgical treatment. This study aims to investigate the following questions: (1) Is it feasible for brain tumour patients to compare three HRQoL questionnaires before and after neurosurgical treatment? If so, (2) Which of the three HRQoL questionnaires is perceived to be the most effective by both brain tumour patients and health care professionals?

Methods: A pilot study was conducted in a metropolitan private medical center in Sydney. Participants (n=5) were recruited through convenience sampling and were asked to complete three HRQoL questionnaires. The usefulness of the European Organisation for Cancer and Treatment of Cancer Quality of Life Questionnaire (QLQ-C30) and (QLQ-BN20), the Functional Assessment of Cancer Therapy-Brain (FACT-Br), and the Short Form 36 (SF-36) health survey, were assessed before and after neurosurgical treatment. Participant and clinician perceptions of the tools’ utility were investigated by pre-developed questionnaires. HRQoL tools and questionnaires were provided to participants before surgery; and either at their postsurgical consultation or by mail.

Results: FACT-Br was the questionnaire well-received by participants. However, varying levels of fatigue contributed to the incompletion of assessments.

Conclusion: The FACT-Br was the preferred HRQoL tool in addressing patient concerns in this small study following brain tumour surgery. Further studies with a larger sample size are recommended to further investigate the clinical utility of HRQoL questionnaires for brain tumour patients.
# TABLE OF CONTENTS

1. **BACKGROUND** .................................................................................................................. 5

2. **METHODS** .......................................................................................................................... 7
   2.1 Study Design, Recruitment and Eligibility...................................................................... 7
   2.2 Instruments......................................................................................................................... 7
       2.2.1 EORTC QLQ C-30 and EORTC QLQ-BN20 HRQoL Questionnaire...................... 7
       2.2.2 FACT-Br HRQoL Questionnaire.................................................................................. 8
       2.2.3 SF-36 Health Survey.................................................................................................... 8
       2.2.4 Development of Critique Questionnaire for Participants ...................................... 8
       2.2.5 Cognitive Competence Rating for Participants....................................................... 9
       2.2.6 Critique Questionnaire for Health Care Professionals.......................................... 10

3. **DATA COLLECTION** .......................................................................................................... 10
   3.1 Participants......................................................................................................................... 10
   3.2 Health Care Professionals................................................................................................ 11
   3.3 Data Analysis..................................................................................................................... 11

4. **RESULTS** .......................................................................................................................... 11
   4.1 Participants......................................................................................................................... 11
       4.1.1 Pilot Testing................................................................................................................. 11
       4.1.2 Time Taken.................................................................................................................. 13
       4.1.3 Preferred Tool............................................................................................................. 14
   4.2 Health Care Professionals.................................................................................................. 16

5. **DISCUSSION** ..................................................................................................................... 16

6. **IMPLICATIONS** ................................................................................................................ 20

7. **LIMITATIONS AND FUTURE STUDIES** ..................................................................... 20

8. **CONCLUSION** .................................................................................................................. 21

REFERENCES ............................................................................................................................ 23
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Questions in critique questionnaire for participants</td>
<td>9</td>
</tr>
<tr>
<td>2. Participants’ demographics, brain tumour diagnosis, cognitive competence</td>
<td>12</td>
</tr>
<tr>
<td>3. Average time to complete HRQol questionnaires</td>
<td>14</td>
</tr>
<tr>
<td>4. Frequency of HRQol questionnaire per clinical utility criteria (before /after neurosurgery)</td>
<td>14</td>
</tr>
<tr>
<td>5. Participants’ preferred HRQol questionnaire based questionnaire criteria (before /after neurosurgical treatment)</td>
<td>15</td>
</tr>
<tr>
<td>6. Health clinician’s attitude towards usefulness, relevance, ability to predict participation</td>
<td>16</td>
</tr>
</tbody>
</table>
Measuring Quality of Life Following Neurosurgical Treatment for Brain Tumour Patients: A Feasibility Pilot Study

**Keywords:** Quality of Life, Brain Tumour, neurosurgical treatment, patient perspectives

1. Background

Primary brain tumours in Australia have an annual incidence of 11.3 cases per 100,000 person-year, within this demographic, there has been a significant increase in primary malignant brain tumours [1]. Although primary brain tumours present to have fairly low incidence rates compared to other cancer sites, such as breast and lung cancer, brain tumour is a disease characterized by severe symptoms and poor prognosis [2-4]. Adults facing this diagnosis are often presented with symptoms such as headache, seizures, insomnia, and nausea [5]. They can also experience secondary symptoms such as personality changes, cognitive deficits, or aphasia due to neurologic deterioration [6, 7]. Patients with malignant brain tumours have poor prognosis as these tumours are associated with progressive disability and decline in mental health status [2, 6]. As advances in anti-cancer treatment focuses on prolonging survival, these treatments still pose risks of severe side effects that may be affecting a patient’s quality of life [8, 9]. Therefore, there has been an emphasis in looking beyond a patient’s overall survival and measuring clinical benefits of any new treatment by obtaining patient perspectives through HRQoL questionnaires to ensure that treatments minimize risks and maximize treatment outcomes [9, 10].

