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Do Family Health Conversations impact patients with glioblastoma multiforme and their family members?

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Abstract:

Aims and Objectives: To assess the impact of family health conversations (FamHC) as a supplement to conventional care on health-related quality of life (HRQoL), family functioning (FFSS) and family hardiness or resilience (FHI) 4 and 14 weeks postoperatively among patients with glioblastoma multiforme and their family members.

Background: There is a lack of knowledge about the efficiency of FamHC among families experiencing glioblastoma multiforme.

Design: A quasi-experimental pre- and post-test design adhering to the STROBE (Strengthening the reporting of observational studies in epidemiology) guidelines for case-control studies. Patients and family members were included consecutively in the pre-test period from November 2013 to December 2014 for the control group (offered traditional care only), and in the post-test period from January 2015 to December 2015 for the intervention group (offered traditional care and FamHC). For both groups, 4 and 14 weeks postoperative measurement were obtained

Methods: Differences in outcomes were assessed using a Difference-in-Difference regression analysis approach measuring difference across pre and post groups and across 4 and 14 weeks measurements.

Results: The study does not reveal significant effects of FamHC (all p-values larger than 0.05) as measured by the three instruments WHOQOL-BREF, FFSS and FHI.

Conclusions: The present study was not able to show significant effects of FamHC. However, it cannot be left out that the intervention might be helpful and supportive at a later state of the illness trajectory.

Relevance for clinical practice: The study adds to the growing evidence-based knowledge on FamHC by questioning their potential use in different cultural contexts among families experiencing critical illness. Oncological nurses need to adapt this information to support their daily care for the patients and their close relatives. For future studies, it is recommended that the families themselves choose when the conversations should take place during the course of the illness.

Bullets: What does this paper contribute to the wider global clinical community?

- In order to significantly increase quality of life, family functioning and family hardiness or resilience of patients and relatives suffering from malignant brain tumour the intervention might have needed to be offered over a longer period of time and with more intensity.
- The findings call for further rigorous research in family nursing with a longer follow-up period on the benefits of particular family health conversations
- These findings have implications for educating nurses globally about care of patients with malignant brain tumour, including direction for development and testing of family nursing interventions

1. Introduction

Most countries in Europe have been affected by the economic crisis, and budget cuts have restricted access to the healthcare system (Karanikolos et al., 2013). Consequently, future healthcare will rely more on the support of families and social networks around the patient to provide support and care. Hence, healthcare needs to shift from a patient-focused approach to a family-focused approach with regard to supporting families in the care of their ill family member and in the prevention of caregiver-related stress and hardship (Hiel et al., 2015). System thinking is a way of looking at a world in which family members are interrelated with one another. In this system approach, the wholeness is viewed as greater than the sum of its parts, where properties or behaviors of the family system are best understood from arrangements and transactions among family members (Bateson, 1972). Based on this theoretically grounded interpretation Family Health Conversations (FamHC) might offer an opportunity to constitute self-identity and identity within the family, increase the families' understanding of multiple ways of being and acting, to see new possibilities and to develop meaning and hope (Persson & Benzein, 2014) for families experiencing serious illness such as glioblastoma multiforme. Specifically, FamHC is defined as "a way of acknowledging a systemic thinking both regarding the relationship and collaboration between nurses and families, and the relationships within the family" (Benzein et al, 2008: 107).

2. Background

In developed countries approximately 5.1 per 100,000 citizens are yearly diagnosed with a malignant brain tumour like glioblastoma multiforme (CBTRUS, 2016). Untreated glioblastoma is deadly within 3-4 months after diagnosis. but with the current standard treatment regimen including surgery, external radiation- and chemotherapy, the median survival time is 14.6 months (Stupp et al., 2005). Most patients develop cognitive dysfunctions including impaired memory function, lack of orientation, language impairment, personality and behavioural changes, paranoia and delusional

disorders (Giesinger et al., 2009). In addition, the patient often loses some of his/her ability to carry out the activities of daily living (Stupp et al., 2005; Giesinger et al., 2009). The dysfunction is related to a combination of various factors such as tumour location and its spread, tumour-related epilepsy, treatment and patient-related factors such as age and psychological stress (Stupp et al., 2005; Pelletier et al., 2002).

Due to the rapid disease progression and frequently accompanying cognitive dysfunctions patients often find it difficult to participate in a structured rehabilitation program postoperatively (Khan et al., 2014) leaving the family members, most often spouses, as primary caregivers. These family members therefore take the responsibility of helping the patient with the physical, cognitive, behavioural as well as emotional consequences of the disease and its treatment (Arber et al., 2013; Ownsworth et al., 2015), affecting also the caregivers life dramatically (Madsen & Poulsen, 2011; Parvataneni et al., 2011; Petruzzi et al., 2013). Family caregivers have been described to develop physical and mental symptoms such as headache, gastritis and depression, because of anxiety and the constant impact of stress caused by having a seriously ill person in the family (Salander, 1996; Janda el al., 2008).

Depression is more common among family caregivers of patients with brain tumours compared to other cancer forms (Finocchiaro et al., 2012). Janda et al. (2008) found that 40% of the family caregivers experienced anxiety, and 10% developed depression, and often family caregivers' quality of life seems to be more affected than that of the patient (Petruzzi et al., 2013). Consequently, the families need help to facilitate the communication within the family and support to draw up practical strategies in order to cope with the situation (emotional needs, etc.) (Arber et al., 2013; Ownsworth et al., 2015; Parvataneni et al., 2011; Ownsworth et al., 2010). Both the patients and their caregivers have indicated that they see conversations concerning the patient's psychosocial challenges as being supportive (Cavers et al., 2013).

