

The developing role of the neuro-oncology nurse: A Dutch perspective

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Patients with gliomas—the most common primary malignant brain tumour—are confronted with a disease with a poor outlook and with little chance of a cure. Survival of these patients depends on a number of independent prognostic factors including age, neurological condition, cognitive function, tumour type and tumour size (Taphoorn and Klein, 2004). Clinically patients may suffer from headache, seizures, poor cognition and focal symptoms such as as aphasia, hemiparesis or hemianopia. Treatment options include radiotherapy, chemotherapy or a combination of the two; treatments usually affect physical, cognitive and emotional functioning and quality of life (Heimans and Taphoorn, 2002).

Specialist nurses can play a key role in these matters by guiding patients and their family carers from diagnosis until death, paying attention to the side effects of treatment and having an influence on quality of life using evidence-based guidelines and supportive care. An evaluation of a nurse-based follow up in an outpatient oncology practice (Graham and Cloughesy, 2004) showed that the outpatient workload for physicians was estimated to

decrease by 30%. Knowledge of brain tumours, understanding the significance and causes of impairments, disabilities and handicaps that patients endure from the disease and the treatment is the basis of performing good care (Graham and Cloughesy, 2004; Remer and Murphy, 2004).

Daily activities of the specialist nurse in neuro-oncology

The aim of a consultation with the specialist nurse is to discuss and advise on clinical and psychosocial matters. Questions that occur after the visit to the physician can be answered. Feelings, such as sadness in the case of bad news or relief if an MRI scan showed a response, can be addressed, or the specialist nurse can explain again the core information given by the doctor.

The specialist nurse informs the patient and family carers about signs and symptoms of the disease, about anti-epileptic drugs, corticosteroids and their side effects, how to cope with epilepsy and loss of function, and assesses the aetiology of cognitive dysfunction and fatigue. Is it from the chemotherapy or other co-medication, radiotherapy treatment or the location of the tumour? Is the patient complaining about sleep disturbance? How is his appetite? Is he feeling sad, anxious or distressed? Counselling by the specialist nurse can be helpful and is focused on diagnosis, impact of the disease and its symptoms and dealing with loss of health and of functioning. The specialist nurse can help to teach patients and their carers about more effective coping skills which can ease the burden and diminish anxiety. Additionally, the specialist nurse can refer the patient and family carer to a psychologist or social worker, or to speech and language therapists, physiotherapists and palliative care.

Specialist nurses coordinate patient care, and by doing that contribute to effective continuity of care, as they are easy accessible for the patient. Tivoli et al (2005) showed that a specialist nurse, as part of a multidisciplinary team, can help increase patient confidence and can make information available for the medical team.

Patients or family carers can reach the specialist nurse by phone to discuss new symptoms, side effects or neurological deterioration, meaning that medication adjustment or a scan can be made sooner. If patients do not attend the outpatient clinic because of the decision to stop treatment

ABSTRACT

This article describes the role of specialist nurses in care, cure and research for patients with brain tumours in the Netherlands. The responsibility of the specialist nurse is management of care during the disease process and its treatment and includes patient education, symptom management and follow-up. Re-allocation of tasks and responsibilities has led to the function of the nurse practitioner, who is responsible for medical treatment with oral chemotherapy. Nursing research in neuro-oncology is focused on specialist nurse functions, which conclude that most patients and relatives value specialist nurse support highly. This article discusses nursing research in relation to symptom clustering which is defined as symptoms that occur simultaneously, cluster together and, as a result, influence outcome such as quality of life, health status and functional status, important outcomes in neuro-oncology clinical trials. Finally, the development and validation of self-report measure instruments for these symptoms resulted in use in randomized controlled trials is explored.

Key words

■ Neurological systems and disorders ■ Nursing roles ■ Nursing research

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or if the end of life is near, the specialist nurse can phone the patient every 3–4 weeks to evaluate the situation and to advise on palliative care.

Other responsibilities of specialist nurses include participation in randomized clinical trials by taking care of informed consent, data management and by performing neurological investigations, mini-mental state exams and neurocognitive testing.

The neuro-oncology clinic

A specialist nurse role for patients with brain tumours was initiated at The Medical Center in the Hague in June 2001. Clinics were held each Monday so that patients with primary brain tumours and brain metastases could meet with the multidisciplinary team consisting of neuro-oncologists, radiotherapists, neurosurgeons, neuro-psychologist and the specialist nurse. Patients were then discussed in the weekly neuro-oncology board meeting.

Task reallocation is the process by which certain duties and responsibilities, which previously fell exclusively to medical staff, are reassigned to other health professionals such as the nurse practitioner and the physician assistant. In this outpatient clinic, the role of the specialist nurse has been extended over the years and has developed into the role of nurse practitioner. Through training, education and experience the nurse practitioner gained responsibility for treating patients with temozolomide (TMZ) using a protocol (Figure 1). This role includes prescription of chemotherapy, anti-emetics and other necessary co-medications. The neuro-oncologist acts as supervisor. In evaluating the toxicity of TMZ, the nurse practitioner decides on dose-delay and dose-adjustment by protocol. She can also perform neurological exams to evaluate a patient's condition and discuss her findings with the attending physician. Research into TMZ toxicity has optimized guidance and treatment of patients receiving using evidence-based practice guidelines.

Nurse-led temozolomide clinic

When a patient is started on anti-tumour therapy, the physician discusses the intended course of treatment with the patient, and refers the patient to the nurse practitioner for further explanation. The nurse discusses temozolomide treatment, its side effects and how the treatment will be evaluated with the patient. After referral to start temozolomide, the nurse practitioner instructs and evaluates patients during neo-adjuvant, adjuvant or recurrent treatment of TMZ. She plays a crucial role in the administration of chemotherapy cycles, the control of laboratory results and in deciding and carrying out of interventions. The nurse practitioner questions the patient or carer about any previous side effects before the start of each cycle and evaluates laboratory results of the blood counts. Fever, nausea or vomiting, fatigue, rash, constipation, headache and seizure are discussed with the patient. Before administering the next cycle the nurse practitioner advises and intervenes according to guidelines and protocols. She can decide on and carry out the necessary interventions, e.g.

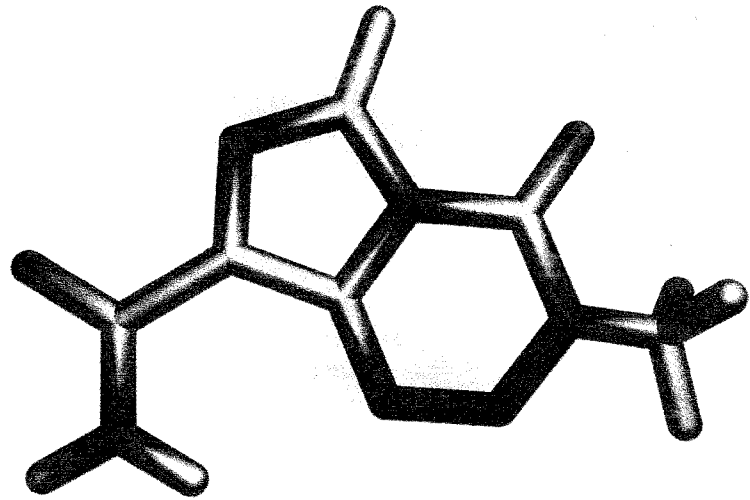


Figure 1. Computer model of a molecule of temozolomide. Atoms are represented as rods and are colour-coded: carbon (yellow), hydrogen (white), nitrogen (blue) and oxygen (red).

administration of growth-factor support, prescribing prophylactic antibiotics or administration of thrombocyte suspensions. The progress of treatment will be documented in the medical files. When toxicity occurs and is not resolved by dose-delay or dose-reduction, the nurse practitioner participates in the discussion to discontinue TMZ treatment if necessary. After two or three cycles, the patient will have a magnetic resonance imaging (MRI) to evaluate the patient's response to the TMZ. The results of the scan and the evaluation of the neurological condition will be discussed by the patient's neuro-oncologist and the nurse practitioner.

Case report of thrombocytopenia

Sometimes patients do not fit into the medical protocol, because of a pre-existing comorbidity, such as renal transplantation and the use of immune-suppressing medication or Korsakov's syndrome. When this occurs, the nurse practitioner discusses this with the medical oncologist. This case report concerns a 51-year-old male with a history of alcohol abuse which resulted in amnesic syndrome and forced institutionalization in a nursing home. He underwent a resection for an anaplastic astrocytoma in 1995, and received radiotherapy afterwards. In 2006 there was tumour recurrence and the patient wished to start temozolomide treatment. The patient was referred to the nurse practitioner and she identified an existing thrombopenia.

The medical oncologist asked her to arrange several diagnostic tests to confirm existence of splenomegaly which could explain the existing thrombopenia. Also there was need to exclude the existence of possible portal hypertension with oesophageal varices. Without varices

the patient was put on a regimen of temozolomide 100 mg per day, for 5 days every 4 weeks. The patient received 12 cycles of temozolomide without irreversible toxicity. He remains stable as monitored by MRI, and no further treatment has been necessary.

Nursing research

Searching PubMed for neuro-oncology nursing research using search terms 'nursing', 'brain tumour' and 'gliomas', several publications were found, mainly from the USA, the UK and some Scandinavian countries. This is probably due to the development of more extended roles and education of nurses in these countries. As described before, Graham and Cloughesy (2004) investigated specialist nurse functions in an outpatient clinic with a favourable outcome. Spetz et al (2005), in a qualitative study, investigated the kind of relationships a specialized nurse in neuro-oncology can fulfil. The study highlighted nurses' easy accessibility and professionalism as vital. Furthermore, Davies and Higginson (2003), in their literature review, conclude that there is evidence from observational studies that suggests that patients with primary brain tumours need individually tailored communication and information, as well as specialist support. Their conclusion is that most patients and relatives highly value specialist nursing support.

Symptom clustering is defined in nursing science as symptoms that occur simultaneously, cluster together and as a result, influence quality of life, health status and functional status outcomes. Fox et al (2007) identified two clusters of symptoms in patients with brain tumours. The first cluster was depression, fatigue, sleep disturbance and cognitive impairment related to quality of life, and the second was pain related to functional status. Armstrong et al (2004) showed that symptom clusters can give direction

to nursing research in providing new strategies for assessment of symptoms and necessary interventions.

Armstrong et al (2005) later developed and validated a self-report measure instrument, the M.D. Anderson Symptom Inventory Brain Tumour Module. It measures symptoms commonly associated with cancer therapies those associated with increased intracranial pressure and those related to focal deficits. The inventory includes ratings of how symptoms interfered with different aspects of a patient's life in the previous 24 hours. It is being used in a companion study of the RTOG 0525 trial (Table 1) looking at clinical benefit of treatment in terms of symptoms and neurocognitive function.

Dutch nursing practice

The specialist nurse and nurse practitioner participate in randomized controlled trials and can perform nursing research, initiated by questions arising from nursing care such as what interventions will improve quality of life how to create and protect hope, paradigms of symptom and symptom clustering. Questions may also arise from shared responsibility for tumour treatment, such as toxicity of TMZ, identifying risk factors for myelosuppression and evaluating the ability of patients and carers to report symptoms.

Van Eck (2005) adjusted a developed guideline for fatigue for patients with cancer and made it appropriate for patients with primary brain tumours. She defined fatigue in patients with primary brain tumours and stated that because of the specific neurological aetiology of fatigue, this original guideline demanded specific interventions. The Dutch National Working Group of Neuro oncology Nurses is implementing this adjusted guideline for its patients.

Eland (2006) interviewed patients and carers and used the Mini-Mental State Examination, Karnofsky Performance Score, the Hospital Anxiety and Depression Scale and the Quality of Life Questionnaire-C30-Brain Tumour Module-N20 (QLQ-C30-BN 20) to determine the impact of diagnosis of a high-grade glioma. She found that the patients and their carers describe and expect 'good' care to be friendly, patient, understanding and attentive to the patient and their carer throughout the whole process, from diagnosis until death.

Zwinkels (unpublished observations, May 2008) investigated the toxicity of TMZ in patients with brain tumours, comparing standard (200 mg/m²/day every 5 of 28 days) and dose-intense (75 mg/m²/day every 21 of 28 days) schedules which were carried out in the nurse-led clinic. Special attention was given for nursing interventions, i.e. dose-delay, dose-reduction, prescription of growth factor support (GFS) (pegfligrastrim, Neulasta) *Pneumocystis carinii* pneumonia (PCP) prophylaxis and thrombocyte transfusions, or adjustment of antiemetics. Toxicity recordings included blood counts according to the National Cancer Institute's (2003) Common Terminology Criteria for Adverse Events (version 3.0 (Table 2). Of observed toxicities during 6 cycles, throm

Table 1. The RTOG 0525 trial

A phase III trial of 834 people comparing conventional adjuvant temozolomide (TMZ) with dose-intense temozolomide in patients with newly diagnosed glioblastoma.

Treatment will be as follows:

Radiation (60 Gy in 2 Gy fractions) concurrent daily TMZ (four times daily for 49 days maximum)

Followed by:

- Arm 1 (Standard Arm): TMZ days 1-5 of 28-day cycle; 6 cycles*
- Arm 2 (Experimental Arm): TMZ days 1-21 of 28-day cycle; 6 cycles*

More information on this trial is available at:

www.cancer.gov/clinicaltrials/RTOG-0525

* Up to 12 cycles may be given if the patient demonstrates continued improvement on MRI scan, decreasing corticosteroid requirement, improvement in performance status or improvement in neurological function

Table 2. National Cancer Institute criteria for adverse events of blood/bone marrow, grades I–IV

Cell type (normal range*)	Grade I	Grade II	Grade III	Grade IV
Leucocytes 4–11 x 10 ⁹ per litre	<3 x 10 ⁹ per litre	<3–2 x 10 ⁹ per litre	<2–1 x 10 ⁹ per litre	<1 x 10 ⁹ per litre
Neutrophils 2–7.5 x 10 ⁹ per litre	<1.5 x 10 ⁹ per litre	<1.5–1 x 10 ⁹ per litre	<1–0.5 x 10 ⁹ per litre	<0.5 x 10 ⁹ per litre
Lymphocytes 1.5–4 x 10 ⁹ per litre	<0.8 x 10 ⁹ per litre	<0.8–0.5 x 10 ⁹ per litre	<0.5–0.2 x 10 ⁹ per litre	<0.2 x 10 ⁹ per litre
Thrombocytes 150–400 x 10 ⁹ per litre	<75 x 10 ⁹ per litre	<75–50 x 10 ⁹ per litre	<50–25 x 10 ⁹ per litre	<25 x 10 ⁹ per litre

* Normal ranges vary. Ranges given are those used by the haematology laboratory, Royal Marsden Hospital, London, UK. From: National Cancer Institute, 2003.

thrombopenia grade 3–4 was most frequently seen in standard-dose schedules (20–23%). Neutropenia and subsequent interventions occurred more frequently in the standard-dose group (39%). If treated for a longer time with TMZ, lymphopenia grade 3–4 occurred significantly more often in dose-intense schedules (36%) necessitating the need for PCP prophylaxis.

Dose-delay because of both thrombopenia and neutropenia during first 6 cycles was more frequently seen in standard-dose schedules, so there was dose-reduction following thrombopenia or neutropenia. This study has shown that the degree of toxicity using a standard-dose or dose-intense schedule was similar to observations in other studies and that occurrence of toxicities has led to decisions on necessary interventions by the nurse practitioner.

Conclusions

Neuro-oncology nursing is a specialty in nursing, and in neuro-oncology it has a focus on clinical care and anti-tumour therapy, symptom care and research activities. Nurses can play a key role in care and cure of patients with brain tumours in monitoring and managing symptoms of the disease and side effects of its treatment. They are easy accessible for patients and their family carers and are in a position to communicate occurring problems with responsible physicians.

Nursing research should be focused on which interventions can be assessed to improve nursing care and education. Development of guidelines for oral chemotherapy with special attention for the influence of dose-delay and dose-reduction on quality of life can perhaps contribute to improvement of care. BJNN

Conflict of interest: none declared.

Armstrong TS, Cohen MZ, Eriksen LR, Hickey JV (2004) Symptom clusters in oncology patients and implications for symptom research in people with primary brain tumors. *J Nurs Scholarsh* 36(3): 197–206

Armstrong TS, Cohen MZ, Eriksen L, Cleeland C (2005) Content validity of self-report measurement instruments: an illustration from

- the development of the Brain Tumor Module of the M.D. Anderson Symptom Inventory. *Oncol Nurs Forum* 32(3): 669–76
- Davies E, Higginson IJ (2003) Communication, information and support for adults with malignant cerebral glioma: a systematic literature review. *Support Care Cancer* 11(1): 21–9
- Van Eck C (2005) Development of a Nursing Guideline: Interventions for Fatigue in Adult Patients with Primary Brain Tumours. Masters thesis, University of Advanced Nursing Practice, Utrecht
- Eland M (2006) The Impact of the Diagnosis of a High-grade Glioma on Patients, Their Families and Caregivers and its Implication for Their Need for Care. Masters thesis, University of Advanced Nursing Practice, Rotterdam
- Fox SW, Lyon D, Farace E (2007) Symptom clusters in patients with high-grade glioma. *J Nurs Scholarsh* 39(1): 61–7
- Graham CA, Cloughesy TF (2004) Brain tumor treatment: chemotherapy and other new developments. *Semin Oncol Nurs* 20(4): 260–72
- Heimans JJ, Taphoorn MJ (2002) Impact of brain tumour treatment on quality of life. *J Neurol* 249(8): 955–60
- National Cancer Institute (2003) Common Terminology Criteria for Adverse Events, Version 3.0. <http://ctep.cancer.gov/forms/CTCAEv3.pdf> (accessed 16 June 2008)
- Remer S, Murphy ME (2004) The challenges of long-term treatment outcomes in adults with malignant gliomas. *Clin J Oncol Nurs* 8(4): 368–76
- Spetz A, Henriksson R, Bergenheim AT, Salander P (2005) A specialist nurse-function in neurooncology: a qualitative study of possibilities, limitations, and pitfalls. *Palliat Support Care* 3(2): 121–30
- Tivoli B, Sanchez B, Tardieu S, Metellus P, Sambuc R, Chinot O (2005) Participation in the national experiment of cancer diagnosis disclosure in neuro-oncology: implications and the perception of the health care team [in French]. *Bull Cancer* 92(4): 373–80

KEY POINTS

- Patients with brain tumours are facing a a disease with a poor perspective and little chance of a cure
- Nurses play a key role in care and cure of patients with brain tumours in monitoring and managing symptoms of the disease and side effects of treatment
- Nursing research until recently has focused on specialist nurse functions, symptom research and measure instruments
- Nursing research should be focused on which interventions can be assessed to improve nursing care