Health-related quality of life (HRQoL) questionnaires are subjective measurements that evaluate a person’s functional, psychological, and social well-being [11]. Many authors have hypothesized that HRQoL data is relevant in acquiring patients’ perspectives and incorporating them in treatment plans, with a view to taking a client-centered approach on patient care [8]. These tools are used with cancer patients as it can facilitate assessment of treatment needs, evaluation of treatment outcome, and prediction of response to future treatment [12]. This is vital for brain tumour patients as incorporation of their perspectives in their treatment plan can best inform health clinicians how to support the individual, which facilitate better health outcomes.
Three common HRQoL questionnaires used for brain tumor patients are: the European Organisation for Cancer and Treatment of Cancer (EORTC) Quality of Life Questionnaire (QLQ-C30) with the brain cancer-specific subscale (QLQ-BN20) [13, 14]; the Functional Assessment of Cancer Therapy-Brain (FACT-Br) [15]; and the 36-Item Short Form (SF-36) health survey [16]. EORTC QLQ BN-20 and FACT-Br are brain cancer specific modules developed to complement their core questionnaires (EORTC QLQ-C30 and FACT-G) to address the most relevant issues brain cancer patients’ experience. These questionnaires are widely used and have been tested for reliability and validity with patients with brain tumours [14, 15, 17, 18]. Each questionnaire offers a different emphasis on well-being. The EORTC QLQ C-30 and QLQ-BN20 questionnaires have a focus on patients’ functional concerns [19]. FACT-Br, in conjunction with FACT-G, has a psychosocial focus; evaluating the emotional and social concerns of brain tumour patients [19]. SF-36 health survey assesses broader physical and emotional health domains, which can facilitate a comparison of HRQoL within the general population [18]. Despite the differences, these questionnaires aim to obtain patient perspectives in order to inform clinicians how a diagnosis or a treatment have influenced a patient’s quality of life.

However, research has shown that there has been a significant issue with completing HRQoL questionnaires in clinical trials for the brain tumour population [20]. Several studies have highlighted methodological and patient related factors that may be contributing to failed completion of these questionnaires [8, 21]. In addition to that, several studies have investigated difficulties health care professionals have in interpreting HRQoL data [22-24]. At present, no single gold standard tool exists to measure HRQoL [25]. Therefore, further investigation is required to identify the most effective and efficient HRQoL questionnaire for brain tumour patients. This study investigates the feasibility of comparing three commonly used HRQoL questionnaires to identify the most effective and efficient tool for brain tumour patients undergoing neurosurgical treatment. The research questions are: (1) Is it feasible for brain tumour patients to compare three HRQoL questionnaires before and after neurosurgical treatment? If so, (2) Which of the three HRQoL questionnaires is perceived to be the most effective by both brain tumour patients and health care professionals?
2. Methods

2.1 Study Design, Recruitment, and Eligibility

The pilot feasibility study received ethical approval from the study center’s Human Research Ethics Committee as an amendment to HREC Reference Number: 5201600915 on July 27th, 2018.

A convenience sampling method was used to recruit potential participants at a metropolitan private medical center, from August to September 2018. Patients over the age of 18 years scheduled to undergo neurosurgical treatment were referred to the first and second author by treating neurosurgeons. Eligibility required potential participants to (1) speak and understand functional English; (2) have no severe disability that will prevent them from filling out questionnaires; (3) provide written informed consent. The first and second author coordinated to see potential participants where they acquired a written informed consent before starting the study. Participants were informed that their participation in the study was entirely voluntary and that they could withdraw their consent at any time. Participants were also informed that there would be no change in their clinical treatment nor service by participating or withdrawing from the study.

Patients were identified by a study number in order to correctly match data for before and after neurosurgical treatment. Medical records were accessed, after informed consent, to acquire date of birth and brain tumour diagnosis to ensure accuracy of patient information.

2.2 Instruments

2.2.1 EORTC QLQ C-30 and EORTC QLQ-BN20 HRQoL Questionnaire

The EORTC QLQ C-30 is a 30-item questionnaire internationally validated for cancer patients [17]. This questionnaire consists of five function scales: physical, role, emotional, social, and cognitive functioning. These questions are rated on a numeric scale from 1 (Not at All) to 4
(Very Much). The last two questions have items assessing overall health and overall quality of life. Each of these two questions can be scored on the numeric scale from 1 (Very Poor) to 7 (Excellent).

The EORTC QLQ Brain Cancer Specific Module (BN20) is a disease specific instrument validated for patients with primary brain tumours [14]. It consists of 20 questions investigating symptoms experienced in the past week. Each question item is rated on a numeric scale from 1 (Not at all) to 4 (Very Much). EORTC QLQ-BN20 is commonly used in combination with the EORTC QLQ-C30, especially in clinical trials with brain metastases patients [26].