Systematic reviews and meta-analyses of family interventions (Chesla, 2010; Hartman et al., 2010; Martire, 2005; Martire et al., 2004; Martire et al., 2010) have shown that family education and support, family psycho-education and family therapy are all effective interventions to improve individual health and relationships among couples. Therefore, there might be a need to adopt a family-focused approach and not only offer individual support to the patient. In interviews with families living with patients with chronic illness, Benzein et al. (2015) found that the families experienced health conversations as important, and strongly emphasized the opportunity to talk with somebody outside the family as important for their well-being. A pilot study also pointed towards a positive effect of family health conversations among couples in palliative care (Benzein & Saveman, 2008). In addition, an integrative review (Ostlund & Persson, 2014) of interventions based on the Calgary Family Intervention Model (Wright & Learhay, 2009) showed positive impact on families' well-being by strengthening the cognitive, affective and behavioural domains of family health.

However, more intervention research using experimental and quasi-experimental designs are needed to strengthen the evidence for Family Systems Nursing practice (Ostlund & Persson, 2014), and no previous studies have investigated the effect of family health conversations for patients with brain tumour. The present study contributes to filling this gap by assessing the impact of family health conversations as a supplement to conventional care on health-related quality of life (HRQoL), family functioning (FFSS) and family hardiness or resilience (FHI) 4 and 14 weeks postoperatively among patients with glioblastoma multiforme and their family members. This assessment was obtained by comparing a post-test period intervention group (which were offered family health conversations as a supplement to conventional care) to a pre-test period control group (which were offered conventional care only). Finally, the intervention effect was assessed by using the Difference-in-Difference approach (Abadie, 2005), which has become standard in assessing designs measuring pre and post differences across intervention and control groups.

3. Methods

Design, sample and setting

The study used a quasi-experimental pre-test period (control group) and post-test period (intervention group) design (Reeves et al-, 2017), adhering to the STROBE (Strengthening the reporting of observational studies in epidemiology) guidelines for case-control studies (von Elm et al., 2008); see Supplementary File 1. Patients and family members were included consecutively at the Department of Neurosurgery, Odense University Hospital, from November 2013 to December 2014 for the pre-test period, and from January 2015 to December 2015 for the post-test period.

Patients who were >18 years of age, undergoing treatment for glioblastoma multiforme were included in the study. Patients who did not understand and speak Danish, who suffered from cognitive dysfunction and/or aphasia, or were not able to give informed consent, were excluded from the study. The study was approved by the Danish Data Protection Agency (ID 14/13782). According to Danish legislation and the local Committees on Health Research Ethics this study does not embrace obligation of notification

For the pre-test period group, patients and family members were assigned to care as usual, and for the post-test period group, patients and family members were assigned to receive FamHC in addition to care as usual. The usual care offered to all patients consisted of consultations one week after the surgery at the neurosurgical department, including information about the histopathological diagnosis. Subsequently, all patients were referred to the department of oncology, for radiotherapy and chemotherapy. During that period the patients were offered two or more consultations with the treating medical doctors and nurses depending on their needs. Patients were also informed about their possibilities to get in contact with general practitioners, psychologists, medical social workers and the Danish Cancer Society. After the end of the oncological treatment, approximately nine

months, the patients were followed and examined every third month at the neurological department. The examinations were focused on needs for rehabilitation and the patients well-being.

Family Health Conversations

The FamHC were developed in Sweden (Benzein et al., 2008), and strongly influenced by the Calgary Family Assessment Model, The Calgary Family Intervention Model (Wright & Learhey, 2009), and the Illness Beliefs Model (Wright & Bell, 2009). They are based on systems theories, assuming human reality emerges in the concrete meeting with others and in interaction with the environment (Maturana, 1988; Bateson, 1972). Focus is on circularity and multiplicity which requires acceptance of a multiverse of opinions, beliefs and actions. Family is defined per Whall's (1986) definition, stating that a family consists of two or more individuals functioning in a way that they perceive themselves to be a family. They may be bound by blood ties or law, or not. The conversations are performed in a non-hierarchal and non-judgmental interactive relationship between the nurses and the families, acknowledging the family's unique perspective where the family is the expert, in their own life (Meiers & Brauer, 2008).

For the present study, the conversations were carried out in the period immediately after outcomes measurements at four weeks and prior to the 14 weeks outcomes measurements by two project nurses who had completed an intensive educational and practical training program. The program included education and practical conversation training besides group sessions on how to reflect on the health conversations offered to the families. That is, training and supervision is provided on how to use a genogram to assess the structure of the family, how to invite the family to tell their illness narrative, and how to practice skills in enhancing family strengths by using circular questioning and offering commendations to the family.

Based on the patient's wish, the conversations took place either in a conference room at the Department of Neurosurgery outpatient clinic or in the patient's home. Each family was offered three conversations over a period of ten weeks. The participants were the patient and family members chosen by the patient him/herself and two project nurses. Two families received one conversations, one family received two conversations and the remaining families received the three conversations they were offered. One of the project nurses was responsible for the conversation whereas the other one observed the communication and supplied additional questions for clarification when needed and to enrich the conversation. All conversations were digitally recorded. During the first conversation, the nurse together with the family drew a genogram (Rempel et al., 2007), visualizing the members of the family, external networks and how the participants were related. The information gathered was applied in the conversations that followed. Each family member was invited to tell their illness narrative, how they experienced the family's situation and which issues and problems they considered as being the most pressing. Based on these narratives, the two nurses and the family together agreed what to talk about and what changes might be desirable and possible for the families. The purpose of the second and third conversation was to further illuminate family members' beliefs about the illness and to strengthen facilitating beliefs and to modify constraining beliefs, besides, reflection of the process of change that had occurred during the conversations were clarified. Each conversation varied between 60 and 90 minutes.

Outcome measures

The effect of the FamHCs was measured by patients' and family members' self-reported outcomes with the primary outcome Health-related quality of life (HRQoL), and secondary outcomes family functioning, and family hardiness or resilience. Outcomes were reported postoperatively after 4 and 14 weeks.

Compared to a norm sample, Dogel et al. (2004) found that patients diagnosed with glioblastoma and their relatives scored significant lower in the psychological domain of WHO Quality of Life Questionnaire (WHOQOL – BREF). We anticipated that families might benefit emotionally from FamHC thus, the sample size was based on an expected difference in mean score of the psychological domain of the WHOQOL – BREF from 67.8 in the pre-test to 73.7 in post-test. Standard deviation (SD) for the entire population was estimated to be 10.5. The calculation was based on normal distribution with a = 5%, 1-b = 10% and equal numbers of patients in both groups. In total 80 patients were needed. *Instruments*

The WHOQOL – BREF is a generic questionnaire, which is widely used, reliable, and a valid tool for assessing HRQoL (Nørholm & Bech, 2001; Nørholm et al. 2004). It contains 26 questions and is a brief version of WHOQOL- 100 (Nørholm et al., 2004). The instrument is made up of five domains measuring overall quality of life and general health, physical health, psychological wellbeing, quality of social relationships, and quality of environment. Each of the 26 questions were initially scored on a five-point Likert scale ranging from 'Not at all' to 'Completely' and transformed into a scale ranging from 0-100. Finally, each of the five domains were calculated as the average of the non-missing questions. Thus, a high score on a domain means a high degree of quality of life on the domain in question. The Danish version of WHOQOL – BREF has been validated (Nørholm & Bech, 2001) and used among a Danish general population (Nørholm et al., 2004) as well as patients with schizophrenia (Nørholm & Bech, 2006), while the German version of the questionnaire was used on German patients diagnosed with malignant glioma and their family members (Dogel et al., 2004).

The Family Function Style Scale (FFSS) comprises 26 questions. It has been designed to evaluate to which extent a family finds that it has competencies within the five sub-scales: interactional patterns, family values, coping strategies, family commitment, and resource mobilization (Trivette et al., 1994).The questions are scored on a five-point Likert scale ranging from 'is not like my family' to 'is always like my family'. The scale can be answered by the patient and the family members jointly,

and it is available in Danish. Each question was rescaled to an interval from 0 to 100, and each of the five domains were calculated as the average of the questions involved in the domain.

The Family Hardiness Index (FHI) was developed to examine how the family acts in a stressful situation (McCubbin & McCubbin, 1987; McCubbin et al., 1996). The instrument comprises 20 statements scored on a four-point Likert scale ranging from 'wrong' to 'true'. The patient and the family jointly respond to the questionnaire. The questionnaire has been translated into Danish for this purpose. In accordance with McCubbin et al. (1996), we rescale the answers to the statements to a scale from 1 to 3 and investigate a three-domain (commitment, challenge, and control) as well as a four-domain (co-oriented commitment, confidence, challenge, and control) version, where each domain was formed by summing the rescaled answers of questions involved, together with a one-domain version formed as the sum of all questions of the instrument.

Data collection procedure

Consecutively enrolled patients and family members were asked to fill in the questionnaires 4 and 14 weeks after surgery. Most of the questionnaires were collected by one of the project nurses reading aloud the questions from the questionnaire after which the family jointly answered these questions. This took place either in Department of Neurosurgery, outpatient clinic at OUH or in the home of the patient. A few of the questionnaires were sent to the families which then jointly responded to them and upon completion sent them back.

In connection with the last collection of questionnaires 14 weeks after the operation, additional information about the following confounders was gathered: patient contact with visiting nurse, occupational therapist, physiotherapist, social worker, psychologist, general practitioner/family

doctor, The Danish Cancer Society, the local organization for brain damage counseling, the brain tumor association, or participation in specialized intensive rehabilitation programs.

Data analysis

First, validity of the instrument scales and subscales were assessed by using Cronbach's Alpha values. For each of the three instruments, Cronbach's Alpha were calculated for all questions as well as for questions from the individual domains. Next, we analysed the differences across week 4 / week 14 and pre / post measures separately for each domain of each instrument. This is done by applying a Difference-in-Difference (DiD) approach, which has become a standard tool in analysis of non-randomized intervention effects (Abadie, 2005). Specifically, we defined two index variables WEEK14 (=1 if measurement at week 14, 0 if at week 4) and POST (=1 if measurement from Post, 0 if from Pre). Next, we defined the interaction variable WEEK14*POST (=1 if measurement from Post and at week 14, 0 otherwise. This implies that the difference pre and post period measurements was measured (by the POST indicator). The average difference for all participants (i.e. pre as well as post period participants) between week 4 and 14 measurements was measured by the WEEK14 indicator, and the additional difference between week 4 and 14 for the post group participants measured by the interaction variable WEEK14*POST.