2.2.2 FACT-Br HRQoL Questionnaire

FACT-Br is a 50-item questionnaire, which consists of both FACT- General (G) and the supplementary brain-cancer specific instrument. This questionnaire has been validated for primary brain tumour patients and used in clinical studies with brain metastases patients [15, 27]. The section with FACT-G investigates 4 components (physical well-being, social/family well-being, emotional well-being, and functional well-being), while the brain specific subscale lists additional concerns. These questions are rated on a numeric scale from 0 (Not at all) to 4 (Very much).

2.2.3 SF-36 Health Survey

SF-36 Health Survey is a generic health questionnaire with 36 questions which evaluate: physical functioning, physical aspects, pain, vitality, social functioning, and emotional concerns. It has shown to be both reliable and valid for brain tumour patients [18]. This instrument is rated on a numeric scale and presents in seven different forms: 1 (Excellent) to 5 (Poor); 1 (Much better now than one year ago) to 5 (Much worse now than one year ago); 1 (Yes, limited a lot) to 3 (No, not limited at all); 1 (All of the time) to 5 (None of the time); 1 (Not at all) to 5 (Extremely); 1 (None) to 6 (Very Severe); and 1 (Definitely true) to 5 (Definitely False).

2.2.4 Development of Critique Questionnaire for Participants

The critique tool developed for brain tumour patients was based on constructs that were suggested to be important influencers in the clinical usefulness of HRQoL questionnaires.
Relevance of information and ability to highlight disease-specific concerns were seen as vital components in HRQoL questionnaires in order to facilitate compliance in filling in such questionnaires [22, 28]. Other questions were also developed based on methodological factors that were suggested to be possible barriers to completing HRQoL questionnaires such as ease of language, time, and assistance to complete these tools [21]. Construction of questions for the critique tool followed guidelines outlined by O’Leary in order to promote clarity and specificity [29]. The questionnaire was then reviewed by an occupational therapist specializing in neuro-oncology in order to identify problematic questions.

The critique questionnaire has five multiple choice questions, which incorporates factors that contribute to completion of HRQoL questionnaires. These factors, indicative of the usefulness of a HRQoL questionnaire, are listed on Table 1. Response categories were listed as “Assessment 1,” “Assessment 2,” and “Assessment 3”. An open-ended question at the end of the questionnaire (“Other Comment”) was included in order to identify other issues that may not be addressed in the questionnaire and enable participants to express their true feelings in case the response categories do not exactly represent their opinion [29, 30].

Table 1. Questions in critique questionnaire for participants

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Which set of questions did you find the easiest to understand?</td>
</tr>
<tr>
<td>2</td>
<td>Which set of questions addressed most of your concerns?</td>
</tr>
<tr>
<td>3</td>
<td>Which set of questions took the least time to complete?</td>
</tr>
<tr>
<td>4</td>
<td>Which set of questions do you think is most relevant to you?</td>
</tr>
<tr>
<td>5</td>
<td>Which set of questions required little to no assistance to complete?</td>
</tr>
</tbody>
</table>

2.2.5 Cognitive Competence Rating for Participants

Measurement of neurocognitive function in brain tumour patients was essential as palliative care studies have shown that the presence of a cognitive impairment influences both a patient’s ability to complete questionnaires and results of HRQoL data [28, 31]. Therefore, using a standardized
test for cognitive testing has become standard practice in brain tumour clinical trials [32]. Due to the pilot nature of this study and its restricted time and resources, performing a standardized cognitive test was not possible. To account for the participant’s cognitive capacity, a cognitive competence Likert scale from 0 (Poor) to 4 (Excellent) was developed. This was rated by a treating doctor or neuropsychologist before and after neurosurgical treatment.

2.2.6 Critique Questionnaire for Health Care Professionals

The critique tool developed for health care professionals contained three items: relevance of information, usefulness of data, ability to predict a patient’s participation in activities. Criteria developed were based on factors that contribute to clinical usefulness of quality of life measures [33]. Usefulness of a HRQoL questionnaire is defined as an instrument’s ability to be conducted in a simple and fast manner, while providing important clinical data [33]. Each criteria had “Assessment 1,” “Assessment 2,” and “Assessment 3” as subheadings where a 5-point Likert scale was used to rate the extent in which they have experienced each criteria. The attitudinal scales were listed as (0=Not at all to 5 = Extremely; 0=Not Useful to 5 = Extremely Useful; 0=Not Relevant to 5 = Extremely Relevant).

3. Data Collection

3.1 Participants

Considering the pilot nature of this study and variability of postsurgical consultations in this context, a sample size of (n=5) was obtained. Order of assessments was randomized using a computer program. This program generated randomized order of questionnaires for each participant, which was used to prepare premade packets. Participants were provided the questionnaires before neurosurgical treatment, which were around one to two days depending on when participants were admitted to the hospital. Participants were also given the questionnaires after their neurosurgical treatment either on their postsurgical consultation or by post. The researchers delivering the questionnaires were trained in how to administer the HRQoL questionnaires and provide instructions to ensure all participants fill out the questionnaires based on the randomized order they were given. The time taken to complete each HRQoL
questionnaire was recorded by the researcher. Each participant also received instructions to fill out the critique questionnaire after completing all three HRQoL tools. One participant (n = 1) completed the questionnaires at their postsurgical consultation, while the rest (n = 4) were sent by post.