Now, letting Y be any of the domains from WHOQOL-BREF, FFSS or FHI, we specified the linear regression DiD model:

$Y = b_0 + b_1WEEK14 + b_2POST + b_3(WEEK14*POST)$

The interpretation of the coefficients b_0, b_1, b_2 and b_3 follows the logic as suggested above: First, b_0 is the mean of Y for measurements from Pre, Week 4. Next, b_1 is the additional mean of Y for Pre-measurements at Week 14. Further, b_2 is the additional mean of Y for Post measurements at Week 4. Finally, b_3 is the additional interaction difference in mean of Y for measurements simultaneously being from Post and at Week 14.

Thus, while b_1 only measures the change in mean from week 4 to week 14, and b_2 only measures the difference between Pre and Post, b_3 shows how much the intervention affects the mean, given that the intervention is defined as the distinctive change in mean for Post from week 4 to week 14.

From the above, the clinical importance of including the interaction term is clear. If not included, then parallellity would be implied, i.e. that the impact of the intervention is the same for week 4 and week 14, and that the difference from week 4 to 14 is the same for the Pre and Post groups. Thus, one may see the interaction term as a test for parallellity.

An alternative interpretation of the coefficients is as follows: The mean of Y for measurements from Pre, Week 4 is b_0. The mean of Y for measurements from Pre, Week 14 is (b_0+b_1). The mean of Y for measurements from Post, Week 4 is b_0+b_2. Finally, the mean of Y for measurements from Post, Week 14 is $(b_0+b_1+b_2+b_3)$.

The advantage of the DiD is that important conclusions can be reached from significance of the coefficients: If b_1 is significantly different from zero, then there might be a change in mean from Week 4 to Week 14 for the Pre-group, which may be caused by other unobserved causes with effects similar to the intervention. Similarly, if b_2 is significantly different from zero, then there is a difference in mean between Pre and Post, which may neither necessarily be related to the

intervention. But if b_3 is significantly different from zero, then there is a significant effect of the intervention.

Finally, we also investigated whether there was an intervention effect on the differences in WHO-BREF between patients and relatives. This was assessed by calculating means for differences. Next, the DiD approach was applied simply by letting Y be the difference in measurements between patients and their relatives.

All data analyses were done using SAS Version 9.4 for Windows 10.

4. Results

Table 1 shows distribution of patients according to inclusion, pre – and post test, and demography.

In the pre-test, there were 73 potential participants. Of these, 40 were included (10 women and 30 men), 20 were excluded (11 women and 9 men), and 13 did not want to participate (3 women and 10 men). In the post-test, there were 65 potential participants. Of these, 20 were included (8 women and 12 men), 21 were excluded (7 women and 14 men), and 24 did not participate (13 men and 11 women). Exclusion reasons covered lack of consent, language difficulties, non-Danish speaking, lack of cognitive abilities, and aphasia. Figure 1 shows an adjusted CONSORT (2010) flow diagram for the patients.

Table 2 shows distribution of patients according to a variety of confounders.

It is seen that the course of the multi-disciplinary care of the patients were similar in regard to the pre- and post-test period. Initially, Cronbach's alpha was obtained for all questions of each instrument as well as for questions involved in each domain as reported in Table 3. For the overall WHOQOL-BREF instrument, values of 0.77 and 0.86 for patients and family members respectively

were obtained. For the domains, the corresponding values for patients and family members, respectively, were 0.47 and 0.60 for overall quality of life; 0.45 and 0.56 for physical health; 0.64 and 0.77 for psychological wellbeing; 0.32 and 0.56 for social relationships; and 0.38 and 0.51 for environment. Turning to FFSS, Cronbach's alpha was 0.81 for the overall instrument. For the five domains, the values were 0.53, 0.80, 0.52, 0.30, and 0.23. Finally, for the overall FHI instrument, a Cronbach's alpha value of 0.73 was obtained, while for the four-domain version the values for the individual domains were 0.59, 0,53, 0.82 and 0.06 respectively, and for the three-domain version 0.53, 0.80 and 0.34 respectively.

Next, means and standard deviations for the involved scales were obtained as reported in Table 3. For WHOQOL-BREF, results for patients as well as for relatives and for the differences (patient minus relatives) are reported. For the FHI, the overall (one-domain) FHI scale is reported, together with results for the three- and four domain versions.

To illustrate, it is seen for the first patient WHOQOL-BREF domain (life quality for the patient) that the average score for Pre in Week 4 was 59.1, while for Pre, Week 14 the average was marginally higher, namely 60.5. For Post, Week 4, the average was 60.6, and for Post, Week 14, the average was 54.2.

Turning to the differences between relatives and patients WHOQOL-BREF values, the mean difference between relative and patient on the scale Life Quality is 15.0 for PRE in week 4. For Pre in week 14, the mean difference is slightly lower, namely 11.2. For Post, the mean difference is 11.3 in week 4 and 9.7 in week 14. Thus, for Pre as well as Post, the relative seems to assess life quality higher than the patient, but the difference is reduced over time. Also, the difference seems to be slightly lower for Post than for Pre at both time points.

The FFSS and FHI domains are interpreted in a similar manner. To illustrate, for the first FFSS dimension (Interactional patterns), the average score for Pre in Week 4 was 80.9, while for Pre, Week 14 the average was marginally higher, namely 82.4. For Post, Week 4, the average was 80.6, and for Post, Week 14, the average was 79.3. Similarly, it is seen for the overall FHI scale that the average score for Pre in Week 4 was 46.5, while for Pre, Week 14 the average was marginally lower, namely 45.0. For Post, Week 4, the average was 47.2, and for Post, Week 14, the average was 45.6.

To provide indications as to whether these means were different across pre – and post values as well as across weeks 4 and 14, the DiD approach applies. Table 4 reports the DiD coefficients and their P-values for domains.

To illustrate, it is seen for the first patient WHOQOL_BREF domain (patient overall life quality) that the average score for Pre in Week 4 was 59.1 (=b_0), while the average for Pre, Week 14 was the sum of b_0 and b_1, i.e. 59.1+1.5 = 60.6. For Post, Week 4 the average was the sum of b_0 and b_2, i.e. 59.1+1.6 = 60.7, while for Post, Week 14 the average was the sum of b_0, b_1,b_2 and b_3, i.e. 59.1+1.5+1.6-7.9 = 54.3. As expected, per definition, it is seen that these mean figures are (apart from round-off on the last digit) the same as the simple means reported in Table 3.

Thus, the effect of the intervention on the first WHOQOL-BREF domain was an average difference of -7.9 (=b_3). This difference is, however, not significant (p = 0.399). Furthermore, it is seen that the change in mean for Pre from Week 4 to Week 14 was 1.5 (=b_1), while the difference in mean between Pre and Post in Week 4 was 1.6 (=b_2); however, none of these two figures are significantly different from zero.

Neither for patients or relatives, any intervention (b_3) coefficient was statistically significantly different from zero (p-values from 0.264 to 0.921). This indicates that the intervention did not lead to larger changes from week 4 to week 14 in the Post group than in the Pre group. Further, with two exceptions, none of the b_2 coefficients were significant (p-values from 0.285 to 0.884). This implies

that no systematic differences are in play between the Pre and the Post groups, except for the two domains physical health of the patient and psychological health of the relative, where the significantly negative b_2 coefficients (p=0.035 and 0.058 respectively) indicate that the Post group may on average be in poorer health than the Pre group. Finally, as none of the b_1 coefficients were significant, no significant changes were seen from week 4 to week 14 for all patients on average (p-values from 0.077 to 0.828).

Turning to the differences between patients and relatives WHOQOL-BREF, it is seen for the domain general life quality that the mean difference between patient and relative for Pre in Week 4 was 15.0 (=b_0), while the average for Pre, Week 14 was the sum of b_0 and b_1, i.e. 15.0-3.8 = 11.2. For Post, Week 4 the average was the sum of b_0 and b_2, i.e. 15.0-3.8 = 11.2, while for Post, Week 14 the average was the sum of b_0, b_1,b_2 and b_3, i.e. 15.0-3.8-3.8+2.3 = 9.7. As expected, per definition, it is seen that these mean figures are the same as the simple means reported in Table 3.

Thus, the effect of the intervention on the first WHOQOL-BREF domain was a mean difference of 2.3 (=b_3) between patient and relative. This difference is not significant (p=0.831). Furthermore, it is seen that neither the change in mean difference for Pre from Week 4 to Week 14 (=b_1) nor the mean difference between Pre and Post (=b_2) are significantly different from zero (P-values 0.534 and 0.613 respectively). However, while the effect of the intervention did not deviate significantly between patients and relatives, and while the development from week 4 to 14 did not deviate significantly between patients and relatives, the significant value of b_0 of 15.0 (p-value 0.001) indicates that relatives in general assess life quality lower than patients.No further change occurred until week 14 (as shown by the not statistically significant b_1) or between pre and post groups (as shown by the not statistically significant b_2), and no intervention effect is in play (as shown by the not statistically significant b_3).

For the FFSS domain, it is seen that none of the intervention (b_3) coefficients are significant, thus indicating no intervention effects (p-values from 0.365 to 0.880). Neither are any differences found on average between Pre and Post as indicated by the not statistically significant b_2 coefficients (p-values from 0.499 to 0.952). Finally, on average, no significant changes occurred from week 4 to week 14 (the b_1 coefficients, p-values from 0.368 to 0.829).

Turning to the FHI domains, none of the b_3 coefficients are significant (p-values from 0.654 to 0.983), thus indicating that no intervention effects were in play. Furthermore, none of the b_2 coefficients are significant (p-values from 0.291 to 0.914), thus indicating that the Pre and the Post groups were similar. Finally, as indicated by the not statistically significant b_1 coefficients (p-values from 0.162 to 0.788), no changes were on average found from week 4 to 14.

5. Discussion

Generally, the Difference-in-Difference (DiD) approach did not identify statistically significant differences between the measurements from weeks 4 and 14. This implies that – on average – patient outcomes did not change significantly between the two periods as measured by the three instruments WHOQOL-BREF, FFSS and FHI. Likewise, there were no statistically significant differences between measurement of the patients from the Pre- and Post-tests. This shows that the two patient groups were comparable, and that there were no systematic differences between the two groups. However, the lack of statistical significance may be due to sample size problems as discussed below and may not necessarily preclude clinical relevance of differences.

Given that there was a limited number of subjects to be included in the study, the quasi-experimental designs such as pre-tests post-tests were considered the most appropriate (Thompson & Panachek, 2006). We only succeeded in including 60 patients during the study period, of which 20 received the intervention and because this is the first study investigating the effect of FamHC on health-related quality of life in this specific population, it was not possible to predict the exact number of participants to be included. This leaves a substantial risk of a type-II error. Thus, some of the results reported to be not statistically significant may be so due to the low number of respondents. We did not find the a priori assumed differences in the psychological domain between the two groups, but the subjective scores of overall life quality were slightly higher among patients pre-test compared to post-test (60.5 vs. 54.2). However, with a power of 80% and a 5% significance level, it would require a sample of about 256 patients to detect if a change of this magnitude reflects a deterioration. Given that the outcomes were self-reported, a reporting bias may also be in play. Future studies should consider other study designs such as qualitative interviews with the families to obtain an in-depth knowledge of their experiences of participating in the conversations. Besides, all the conversations were audio recorded and future analysis of the content of the conversations would contribute to a more detailed description of the topics that the families found important to discuss, in order to tailor the FamHC to the exact needs of the families in the future.