3.2 Health Care Professionals

Questionnaires developed were sent to a neurosurgeon and an occupational therapist (n=2) by email invitation. Follow-up emails were sent every two weeks after initial invitation.

3.3 Data Analysis

Descriptive statistics (means, standard deviations) were calculated on Excel (Version 1803). Statistical comparisons were not made due to lack of randomization, small sample size, and change of delivery in instruments before and after surgery.

4. Results

4.1 Participants

Five participants consented to this study (four women and one man, mean age = 49.2, SD= 13.102). See Table 2 for participants’ demographic details and wide range of brain tumour diagnosis. Cognitive competence before and after surgery stayed consistent for all participants except one, this participant scored 2 before and 0 after surgery (Participant 2).

4.1.1 Pilot Testing

Four out of five consenting participants attempted to complete the questionnaires before surgery. Each participant had clinical procedures requiring their time and concentration in preparation for their surgery, therefore questionnaires were delivered at different times of the day, depending on the participant’s availability.
Three out of five participants who were diagnosed with high grade brain tumours and brain metastases were given the questionnaire the night before their surgery (Participant 1, 2, 3). These participants gave different amounts of participation in completion of questionnaires due to

Table 2. Participants’ demographics, brain tumour diagnosis, cognitive competence

<table>
<thead>
<tr>
<th></th>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
<td>Female</td>
<td>Female</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td>45</td>
<td>59</td>
<td>56</td>
<td>28</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Standard Deviation)</td>
</tr>
<tr>
<td><strong>Tumour(s) Diagnosis</strong></td>
<td>Anaplastic Astrocytoma (WHO Grade III Glioma)</td>
<td>Glioblastoma, IDH-WILD TYPE (WHO Grade IV)</td>
<td>Brain lesion, left temporal lobe – metastatic breast carcinoma</td>
<td>Astrocytoma (WHO Grade II)</td>
<td>Meningothelial Meningioma and Secretory Meningioma (WHO Grade I)</td>
</tr>
<tr>
<td><strong>Cognitive Competence</strong></td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><em>Before Surgery</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Standard Deviation)</td>
</tr>
<tr>
<td><strong>Cognitive Competence</strong></td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><em>After Surgery</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Standard Deviation)</td>
</tr>
</tbody>
</table>

fatigue levels. Participants were also observed to acquire support from their partners/carers during the session. One participant did not participate in completing the questionnaires as the
patient reported he ‘felt too tired’ (Participant 2). This patient’s partner reported that he had several clinical tests throughout the day and needed to rest. Another participant did not finish all three HRQoL questionnaires and only completed the first two they were given (SF-36 and FACT-Br) (Participant 1). The researcher observed the participant getting fatigued as she placed her head on the table. Participant 1 was given time to rest and rated the critique tool based on the two questionnaires she completed. The researcher administered the critique tool as a semi-interview to facilitate the process. The other two participants diagnosed with low grade brain tumours completed their questionnaires independently in the afternoon of the day before their surgery.

Post-op questionnaires were delivered by postsurgical consultation (n = 1) or by post (n=4). Participant 1 completed the questionnaires on her follow up appointment and successfully finished two questionnaires (EORTC QLQ-C30 and QLQ-BN20, FACT-Br). Similar observations were made for this patient in comparison to her capacity to complete questionnaires before surgery. The patient was observed discussing questions with her partner and reported feeling ‘tired’ by the end of the second questionnaire. The researcher delivered the critique tool as a semi-interview. The remaining post-op questionnaires were sent by post and two responses were obtained from Participant 4 and 5.

4.1.2 Time Taken

The average time each participant took to complete questionnaires are presented on Table 3. The average time the participants took for each questionnaire were within the average 5 to 15 minutes, which is the standard time HRQoL questionnaires would normally take [34]. The researcher was unable to record time for Participant 5 due to interruptions by other health clinicians needing to see the participant. However, this participant was still able to finish all three questionnaires.
Table 3. Average time to complete HRQoL questionnaires

<table>
<thead>
<tr>
<th></th>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average (minutes)</td>
<td>13</td>
<td>-</td>
<td>10.33</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0</td>
<td>-</td>
<td>1.53</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

4.1.3 Preferred Tool

Table 4 demonstrates the frequency of HRQoL questionnaire per clinical utility criteria. The total does not equate to the number of participants (n=5) per question criteria due to varying levels of participation and completion of questionnaires. However, FACT-Br was the questionnaire well-received under the criteria *address most of your concerns* and *most relevant*. HRQoL questionnaires chosen per question criteria can be found in Table 5.

Table 4. Frequency of HRQoL questionnaire per clinical utility criteria (before /after Neurosurgery)

<table>
<thead>
<tr>
<th>Question Criteria</th>
<th>Number of participants</th>
<th>EORTC C-30 and BN-20</th>
<th>FACT-Br</th>
<th>SF-36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easiest to understand</td>
<td></td>
<td>Pre-op</td>
<td>Post-Op</td>
<td>Pre-Op</td>
</tr>
<tr>
<td>Addressed most of concerns</td>
<td></td>
<td>-</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Least time</td>
<td></td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Relevant</td>
<td></td>
<td>-</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>No/Little assistance</td>
<td></td>
<td>2</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>4</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>
Participant 3 omitted the questions that asked about *relevance* and *addressed most of your concerns* when answering the questionnaires before her surgery. She commented on FACT-Br and reported that asking about the last seven days is not representative of her experience. Participant 3 also reported that some topics such as toileting do not pertain to her as those physical concerns are more apparent in a different age group. Similarly, Participant 4 reported that a lot of the physical concerns in the questionnaires do not pertain to her as she thought with her age, emotional concerns are more relevant.

**Table 5.** Participants’ preferred HRQoL questionnaire based questionnaire criteria (before /after neurosurgical treatment)

<table>
<thead>
<tr>
<th>Questions</th>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which set of questions did you find easiest to understand?</td>
<td>SF-36</td>
<td>EORTC C30 and BN20</td>
<td>-</td>
<td>F-ACT-Br, EORTC C30 and BN20</td>
<td>EORTC C30 and BN20</td>
</tr>
<tr>
<td>Which set of questions addressed most of your concerns?</td>
<td>FACT-Br</td>
<td>FACT-Br</td>
<td>-</td>
<td>FACT-Br</td>
<td>FACT-Br</td>
</tr>
<tr>
<td>Which set of questions took the least time to complete?</td>
<td>FACT-Br</td>
<td>FACT-Br</td>
<td>FACT-Br</td>
<td>EORTC C30 and BN20</td>
<td>EORTC C30 and BN20</td>
</tr>
<tr>
<td>Which set of questions do you think is most relevant to you?</td>
<td>FACT-Br</td>
<td>FACT-Br</td>
<td>FACT-Br</td>
<td>EORTC C30 and BN20, SF-36</td>
<td>EORTC C30 and BN20</td>
</tr>
<tr>
<td>Which set of questions required little to no assistance to complete?</td>
<td>SF-36</td>
<td>EORTC C30 and BN20</td>
<td>-</td>
<td>EORTC C30 and BN20, FACT-Br, SF-36</td>
<td>EORTC C30 and BN20, FACT-Br</td>
</tr>
</tbody>
</table>
4.2 Health Care Professionals

An occupational therapist specializing in neuro-oncology responded to the questionnaire delivered by email. The health clinician’s attitude towards the HRQoL questionnaires and its 
*usefulness*, *relevance*, and *ability to predict participation* are exhibited on Table 6. The health care professional rated FACT-Br and EORTC QLQ C-30 and BN 20 similarly as it is both very useful and extremely relevant. All three questionnaires however, were rated similarly in its ability to predict participation in everyday activities.

**Table 6.** Health clinician’s attitude towards usefulness, relevance, ability to predict participation

<table>
<thead>
<tr>
<th>HRQoL Questionnaires</th>
<th>Usefulness</th>
<th>Relevance</th>
<th>Predict Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EORTC QLQ C-30 and BN20</td>
<td>Very</td>
<td>Extremely</td>
<td>Moderately</td>
</tr>
<tr>
<td>FACT-Br</td>
<td>Very</td>
<td>Extremely</td>
<td>Moderately</td>
</tr>
<tr>
<td>SF-36</td>
<td>Moderately</td>
<td>Moderately</td>
<td>Moderately</td>
</tr>
</tbody>
</table>

Overall, participants who completed the questionnaires reported preferring FACT-Br as the HRQoL tool that is the *most relevant* and have fulfilled the criteria *address most of your concerns*. The health professional that responded stayed consisted with that finding as the health professional reported FACT-Br as a very useful and extremely relevant questionnaire for brain tumour patients.

5. Discussion

HRQoL questionnaires have become a pertinent outcome measure for brain tumour patients as current treatment options pose risks of severe side effects [8]. Therefore, there has been an
emphasis in looking beyond a patient’s overall survival and acquiring clinical endpoints that assess a person’s quality of life. However, studies have reported a high rate of non-compliance for completing HRQoL questionnaires in the brain tumour population [20]. With limited studies on the clinical utility of HRQoL questionnaires in the brain tumour population, further investigation is required to find the most effective and efficient HRQoL questionnaire for brain tumour patients undergoing neurosurgical treatment. We investigated the feasibility of comparing three commonly used HRQoL questionnaires (EORTC C30 and BN-20, FACT-Br, and SF-36 Health Survey) to identify the most effective and efficient questionnaire for brain tumour patients before and after neurosurgical treatment.