Patients diagnosed with glioblastoma often develop cognitive dysfunctions and personality changes. This can make it difficult to participate in research studies (Ford et al 2012). This means some patients were excluded in the context of this project, because they were not able to answer the questions.

As stated above, fewer patients were included in the post-test than in the pre-test period. One reason may be that, according to some families, participation in both the survey and supporting conversations was too overwhelming in the period where patients received concomitant oncological treatment. Corresponding studies also find that it is too stressful for relatives when they are both going to participate filling in extensive questionnaires and therapeutic conversations (Boele et al., 2013).

The period from week 4 to week 14 was chosen because patients in this time period were treated at the hospital and therefore did not need unnecessary transport to the hospital. In addition, we expected that there in this time period would be the most marked change in their family situation. This turned out not to be the case. If the period had been longer, then changes in the family situation might have been more quantifiable. Thus, it has been reported that specialist nurses can contribute as a resource, however, the need for supporting care varies over time and family member's needs and desires for information and sharing their own emotions is wanted at a later stage of the course of the illness (Ford et al., 2012).

Since we decided to use questionnaires, patients with language difficulties and cognitive dysfunction were excluded from participating. We might therefore unintentionally have excluded families where the patient creates the biggest change in the family situation.

It can also be questioned whether a generic outcome such as quality of life is the most proper outcome to evaluate the effectiveness of a specific intervention. When using questionnaires which were developed from the conceptual framework of the Calgary Family Assessment Model Sveinbjarnardottir et al. (2013) found that both patients and family members within acute psychiatric care who received short therapeutic conversations perceived significantly higher cognitive and emotional support from the nurses than patients and family members who received standard care. However, it is to be expected that psychiatric conditions may not deteriorate as

rapidly as tumor conditions, whereby psychiatric patients and their relatives may benefit more from therapeutic conversations than their tumor counterpart, which makes the two populations less comparable.

To fill in three relative extensive questionnaires might have been too exhausting in this period of the patients' lives. It could mean, that some patients might not have reflected on the questions before answering.

For some families, questionnaires could contribute to a discussion of family values and practices, which in itself could be the beginning of a sort of therapy and therefore serve as a study bias. Especially FFSS appears to have an intervening function, since questions initiate a reflection among family members. On the other side the questions were answered by the whole family, and it is required in the FFSS, that there must be consensus before choosing the answers. Therefore, we believe that the responses gave a realistic picture of the family function, strengths and resources (Trivette et al., 1994).

6. Conclusion

The study does not reveal an effect of FamHC on life quality. However, this does not necessarily imply that the intervention might not be helpful and supportive at a later state of the illness trajectory. Nurses need to consider the patient and the family as a unit of care with complex needs that require possibilities to listen to and understand one another's feelings, thoughts and experiences with the critical illness glioblastoma multiforme.

7. Relevance to clinical practice

The study adds to the growing evidence-based knowledge on FamHC and their potential use in different cultural contexts among families experiencing critical illness. It has not been possible to find comparable studies that have obtained the effect of therapeutic conversations on families suffering from glioblastoma multiforme using a quantitative method. However, there are studies with a qualitative approach that demonstrate a positive effect. In these studies, patients have a different diagnosis (Östlund et al., 2016; Dorell et al., 2017). In future studies in the field it is recommended that the families themselves choose when the therapeutic conversations will take place during the course. At the same time, families must be included even though the patient is too weak to participate, as it is assumed that these families most need the conversations. Finally, the effects of therapeutic conversations could also be considered using a qualitative approach.

Conflict of interest

None

Ethical considerations

The study conforms to the principles outlined in the Declaration of Helsinki II (World Medical Association, 2001). Participation was voluntary, and all patients gave written informed consent before the inclusion. Permission was obtained from the patient prior to the involvement of his/her family members. Both patients and family members gave their written consent to the tape-recorded conversations to be used for research purposes. Inclusion numbers and accompanying personal data were kept safe according to the current rules of the Danish data protection agency. Only clinically approved questionnaires with questions that have been used among a normal population and psychiatric patients were used.

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Figure 1. Overview of patient flow

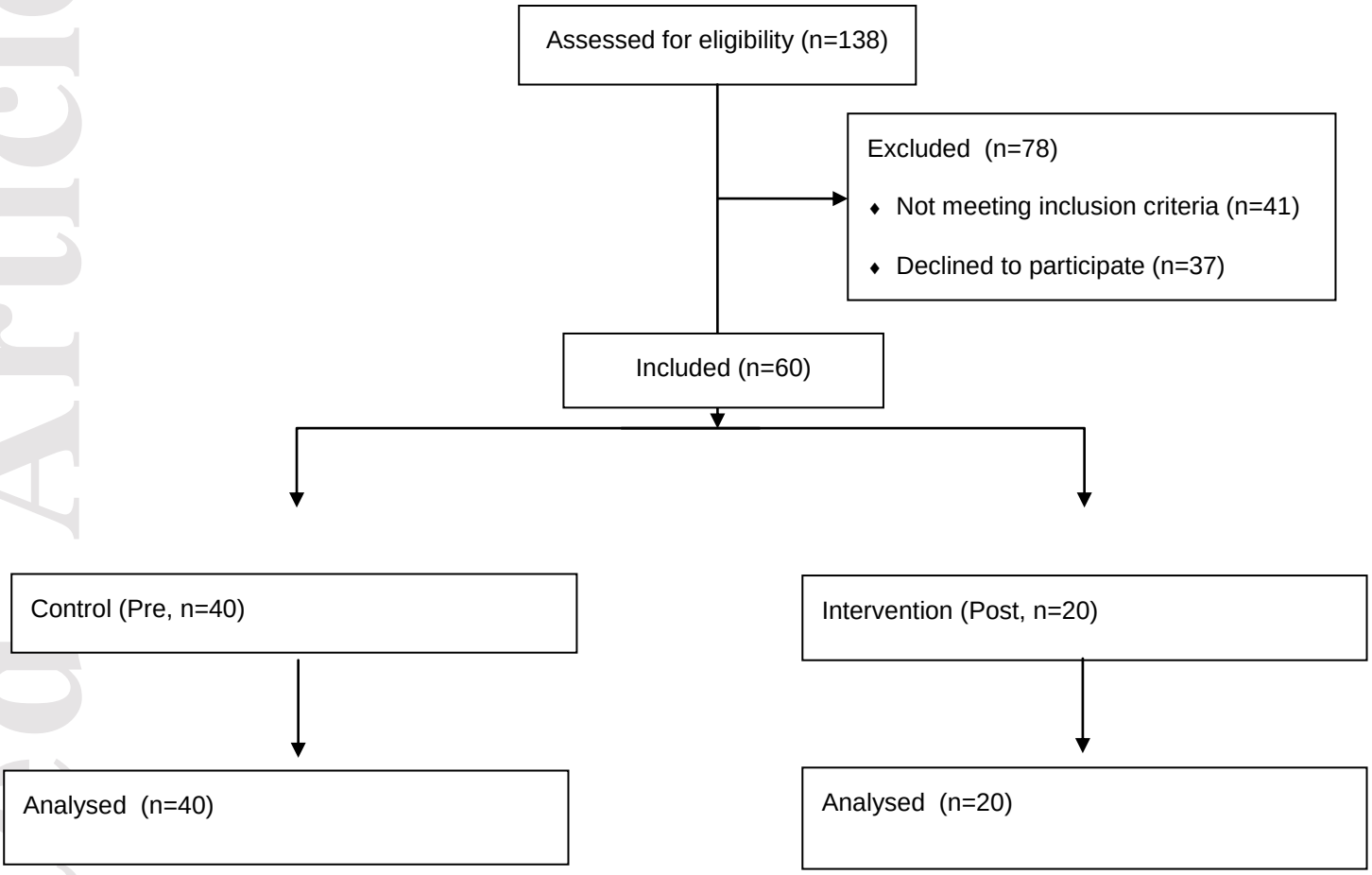

Table 1. Distribution of patients according to inclusion and demography.

Pre:				Post:		
	Included	Excluded	Did not wish to participate	Included	Excluded	Did not wish to participate
Population	n=40	n=20	n=13	n=20	n=21	n=24
Age (mean)	66.4	65.4	67.3	68.1	70.1	66.7
Age (Std)	10.4	15.9	12.4	10.6	10.3	11.4
Female	10 (25%)	11 (55%)	3 (23%)	8 (40%)	7 (33%)	11 (46%)
Male	30 (75%)	9 (45%)	10 (77%)	12 (60%)	14 (67%)	13 (54%)

Table 2. Confounders Pre and Post, Week 14.

	Community Nurse	Ergo therapist	Physio therapist	Social Worker	Psychologist	Medical Practitioner	The Danish Cancer Society	Brain Injury Association	Brain Tumor Association	Specialized Intensive Rehabilitation (project)	Other
Pre, Week 14 N=40	9 (23%)	4 (10%)	6 (15%)	8 (20%)	3 (8%)	14 (35%)	10 (25%)	0	2 (5%)	5 (13%)	8 (20%)
Post, Week 14 N=20	4 (20%)	7 (35%)	8 (40%)	6 (30%)	2 (10%)	8 (40%)	6 (30%)	1 (5%)	1 (5%)	2 (10%)	3 (15%)

Table 3. Cronbach Alphas, means, and standard deviations for domains.

	All	Pre, Week 4		Pre, Week 14		Post, Week 4		Post, Week 14	
	Cronbach Alpha	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
WHOQOL-BREF scales (patient) (Cronbach Alpha=0.77):									
Overall life quality	0.47	59.1	22.5	60.5	19.8	60.6	19.6	54.2	20.6
Physical health	0.45	66.2	10.7	62.5	11.2	59.1	15.7	59.3	11.3
Psychological	0.64	71.3	13.4	68.8	14.5	72.8	14.5	68.8	9.7
Social relationships	0.32	74.8	14.2	69.1	13.9	78.8	14.4	75.7	12.2
Environment	0.38	67.2	11.7	65.3	10.8	66.8	8.9	66.9	8.5
WHOQOL-BREF scales (relative) (Cronbach Alpha=0.86):									
Overall life quality	0.60	74.1	16.4	71.7	20.5	71.9	20.2	63.9	26.4
Physical health	0.56	69.6	11.0	69.0	10.3	66.2	10.8	66.1	14.9
Psychological	0.77	75.6	11.0	71.6	13.2	68.3	17.4	70.6	16.6
Social relationships	0.56	75.2	13.9	69.6	16.8	78.8	14.7	74.0	15.8
Environment	0.51	69.9	11.6	68.4	11.1	69.1	11.1	69.3	10.2
WHOQOL-BREF scales (difference patient minus relative):									
Overall life quality	-	15.0	26.7	11.2	26.3	11.3	29.2	9.7	26.6
Physical health	-	3.5	14.6	7.0	11.3	7.1	20.0	6.8	14.4
Psychological	-	4.4	15.7	2.4	16.3	-4.5	21.5	1.8	17.7
Social relationships	-	0.4	18.7	0.9	18.6	0.0	15.8	-1.7	13.9
Environment	-	2.8	14.2	3.8	12.6	2.3	12.5	2.4	9.0
FFSS scales (Cronbach Alpha=0.81):									
Interactional patterns	0.53	80.9	14.8	82.4	12.8	80.6	13.8	79.3	11.5
Family values	0.80	93.4	8.4	92.6	7.9	91.9	10.0	92.3	12.4
Coping strategies	0.52	61.3	16.2	60.4	16.9	64.4	17.8	57.4	17.0
Family commitment	0.30	87.5	12.4	86.8	13.9	85.8	12.7	86.0	15.2
Ressource mobilization	0.23	60.9	17.5	64.8	19.2	61.3	21.4	64.0	18.2
FHI overall scale:									
FHI	0.73	46.5	6.3	45.0	7.5	47.2	4.9	45.6	4.8
FHI four item scale:									

Co-oriented commitment	0.59	21.1	2.3	20.3	3.1	20.8	1.7	19.7	2.1
Confidence	0.53	10.6	1.8	10.4	2.2	10.2	1.6	10.3	1.9
Challenge	0.82	11.0	3.6	10.0	3.6	12.0	2.8	11.1	2.6
Control	0.06	3.8	1.8	4.3	1.7	4.3	1.4	4.6	1.9
FHI three item scale:									
Commitment	0.53	20.9	2.3	20.2	3.2	20.5	1.7	19.5	1.7
Challenge	0.80	13.7	3.8	12.7	3.8	14.7	2.8	13.7	3.0
Control	0.34	11.9	2.5	12.1	2.7	12.0	2.2	12.4	2.7

Table 4. Difference-in Difference (DiD) regression coefficients and P-values for domains.

	Intercept (b0)		Week 14 (b1)		Post (b2)		Post*Week 14 (b3)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
WHOQOL-BREF scales (patient):								
Overall life quality	59.1	<0.001	1.5	0.757	1.6	0.785	-7.9	0.339
Physical health	66.1	<0.001	-3.6	0.187	-7.0	0.035	3.8	0.426
Psychological	71.3	<0.001	-2.4	0.430	1.6	0.674	-1.5	0.776
Social relationships	74.8	<0.001	-5.6	0.077	4.0	0.299	2.6	0.636
Environment	67.2	<0.001	-1.9	0.431	-0.4	0.884	2.5	0.629
WHOQOL-BREF scales (relative):								
Overall life quality	74.1	<0.001	-2.4	0.608	-2.2	0.693	-5.6	0.482
Physical health	69.6	<0.001	-0.6	0.828	-3.4	0.285	0.5	0.921
Psychological	75.6	<0.001	-4.0	0.209	-7.3	0.058	6.3	0.264
Social relationships	75.2	<0.001	-5.6	0.111	3.5	0.401	0.9	0.886
Environment	69.9	<0.001	-1.6	0.536	-0.9	0.773	1.8	0.685
WHOQOL-BREF scales (difference patient minus relative):								
Overall life quality	15.0	0.001	-3.8	0.534	-3.8	0.613	2.3	0.831
Physical health	3.5	0.135	3.5	0.299	3.6	0.374	-3.9	0.517
Psychological	4.4	0.113	-1.9	0.626	-8.9	0.064	8.2	0.242
Social relationships	0.4	0.881	0.5	0.900	-0.4	0.931	-2.2	0.753
Environment	2.8	0.174	1.0	0.730	-0.5	0.896	-0.9	0.858
FFSS scales:								
pattern	80.9	<0.001	1.4	0.642	-0.3	0.933	-2.8	0.608
values	93.4	<0.001	-0.8	0.688	-1.6	0.537	1.2	0.736
coping	61.3	<0.001	-0.9	0.816	3.1	0.499	-6.1	0.365
commit	87.5	<0.001	-0.7	0.829	-1.7	0.651	0.9	0.874
resource	60.9	<0.001	3.9	0.368	0.3	0.952	-1.1	0.880
FHI overall scale:								
FHI	46.5	<0.001	-1.4	0.315	0.7	0.698	-0.1	0.983
FHI four item scale:								
Co-oriented commitment	21.1	<0.001	-0.8	0.162	-0.3	0.657	-0.3	0.754

Confidence	10.6	<0.001	-0.2	0.643	-0.5	0.373	0.3	0.654
Challenge	11.0	<0.001	-0.9	0.214	1.0	0.291	0.1	0.966
Control	3.8	<0.001	0.5	0.216	0.5	0.318	-0.2	0.829
FHI three item scale:								
Commitment	20.9	<0.001	-0.6	0.261	-0.4	0.560	-0.3	0.779
Challenge	13.7	<0.001	-1.0	0.231	1.0	0.303	-0.1	0.983
Control	11.9	<0.001	0.2	0.788	0.1	0.914	0.3	0.799