The primary aim of this study was to investigate the feasibility of comparing three commonly used quality of life questionnaires with brain tumour patients before and after neurosurgical treatment. Based on our findings, participants diagnosed with low grade brain tumours were able to complete the three HRQoL questionnaires and the critique tool independently and within the standard time. Despite the interruptions experienced by Participant 5, questionnaires were still completed. This suggests that it is feasible to compare three HRQoL questionnaires for low grade brain tumour patients undergoing neurosurgical treatment.

The secondary aim of this study was to identify which of the three HRQoL questionnaires is perceived to be the most effective by both brain tumour patients and health care professionals. The findings of this study demonstrated that the FACT-Br was chosen as the preferred questionnaire for the criteria of “most relevant” and “address most of your concerns.” The FACT-Br evaluates subscales of physical, social/family, emotional, functional well-being, and brain-specific concerns. In contrast, EORTC C-30 and BN20 evaluates subscales of visual disorder, motor dysfunction, future uncertainty, and communication deficit. Our study found, FACT-Br and EORTC C-30 and BN20 were chosen for various criteria as the preferred HRQoL questionnaires before and after neurosurgical treatment by the participants. This may be due to the brain cancer-specific subscales of both FACT-Br and EORTC QLQ BN20, which were developed for the purpose of evaluating HRQoL of brain tumour patients [14, 15]. Therefore, items in these questionnaires may be a better representation of important topics for brain tumour
patients. However, FACT-Br was still chosen to be the preferred tool, which may be due to the emotional and social concerns it is able to address. Participant 4, for example, reported that a lot of the physical concerns in the questionnaires do not pertain to her as she thinks with her age, emotional concerns are more relevant. This may also be a reason as to why SF-36 Health Survey was not chosen for the criteria “most relevant” and “address most of your concerns” by participants in this study. One study that assessed SF-36 for its reliability and validity for brain tumour patients found that it had low sensitivity when assessing functional and emotional status [18]. Therefore, questions in SF-36 may not have addressed all of the concerns brain tumour patients are experiencing at this point of their diagnosis.

FACT-Br has been tested for its validity for brain metastases patients [27], Participant 3, who was treated for metastatic brain cancer, did not choose any assessments pre-operatively under the criteria “most relevant” and “address most of your concerns.” Participant 3 did report that questioning her quality of life for the past seven days was not representative of her experience. Both FACT-Br and EORTC C-30 and BN20 both present their recall period as seven days, which may have contributed to the omission of the questions. Omission of questions and incompletion of HRQoL questionnaires were factors affecting the collection of data in this study, which many authors often assume is due to personal factors, such as having lower function [28].

The findings of this study suggest that patients diagnosed with high grade tumours had high levels of fatigue contributing to missing data when acquiring HRQoL questionnaires. These participants were also observed to acquire support from their partners/carers. One study assessed issues around missing data when collecting HRQoL questionnaires from glioma patients in clinical trials and found administrative failure, such as when the questionnaire is administered, to be a major source of failure to complete questionnaires [21]. Researchers in quality of life assessments have agreed to this finding as they have also found personal factors to be less of an issue than administrative, methodological, and logistic factors [35, 36]. Personal factors consist of a patient’s motivation, ability to understand instructions, and fill out questionnaires [21]. Motivation to participate in this study by filling out the questionnaires was present in all of the participants as they all consented to fill out the tools. Some of the participants made an attempt to fill out the tools, but were not able to complete the questionnaires independently and so, they
sought support from their partners to complete them. Participant 2 demonstrated willingness to participate in the study as he consented, however refused to complete the questionnaires due to fatigue, which may have acquired from various clinical tests he performed throughout the day. This confirmed the issue that administrative factors, such as timing of assessments, that may be contributing to incomplete sets of data.

Optimal timing of delivering HRQoL questionnaires are dependent on its purpose [25]. This study gathered pre-operative patient perspectives on HRQoL questionnaire to gain baseline measurements. However, the administration of the assessments were dependent on the availability of patients admitted into the hospital. Participant 1, 2, and 3 were not available until the night before their surgery due to neuropsychological assessments and other clinical tests. Issues around administering questionnaires immediately after clinical tests contribute to fatigue and may also change the attitude of patients in taking HRQoL questionnaires [25]. This may have influenced Participant 1, 2, 3’s ability to complete the questionnaires.

Personal factors are perceived as less of an issue when it comes to filling out questionnaires due to the apparent motivation seen in patients [35, 36]. For example, a longitudinal HRQoL study (n=297) was done to evaluate patients with malignant disease to investigate non-compliance during the study and found a high proportion of their participants were able to fill in HRQoL questionnaires until death [28]. This study suggested that having more support from family or caregivers when filling out questionnaires may facilitate compliance [28]. However, these suggestions were based on a positive bias due to the other participants (n =180) who were eligible, but did not participate in the study due to having more advanced diseases and were closer to death [37]. Therefore, observations were not made for these patients and were not represented in the results. The findings of the study were consistent with Participant 2, who was diagnosed with a higher grade of brain tumour and was not able to fill out questionnaires before and after surgery, despite having support from his partner to fill out the HRQoL tools.
6. Implications

From our knowledge, this is the first study that investigated the feasibility of comparing three commonly used HRQoL questionnaires (EORTC C30 and BN-20, FACT-Br, and SF-36 Health Survey) to identify the most effective and efficient questionnaire for brain tumour patients before and after neurosurgical treatment. Findings of this study identified FACT-Br as the preferred tool under the criteria most relevant and address most of your concerns. This finding suggests that the participants in this study found emotional and social domains to be the relevant issues that is representative of their concerns. This finding also stayed consist with the health care professional, who identified FACT-Br as a questionnaire that is very useful and extremely relevant for brain tumour patients. Another finding of this study found that it is feasible to compare the three commonly used questionnaires to low grade brain tumour patients undergoing neurosurgical treatment. This was demonstrated to their capacity to complete questionnaires independently and in a timely manner. The last finding of this study found patients diagnosed with high grade tumours experience high levels of fatigue, either from their diagnosis or environmental factors (e.g. neuropsychological exams and other clinical tests), contributing to incompletion of HRQoL questionnaires. Participants were also observed to acquire support from their partners when filling out the questionnaires as they discussed the content and had their partners fill out the questionnaires. This suggests that acquiring a patient-proxy perspective can enable involvement of those participants who have difficulties providing self-report questionnaires due to fatigue levels.

7. Limitations and Future Studies

There were several limitations to our study. One main limitation is our small sample size recruited through convenience sampling in one location. This used a non-randomized and non-controlled sample, which is a threat to internal validity by not accounting for external factors. Although results of this study found feasibility with low grade brain tumour patients, they cannot be extrapolated to all other clinical sites. Further studies with a larger sample size are recommended to further investigate the usefulness of HRQoL questionnaires.
Due to the pilot nature of this study, systematic procedures in a neurooncological setting were not accounted for in the design and time constriction of this project. Therefore, with limited time and resources, there was a change of instrument administration (e.g. self-administered questionnaire at hospital to questionnaire mailed by post) before and after surgery, which may have contributed to the different amounts of missing data before and after neurosurgical treatment. Therefore, further studies should administer the questionnaires either by self-report or semi interview to enable better delivery of instructions and support if needed. The exclusion criteria for this study prevented participants who may have severe cognitive deficits to participate, creating a sample bias. Therefore, results of our study does not represent all brain tumour patients.

Based on our findings, further studies should also continue to develop the critique questionnaire to further assess clinical utility. For example, the critique tool for health care professionals can further expand on the criteria usefulness by assessing how long it takes to calculate and interpret HRQoL questionnaires. Also, due to the observed support some participants had, future studies should look into developing a critique tool for patients’ partner/carer (proxy). This may enable involvement of those participants who have difficulties providing self-report questionnaires due to fatigue levels or possible cognitive deficits.

8. Conclusion

This pilot study has shown that comparing three commonly used HRQoL questionnaires (EORTC QLQ C30 and BN20, FACT-Br, SF-36 Health Survey) to identify the most efficient and effective tool is feasible for low grade brain tumour patients undergoing neurosurgical treatment. A larger study is recommended to further investigate the clinical utility of HRQoL questionnaires for brain tumour patients.

Based on the findings of this small pilot feasibility study, we recommend several suggestions for future studies with a larger sample size. Firstly, we recommend studies to administer the HRQoL questionnaires either as a self-report or semi interview before and after neurosurgical treatment to provide better delivery of instructions and support if needed. We recommend further development of critique tool to increase assessment of questionnaires’ clinical utility. Lastly,
future studies should look into developing a critique tool for patients’ proxy to enable involvement of those participants who have difficulties completing self-report questionnaires due to fatigue or cognitive deficits.
References:

Appendix A

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- Disclosure of potential conflicts of interest
- Research involving Human Participants and/or Animals
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“This article does not contain any studies with human participants or animals performed by any of the authors.”

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Appendix B
Ethics Amendment Approval

RE: Request for amendment - HREC Ref No. 5201600915

Rebekka Tennent <rebeka.tennent@mq.edu.au> on behalf of Ethics Secretariat <ethics.secretariat@mq.edu.au>
Fri 27/07/2018 12:17 PM

To: Andrew Davidson <asdavidson1@mac.com>; Health Sciences Centre Ethics Support <muhsc.ethics@mq.edu.au>; 
Cc: Joan O'Donnell (HDR) <joan.odonnell1@hdr.mq.edu.au>; Belinda Johnston <belinda.ji66@gmail.com>; Angelica Cardenas Tadle <ataad3557@uni.sydney.edu.au>; Lesley Morris <lmorris@mqneurosurgery.com>

Dear Andrew,

This was approved.

All the best,
Rebekka.

From: Andrew Davidson <asdavidson1@mac.com>
Sent: Friday, 6 July 2018 4:23 PM
To: Ethics Secretariat <ethics.secretariat@mq.edu.au>; Health Sciences Centre Ethics Support <muhsc.ethics@mq.edu.au>
Cc: Joan O'Donnell (HDR) <joan.odonnell1@hdr.mq.edu.au>; Belinda Johnston <belinda.ji66@gmail.com>; Angelica Cardenas Tadle <ataad3557@uni.sydney.edu.au>; Lesley Morris <lmorris@mqneurosurgery.com>
Subject: Request for amendment - HREC Ref No. 5201600915

Dear Human Research Ethics Committee,

I would like to submit an amendment to my existing HREC-approved research project (Reference No. 5201600915).
I have attached the Amendment Form, as well as the necessary PICF and data collection forms, for your information.

Regards,
Andrew

Associate Professor Andrew S Davidson
MB BS, MS, PhD, FRACS
Neurosurgeon
Appendix C
Critique Questionnaire for Health Care Professionals

Quality of Life Measure Following Neurosurgical Treatment for Brain Tumour Patients

Critique Questionnaire for Health Care Professionals

1. Rate each assessment according to its quality of life report and “usefulness” of data.
   Assessment 1
   Not Useful  Slightly Useful  Moderately Useful  Very Useful  Extremely Useful
   Assessment 2
   Not Useful  Slightly Useful  Moderately Useful  Very Useful  Extremely Useful
   Assessment 3
   Not Useful  Slightly Useful  Moderately Useful  Very Useful  Extremely Useful

2. Rate each assessment according to its relevance of information for the brain tumour population.
   Assessment 1
   Not Relevant  Slightly Relevant  Moderately Relevant  Very Relevant  Extremely Relevant
   Assessment 2
   Not Relevant  Slightly Relevant  Moderately Relevant  Very Relevant  Extremely Relevant
   Assessment 3
   Not Relevant  Slightly Relevant  Moderately Relevant  Very Relevant  Extremely Relevant

3. Rate each assessment according to its ability to predict a patient’s participation in activities.
   Assessment 1
   Not at all  Slightly  Moderately  Very  Extremely
   Assessment 2
   Not at all  Slightly  Moderately  Very  Extremely
   Assessment 3
   Not at all  Slightly  Moderately  Very  Extremely
Other comments:

Completed by: __________________________

Signature: __________________________

Date: __________________________
Appendix D
Critique Questionnaire for Participants (Post-Op)

Quality of Life Measure Following Neurosurgical Treatment for Brain Tumour Patients

Postoperative Critique Questionnaire

Today’s Date:

Date of Surgery:

1. Which set of questions did you find easiest to understand?
   - Assessment 1
   - Assessment 2
   - Assessment 3

2. Which set of questions addressed most of your concerns?
   - Assessment 1
   - Assessment 2
   - Assessment 3

3. Which set of questions took the least time to complete?
   - Assessment 1
   - Assessment 2
   - Assessment 3

4. Which set of questions do you think is most relevant to you?
   - Assessment 1
   - Assessment 2
   - Assessment 3

5. Which set of questions required little to no assistance to complete?
   - Assessment 1
   - Assessment 2
   - Assessment 3

Other comments:
Appendix E
Critique Questionnaire for Participants (Pre-Op)

Quality of Life Measure Following Neurosurgical Treatment for Brain Tumour Patients
Preoperative Critique Questionnaire

Date:

1. Which set of questions did you find easiest to understand?
   Assessment 1       Assessment 2       Assessment 3

2. Which set of questions addressed most of your concerns?
   Assessment 1       Assessment 2       Assessment 3

3. Which set of questions took the least time to complete?
   Assessment 1       Assessment 2       Assessment 3

4. Which set of questions do you think is most relevant to you?
   Assessment 1       Assessment 2       Assessment 3

5. Which set of questions required little to no assistance to complete?
   Assessment 1       Assessment 2       Assessment 3

Other comments:
Appendix F
Cognitive Competence (Pre-op)

Quality of Life Measure Following Neurosurgical Treatment for Brain Tumour Patients

Preoperative Participant Cognitive Competence

Date:

Please rate the participant's cognitive competence to complete three health-related quality of life questionnaires and one 5-question multiple choice critique questionnaire.

☐ 0 – Poor
☐ 1 – Barely Adequate
☐ 2 – Satisfactory
☐ 3 – Good
☐ 4 – Excellent

Other comments:

Surgeon/Registrar’s Signature: ________________________________

Surgeon/Registrar’s Name: ________________________________

Date:
Appendix G
Cognitive Competence (Post-op)

Quality of Life Measure Following Neurosurgical Treatment for Brain Tumour Patients

Postoperative Participant Cognitive Competence

Date:

Please rate the participant’s cognitive competence to complete three health-related quality of life questionnaires and one 5-question multiple choice critique questionnaire.

- 0 – Poor
- 1 – Barely Adequate
- 2 – Satisfactory
- 3 – Good
- 4 – Excellent

Other comments:

Surgeon/Registrar’s Signature: ________________________________

Surgeon/Registrar’s Name: ________________________________

Date: