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In This Issue:

Editorial

Editor - Vicki Evans

This edition gives rise to several interesting articles that will have an impact on neuroscience nursing care.

Firstly, an article on nurse suturing which will expand the scope of neurosurgical advanced practice and drain care.

Then there is a literature review on adult pilocytic astrocytomas, an interesting article as this is predominantly a neoplasm in the paediatric population, but not always!

The next manuscript was a prize winning lecture from the 2011 ANNA Conference, centred around ventricular peritoneal shunts, usage and a case presentation.

We are lucky to have a number of submissions from international neuroscience nurses and conference reports. This connection builds networks and advances neuroscience collaboration.

The following Guest Editorial is from the President of the Japanese Association of Neuroscience Nurses—Mitsue Ishiyama. She presents a history of Japan and encourages you to attend the World Federation of Neuroscience Nurses Congress which will be held in the Gifu Prefecture, Japan 2013. Whilst the 2010 earthquake and resultant tsunami wreaked havoc to the northern parts of Japan in particular, Gifu was largely unscathed. The Japanese have spent considerable time and effort into rebuilding their beautiful land for you to visit.

Enjoy reading!

Cheers, Vicki

Guest Editorial

Mitsue Ishiyama

Japan — 2013 Congress — Welcome!

Japan is surrounded by the Pacific Ocean, the Sea of Japan and the South China Sea. There are four seasons in Japan, changing the flowers, trees (beautiful cherry blossoms), people's clothes and food.

The history of Japan has been long, starting with the Samurai Period in A.D. 1000, where 'Bushido' and 'Zen in Buddhism' were born. Now, Japan is a more modern, economic power.

Japanese people love the historical and beautiful environments, but they were destroyed by the huge earthquake, tsunami and resultant nuclear power plant accident - March 11, 2011. Approximately 16,000 people died and over 3,000 people are still missing. Many still live in temporary housing. However, there has been a massive effort to rebuild and reconnect knowing the importance of bonds between people.

We are delighted that the 11th World Federation of Neuroscience Nurses, Quadrennial Congress will be held at the Nagaragawa Convention Centre, Gifu Japan 13th - 16th September 2013. The 1st WFNN Congress was held in Tokyo 40 years ago!

There will be a Neuroscience lecture showcasing Japanese frontier technology, recovering consciousness, workshops, hospital tours., as well as Japanese traditional events and sightseeing. Gifu has beautiful mountains, rivers and historical places. You can enjoy 'Ukai' at Nagara River which is near the venue. 'Ukai' is a Japanese traditional fishery and began 300 years ago and cormorant fisherman will demonstrate fishing with cormorants, a unique experience. You can also see 'Gifu castle' from the venue and catch the cable car to the mountain top.

Gifu is in the centre of Japan, 2 hours from Tokyo, 1hr from Japan International Airport by express train. Travel information will be provided, including the use of a shuttle bus at

Gifu station for the period of the Congress. Japanese people are kind, polite and proud of their culture. Our wish is that you can enjoy coming to Japan and participating in the WFNN Congress. The theme of the 11th WFNN Congress is 'Integration' of Knowledge, Skill, Clinical Practice and Education". Neuroscience nurses from across the world will present their research allowing for increased knowledge, networking opportunities and catching up with friends, all creating an enriching experience!

We will entertain you with our hospitality and culture and look forward to welcoming you to historical and beautiful Japan!

Mitsue Ishiyama
President,
Japanese Association of Neuroscience Nurses.

Book Reviews

By **Dr Jacqueline Baker,** Senior Lecturer. Faculty of Nursing, Midwifery & Health. University of Technology, Sydney.

Darlington, C. 2009, 'The Female Brain', 2nd ed, CRC Press, Boca Raton, USA.

I picked up this book with some scepticism as I thought it might be another book like 'Men are from Mars and Women are from Venus' or 'Why men don't listen and women can't read maps'! Such books are fun to read, however, they provided little evidence for conclusions. Darlington's book does provide this evidence, which is based on a formal examination of the structural and functional evidence of the differences in the female and male brain.

Topics covered in the book include the brain structure; functional differences between the female and male brain; perception and cognition; the different usage of the cerebral hemispheres; and in the final chapters the examination of selected diseases processes, pharmacokinetics and pharmacodynamics. In concluding, Darlington indicates that there is research evidence to support differences between the female and male brain, including structure and function, susceptibility to neurological disorders and the response to neuroactive drugs.

Nevertheless, this book is not for the faint hearted! To fully appreciate the discussion you require a sound understanding of neuroanatomy, neurophysiology and, in particular, neurochemistry including neurotransmitters and neuromodulators in order to understand fully the discussion. In addition, it will help to have an understanding of research processes such as experimental designs.

For me, the best aspect of this book was seeing that there are practical allocations in the management of female patients with neurological disorders. Whether it is increased risk that might exist with some diseases or how the 'female brain' responds to different drug therapies, there is a practical knowledge for the neuroscience nurse. I will conclude with a quote from the end of the book: "Differences are to be celebrated. They make life rich and exciting. The differences between the female brain and the male brain are just more examples of the enriching diversity of our species" (p. 242).

"A Stitch in Time!" Nurses suturing post neurosurgical drain removal.

Kylie Wright

Abstract

External ventricular, subdural, and lumbar drains used in neurosurgery require the site to be sutured after drain removal to prevent cerebrospinal fluid (CSF) leak and cerebral infections. Historically the suturing has been the responsibility of medical staff.

Clinical review identified that neurosurgical patients at Liverpool Hospital had experienced delays (mean=9 hours, range= 5.5-24 hours) in drain removal and site suturing once removal was deemed appropriate. The impact was significant in terms of patient discomfort, loss of independence and the notably increased risk of complications associated with prolonged immobilisation due to mandatory bed rest until drain removal.

An innovative project overcame traditional barriers to advancing nursing practice, enabling registered nurses to gain accreditation for the procedure of suturing drain sites after neurosurgical drain removal. The overall objective of the project was to minimise patient immobility and maximise opportunities to improve patient outcomes through timely drain removal and site suturing. The prospect of expanding the level of nursing practice within the unit utilising an expanded skill set was an additional benefit. During the first phase of the project, 47% of drain sites were sutured by nurses. Of these, 100% of drains were removed and sites sutured within the two hour benchmark, and with a zero infection rate.

This paper outlines the development, planning and implementation of a nurse-led drain site suturing project, including education and evaluation. The project demonstrated that this model of care is transferable, creates professional development opportunities, enhances service delivery and maximises patient outcomes.

Key Words: Suturing, Neurosurgical drains, Advanced practice

Introduction

Drains are commonly inserted following neurosurgical procedures. External ventricular drains, subdural drains, and lumbar drains are frequently seen in the neurosurgical patient population and their appropriate management, interpretation of their performance and removal are issues of concern.

Placement of such drains is accepted medical therapy for the treatment or prevention of various post traumatic or post operative events (Greenberg, 2010). External ventricular drains (EVDs) are inserted to relieve pressure from within the cranial vault by releasing cerebro-spinal fluid (CSF). Subdural drains are placed after evacuation of subdural haematoma to prevent re-accumulation of fluid.

Questions or comments about this article should be directed to Kylie Wright, CNC Neurosurgery Liverpool Hospital, NSW at kyliem.wright@sswahs.nsw.gov.au

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Lumbar drains allow the continuous drainage of CSF from the subarachnoid space to manage dural fistulas, shunt infections, and for the diagnostic evaluation of idiopathic normal pressure hydrocephalus (American Association of Neuroscience Nurses, 2007).

The distal tips of these drainage devices are sitting in a ventricle, subdural or subarachnoid space within the brain. When they are removed, it is common practice that the old drain site be sutured closed to prevent CSF leak and/or cerebral infections such as meningitis (Jennett and Lindsay, 1994; Woodward, 2009).

Historically at Liverpool Hospital, a tertiary referral hospital in Sydney, New South Wales (NSW) Australia, the suturing of these drain sites has been the responsibility of the medical staff, and it is believed that this is the current practice of many neurosurgical units Australia wide.

The Clinical Problem

Through the process of clinical incident monitoring and review, it was identified that most neurosurgical patients at Liverpool Hospital were waiting extended periods of time to have drains removed due to a shortage of experienced medical staff able to undertake the suturing following drain removal. The neurosurgeons were not supportive of interns rotating through the neurosurgical specialty performing the suturing until they had been deemed competent by the more senior neurosurgical registrars as they often had minimal suturing experience and little knowledge of neurosurgical drain use. The practicality of this situation was challenging given the limited time neurosurgical registrars had to teach and deem the interns competent within their ten week placement in the neurosurgical specialty.

Current practice in the unit was for post operative drain removal and suturing to be ordered following patient review during the routine morning rounds. Like most busy neurosurgical units, the registrars were often unavailable, as they were fulfilling commitments in the operating theatres, clinics, or consulting and were frequently away from the unit when the drains were to be removed. In most cases these drains were therefore not removed until late in the evening when the registrar had finished his/her daily duties and then had time to perform a closing suture.

The impact of this practice on patients was of concern to the nursing staff, in particular patient discomfort, loss of independence and the increased risk of the complications associated with prolonged immobilisation due to mandatory bed rest until drain removal.

A critical incident occurred where the patient's drain removal was delayed 24 hours. The impact on this patient was considerable in terms of patient dissatisfaction and impeded initiation of mobility, physiotherapy and independence. This caused frustration amongst the nursing and allied health staff because the drain was ready to be removed but no one was available to suture the site and hence the team could not progress the patient's recovery. In addition, the neurosurgeon managing the patient was dissatisfied that drain removal had been delayed so long.

To improve practice in the unit, a reference group of senior clinicians consisting of the Neurosurgical Clinical Nurse Consultant (CNC), Nursing Unit Manager (NUM), Senior Neurosurgical Registrar and Director of Neurosurgery, was formed to discuss the problem, analyse the causes and devise strategies to reduce the incidence of drain removal delays in this neurosurgical patient group.

Overall aim

The overall aim of the project was to minimise patient immobility and maximise opportunities to improve patient outcomes through timely drain removal and site suturing.

Analysis of current drain removal practices

Upon analysis of practice, it was recognised that there was no data on average timeframes that patients were waiting for drain removal and suturing. In addition, it was not known how many patients were at risk of drain removal delays. What was known was that the problems arising from prolonged immobilisation could actually become bigger problems than the primary disease itself; and that these delays were putting patients at risk of complications, such as pressure ulcers, deep vein thrombosis, increased respiratory compromise and infection.

The literature supports facilitating early mobilisation post-operatively as it is thought to decrease morbidity and mortality, improve pulmonary function, reduce pain, shorten hospital length of stay, and reduce the incidence of sepsis and respiratory failure (Dittmer and Teasell, 1993; Part 1 & 2). A retrospective audit of the ten most recent patients that had undergone neurosurgical drain removal and suturing in the Neurosurgical unit at Liverpool Hospital identified that patients had experienced average delays of 9 hours , with a range of 5.5 -24 hours for the drain to be removed and site sutured. Of these ten patients, three patients developed respiratory complications, and all patients had delayed physiotherapy attributed to mandatory bed rest whilst the drain was insitu. Annually, the Liverpool Hospital neurosurgical service admitted around 250 patients requiring such drains.

To improve patient outcomes, minimise unnecessary time in bed and expedite patient care through prioritisation, the reference group recommended enabling registered nurses to gain accreditation for the procedure of suturing drain sites after neurosurgical drain removal. Furthermore, a benchmark time for removal and suturing of drains was set at two hours following the order for removal and to maintain this benchmark long

term.

Suturing and scope of practice

Scope of practice is the range of roles, functions or responsibilities and activities, which a registered/licensed professional is educated for, competent in, and is authorised to perform. It defines the accountability and limits of practice (International Council of Nurses, 2005). The scope of practice of the nursing and midwifery professions encompasses all nursing and midwifery activities whereas an individual nurse or midwife's scope of practice is the range of actions and activities that the licensed nurse or midwife is 'educated, authorised and competent to perform' within the legal and regulatory frameworks established for their practice (Australian Nursing and Midwifery Council, 2007).

The literature was reviewed exploring the task of suturing and suturing within the current registered nurse (RN) scope of practice. The literature concluded that suturing should not be attempted without prior instruction and should be carried out under the strict supervision of a skilled practitioner (Clark, 2004).

Complications from suturing can occur, particularly if strict asepsis is not maintained throughout the procedure (Castille, 1998). The suture track provides bacteria with an entry pathway and must be kept clean and dry until initial healing has taken place to prevent the occurrence of infection (Richardson, 2004). Sutures must not be too tight, as this can lead to devitalisation of the tissue at the wound edge, and they must not be too loose, as this can lead to inadequate apposition of the wound edges resulting in delayed healing (Clark, 2004).

'Nurse suturing' in the neurosurgical setting was a new concept and not in the neurosurgical nurse current scope of practice. The literature indicated that midwives in birthing units and nurses in Emergency Departments (EDs) had been suturing as part of their practice for some years. Midwives perform basic perineal suturing and structured training processes are established within this specialty (Kindberg, Stehouuwer, Hvidman, and Henriksen, 2008; Selo-Ojeme, Ojuitiku, & Ikomi, 2009; Smith, Leap, and Homer, 2010; Wilson, 2011). Similarly, in emergency departments suturing is an advanced skill for registered nurses who complete a standardised training program in wound management and suturing repair. The literature reports nurses are capable of providing definitive care for patients who present to EDs with dermal lacerations (Bonadio, Carney, and Gustafson, 1994; Charles, Le Vasseur, and Castle, 1999; Middleton, 2006).

Nurses wishing to integrate activities into their own practice that are not currently part of the accepted scope of nursing and midwifery practice must ensure that they have the necessary experience and educational preparation to do so safely, that their competence has been assessed by a qualified, competent health professional; that they are confident of their own ability to perform the activity safely; and that they have the necessary authorisations and organisational support (Nurses Board Victoria, 2007). With this in mind, the Australian Nursing and Midwifery Council nursing professional practice decision making tools (Australian Nursing & Midwifery Council Professional Practice Framework, 2007) were consulted and their frameworks followed. These tools provided a mechanism for decision making that is based on competence, and enables reflection on current practice and practice change including:

- identifying a need for expanding scope of practice to meet patient needs and improve health outcomes;
- assessing risk, accountability and gaining organisational support;
- appropriately consulting, planning, educating, supervising and assessing competence, and
- ensuring policies and procedures are approved by the organisation and are reflective of the expanded scope of practice.

An expanded scope of practice can occur when a nurse wants to expand their scope of practice and the employer is satisfied they can demonstrate an appropriate model to support this role expansion.

Planning and Implementation

A formal consultation process was undertaken by the Neurosurgical CNC who met with the five practicing Neurosurgeons and the Principal Director of Nursing & Midwifery at Liverpool Hospital. The aim was to gain support from these key stakeholders to enable the practice of nurses suturing in the neurosurgical unit and promote recognition of this endeavour as an advanced clinical skill and expansion of the neurosurgical nursing role.

Support for this practice change was unani-

mously positive and written evidence of support was provided by the Clinical Director of Surgical Services, the Director of Nursing and Midwifery Services, and the Director of Neurosurgery. As the proposed project was a significant practice change for the Department of Neurosurgery, it was agreed initially that only the Neurosurgical CNC would be trained in suturing and practice change outcomes would be reviewed and analysed, with the view of training more interested neurosurgical nursing staff in the future.

To support clinical practice it was deemed mandatory that a policy guideline be developed to provide accurate and adequate information relating to this new practice change and delivery of care (See Appendix 1). The policy aimed to ensure standardisation of practice and patient safety and covered details regarding the clinical risk, clinical accreditation processes, equipment, suturing procedures, post procedural care, expected outcomes, and performance measures. The practice policy was endorsed by the Liverpool Hospital Corporate Policy Committee, the Director of Neurosurgery and the Infection Prevention Unit.

Furthermore a competency assessment tool was developed (See Appendix 2) in line with the principles for the assessment of National Competency Standards for registered nurses endorsed by the Australian and Midwifery Council (Australian Nursing & Midwifery Council, 2002), and an assessment checklist booklet was developed to accurately record training processes. Lastly, the development of a suturing experience logbook was undertaken where all suturing experience and associated data could be collected.

The project was to be implemented in two phases. Phase 1 was to be a trial undertaken by the CNC, including education and evaluation of the outcomes. Phase 2 would depend on the outcomes of Phase 1, and would involve the expansion of the project to other staff members.

Accreditation process

For the Neurosurgical CNC to gain accreditation for the procedure of suturing post neurosurgical drain removal, an accreditation process was developed. The initial step was attendance at a suturing workshop conducted through the Clinical Skills Training Centre at Liverpool Hospital. This session was conducted for the medical students as part of their training through the University of New South Wales. Education was provided by the Director of Plastic Surgery and involved teaching suturing techniques, extensive practice and assessment on models. Difficulties were experienced initially gaining permission for the CNC to attend, as the course traditionally was for medical staff. However, after liaison with various department directors, nurses were invited to participate.

After being assessed and deemed competent by the Director of Plastic Surgery, the CNC was required to suture patients under supervision, using the assessment checklist. The specific criteria on the assessment checklist were to be successfully achieved on three separate occasions. Supervision and final accreditation was to be provided by the senior neurosurgical registrar. Once accreditation was achieved, systems were set up within the neurosurgical unit where the CNC would be alerted of pending drain removals that required suturing.

Evaluation of Phase 1

The project was embraced and supported by all staff in the neurosurgical service and the outcomes were positive. The data collected included biographical patient data as well as drain type, drain site, time taken from when the drain was ordered to be removed until the time the drain was removed and suturing completed. Data on CSF leaks post suturing was also collected and the suture site infection rate. Infection rate was defined as the development of a suture abscess or by organisms isolated from an aseptically obtained wound culture within one week of suturing. Data was analysed on a three monthly basis and results were presented to the Surgical Quality Management and Neurosurgical Mortality and Morbidity committees.

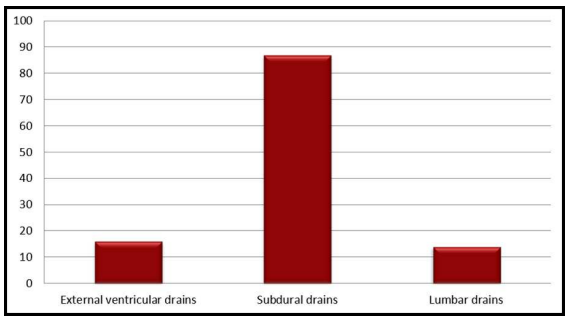

Figure 1: *drain sites sutured by nurses in one year n=117*

After one year of nurse suturing, the data indicated that from 248 neurosurgical drain

sites, 47% (n=117) had been sutured by the CNC. This patient group included 16 EVDs, 87 subdural drains and 14 lumbar drains (see Figure 1). Bilateral subdural drains were counted as two separate drain sites. The remaining drains were sutured by the registrars. The reasons why the registrar sutured instead of the nurse included drain removals occurring on weekends when the CNC was not on duty, when the CNC was off campus due to other commitments, or if a clinical decision was made to remove drains unexpectedly during non business hours.

One hundred-percent of drains removed and sites sutured by the nurse occurred within the two hour benchmark, allowing the majority of patients to sit out of bed, mobilise and commence physiotherapy where appropriate, which assisted with patient comfort and independence.

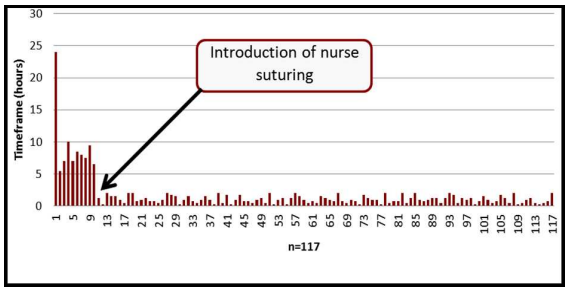

Figure 2: *Timeframes of occurrence of drain removal and suturing*

Figure 2 (above) illustrates the timeframes when suturing was completed prior to the implementation of nurse suturing, followed by the 117 occasions of suturing completed by a nurse within the sustained two hour benchmark. Furthermore, of the 117 suturing occasions there were no CSF leaks following suturing and no recorded infections.

Phase 2 - Sustaining change

Following evaluation of the first phase of the project, the next step was to sustain the change. The goal was to improve the percentage of drain sites being sutured by nurses. To do this more nursing staff needed to be trained and deemed competent in the suturing skill and maintenance of the existing data review needed to continue.

A core group of approximately ten RNs to be accredited to suture were targeted. The nurses expressed an interest to extend their skills and were supported by the NUM and CNC.

The previous accreditation process undertaken by the CNC was implemented. However enrolling the nurses into the medical student suturing workshop became problematic. To overcome this problem, and following negotiations with the Neurosurgery and Plastic Surgery Directors, support was granted for the CNC to teach the nurses the technique of suturing via structured suturing workshops. The benefits of this option were that a nurse was teaching nurses, and that training could be specifically focussed on suturing post neurosurgical drain removal rather than suturing in general.

The accreditation procedure was mapped out and included:-

- Identification of a suitable and willing RN;
- Support from CNC/NUM/ Director of Neurosurgery;
- Pre-reading of clinical policy/guideline;
- Attendance at the suturing workshop;
- A minimum of three (3) supervised successful suturing occasions using the competency assessment tool;
- Once competency was achieved, a certificate of accreditation was issued, and the nurse was permitted to suture independently.

Recency of practice and re-accreditation issues were also considered. To ensure ongoing competent and safe practice, the accredited nurses needed to maintain an adequate amount of suturing experience post accreditation. It was agreed that nurses should undertake ten suturing occasions per year to maintain recency of practice. If this did not occur, a process of peer review was to be undertaken where a colleague accredited in suturing would observe the suturing occasion and provide feedback and recommendations. If needed, refresher suturing workshops and re-accreditation processes could be repeated.

The neurosurgical nurses embraced the opportunity to enhance their scope of practice and utilise extended and expanded skills. This project was seen as a challenge that enhanced services and improved patient outcomes. Results from a staff evaluation found the nurses reported that they were getting 'too comfortable' in their daily work and welcomed this new challenge. They felt very enthusiastic about learning a new skill and enjoyed the technical and practice aspects, finding the process of learning very motivating. This enthusiasm rippled through the neuro-

surgical unit with many nurses requesting to learn the skill and participate in the accreditation procedures.

Three months into the second phase of the project, eight (8) nurses were at various stages of the accreditation process, and preliminary data has shown an increase from 47% to 52% of neurosurgical drain sites having been sutured by nurses. Ongoing results have shown a continued 100% of occasions being sutured within the two (2) hour timeframe, with no CSF leaks or infected suture sites.

Future scope of practice

Enabling nurses to gain accreditation for the procedure of suturing neurosurgical drain sites post drain removal is still in its infancy, although it has thrived as an approach to improve patient care, and professional neuroscience nursing development. The neurosurgical nurses at Liverpool hospital are continuing to develop their skills in this area. Future goals are to continue to train and develop these skills in all nurses working within neurosurgery and to support other neurosurgical units and perhaps intensive care units to consider this model of care.

Summary

Drains used in neurosurgery require the site to be sutured after drain removal to prevent CSF leak and cerebral infections. Historically the suturing has been the responsibility of medical staff. This innovative project at Liverpool Hospital has overcame traditional barriers and has enabled nurses to gain accreditation for the procedure of suturing drain sites after neurosurgical drain removal with positive patient results. The process included consultation and education to achieve these outcomes and created professional development opportunities, enhanced service delivery and maximised patient outcomes. The "Stitch in Time" project has displayed benefits to both patients and neurosurgical nurses, and it will continue to challenge the nursing team at Liverpool hospital.

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Appendix 1

Policy Directive
Policy Title: Neurosurgical Drains - Suturing Post Removal
Background:
External ventricular drains (EVDs), subdural drains, and lumbar drains used in Neurosurgery require the existing site to be sutured post removal, to prevent cerebrospinal fluid (CSF) leaks and/or increased risk of cerebral infections e.g. meningitis,ventriculitis.

1. Introduction:

The risk addressed by this policy:
Patient clinical risk. Prevention of CSF leak and or infection.

The Aims / Expected Outcome of this policy:
Suturing existing drain sites post neurosurgical drain removal will be performed by appropriately trained and/or accredited staff in accordance with the following policy requirements.

Related Policies
- External Ventricular Drain (EVD) – Removal
- Standards and Additional (transmission based) precautions
- Personal Protective Equipment
- Sharps – Safe Handling, Use and Disposal
- Hand Hygiene
- Infection Control Policy

2. Policy Statement

The following Liverpool Hospital staff may suture existing drain sites post neurosurgical drain removal:

Registered nurses who have completed a suturing workshop conducted by a Plastic Surgeon (in the Clinical Skills Training Centre) or the Neurosurgical Clinical Nurse Consultant (CNC), and have been accredited using the competency assessment tool and deemed competent by the Director of Neurosurgery, may suture an existing drain site upon removal of the neurosurgical drain.

Registered nurses undertaking the practical accreditation component of the neurosurgical drain site suturing process must be under the direct supervision of a staff member deemed competent by the Director of Neurosurgery.

Medical students and medical officers that have undergone appropriate training* may suture an existing drain site after removal of a neurosurgical drain.

*Note: Medical students are required to contact the Clinical Skills Training Centre. Interns are required to contact the Division of Clinical Training.

Registered nurses, who have undertaken previous training or performed suturing outside of the Department of Neurosurgery at Liverpool Hospital, must contact the Director of Neurosurgery and seek accreditation to perform this skill at Liverpool Hospital. Recognition of Prior Learning (RPL) will be considered in this process.

Restrictions for unaccredited staff:

Registered / Enrolled Nurses may remove surgical drains but are NOT permitted to suture the drain site.

Medical officers or medical students who have yet to complete the appropriate training must do so only under the direct supervision of an accredited medical officer or accredited registered nurse.

General Issues:
- Infection control precautions must be adhered to throughout procedure.
- Sterile technique must be maintained during suturing to reduce infection risk.
- Liverpool Hospital reserves the right to withdraw the authority to suture at any time, with appropriate reasoning.
- Registered nurses/medical officers accredited to suture may use local anaesthetic i.e. lignocaine 1% plain 0.2mL to 0.5mL injected intradermally sufficient to raise a small wheal. NB: Registered nurses must obtain a medication prescription. Phone orders must be written on the medication chart and signed by a Medical Officer within 24hrs.

3. Principles / Guidelines

Equipment
- Disposable sheet or protective drape
- Disposable (non-sterile) gloves, goggles/eye protection
- Sterile gloves.

- Sterile fenestrated drape.
- Suture cutter
- Chlorhexidine 1%, sterile normal saline
- Local anaesthetic - lignocaine 1% plain in 5mL
- 5mL syringe
- 18G drawing up needle and 25G needle to administer local anaesthetic
- Suture pack #5 – needle holder, forceps, scissors.
- Suture material – usually 3.0 nylon on a 24 mm reverse cutting needle
- Sharps container
- Sterile transparent occlusive dressing
- Additional sterile gauze
- Sterile specimen jar.

Procedure

- Obtain verbal or written request for drain removal and suturing from neurosurgical medical team.
- Explain procedure to patient and ensure verbal/implied consent is obtained.
- Collect appropriate equipment and take to patient's bedside.
- Check patient's identity - ask for full name and date of birth and verify details against both armband and health care record, also confirming correct medical record number (MRN).
- Explain to patient the steps involved in procedure and his/her role during drain removal and suturing.
- Ascertain if patient has any allergies e.g. to cleansing solutions, local anaesthetic agents or dressings.
- Assist patient to position in order to maximise comfort and expose the area requiring suturing. Place disposable sheet or similar drape under head to protect pillowcase from spillage.
- Wash hands
- Prepare equipment and position next to patient. Position sharps container to allow direct disposal of sharp/s post drain removal and suturing.
- Don non-sterile gloves, eyewear.
- Remove old dressing and using suture cutter, cut suture and remove drain as per related policies. Place sterile gauze over old drain site until ready for suturing.
- Perform surgical hand wash with antiseptic soap, and don sterile surgical gloves.
- Prepare skin appropriately - apply antiseptic and allow skin to dry for approximately 2 minutes, or as per manufacturer's recommendations.
- Have an assistant hold the ampoule of lignocaine. Whilst maintaining asepsis draw up the local anaesthetic with 19g drawing up needle.
- Inject local anaesthetic (lignocaine 1% plain, amount 0.2mL to 0.5mL) intradermally via 25g needle around old drain site, enough to raise small wheal only.
- Suture the old drain site and tie securely – one to two sutures is all that should be required.
- Dispose of sharps material in sharps container.
- Cover old drain/suture site by application of sterile transparent occlusive dressing.
- Dispose of non-sharp material in general waste. Items contaminated with blood must be disposed of in a contaminated waste bin.
- Decontaminate hands.
- Suitably end patient encounter (i.e. assist patient to desired position, ensure immediate needs are met).
- Return equipment and clean/restock as required.
- Document procedure in health care record and on drain record chart/ External ventricular drain chart noting any associated patient management provided.

Post Procedural Care

The sutured site is to be checked daily and assessed for signs of infection. Signs of infection such as redness, swelling and discharge, and/or pain must be reported to the neurosurgical team immediately.

Observe for signs of:

- CSF leak – observe dressing 4/24 for 24 hours post drain removal and suturing and document findings in health care record
- Meningitis – 4/24 temperatures for 24 hours post drain removal and suturing of drain site
- Neurological deterioration- 4/24 neuro-

logical observations (Glasgow Coma Scores) for 24 hours post drain removal.

4. Performance Measures

Review of complications related to suturing post removal of neurosurgical drains will be through the Neurosurgical Department morbidity and mortality case review meetings. All Incident Information Management System (IIMS) reports are monitored and reviewed and any issues related to suturing post removal of neurosurgical drains will be addressed by the Neurosurgical Team.

Appendix 2:

Clinical Accreditation Outline - Suturing Post Neurosurgical Drain Removal

For the Neurosurgical Registered Nurse to gain accreditation for the procedure of suturing post removal of the neurosurgical drain, the following accreditation process must be achieved:

Requirements for Accreditation

Fulfilling criteria as per either:

A) For full accreditation or

B) For Recognition of Prior Learning

- Nurse Unit Manager and Clinical Nurse Consultant support staff member to become accredited in this advanced clinical skill
- Attend suturing tutorial/workshop conducted by a Plastic Surgeon or Clinical Nurse Consultant through the Clinical Skills Training Centre
- Minimum of three (3) supervised successful suturing occasions of neurosurgical drain sites
- Recognition of Prior Learning (RPL) is granted to individual staff members who hold current accreditation in suturing. Accreditation incorporating RPL may be achieved as per the following procedure:
- Provision of documented evidence of previous accreditation (i.e. certificate or official notification from manager / facility) to the Director of Neurosurgery
- Minimum of one (1) supervised successful suturing occasions of neurosurgical drain site

Identification of Assessors:

- Nursing staff who have completed this accreditation process and are listed on the Department of Neurosurgery database (records maintained by Clinical Nurse Consultant).
- Medical Officers that have undergone appropriate training.

Certificate of Accreditation:

A certificate of accreditation will be issued after successful completion of the requirements as outlined above.

Assessment Checklist: Suturing Post Neurosurgical Drain Removal

This checklist is based on related policies within Liverpool Hospital. The following criteria must be successfully achieved during assessment on a minimum of 3 separate occasions (exception: staff granted RPL are to complete only 1 assessment). Unsuccessful suturing attempts must also be recorded.

Ventricular Peritoneal Shunts : Not so Black & White.

Christopher Tolar, Leigh Arrowsmith

Abstract

Cerebral shunts are commonly used to treat hydrocephalus. This paper will discuss hydrocephalus including its causes, the different types of hydrocephalus, the signs and symptoms and how ventricular peritoneal shunts (VPS) help with the treatment of hydrocephalus. VP shunts are inserted surgically and as with any surgical procedure complications can arise. These complications will be discussed and their treatment examined. A case study will show how something as commonly used as a VP shunt is not so black and white!

Key Words: ventricular-peritoneal shunt, hydrocephalus, cerebro-spinal fluid, level of consciousness, headaches, external ventricular drain.

Introduction

Hydrocephalus is a Greek word which literally means 'water on the brain.' It is a condition in which there is an excessive build-up of cerebro-spinal fluid (CSF) within the ventricles of the brain' (Lindsay & Bone 1997).

CSF is a straw coloured fluid that is thought to be an ultra-filtrate of blood. It cushions the brain, allows for the removal of metabolic products and helps provide an adequate environment for neurotransmission (Pediatrics Clerk 2010). It is produced continuously at a rate of approximately 500ml/day, where it flows freely through the subarachnoid (SA) space and is absorbed into the venous system through the arachnoid villi and into the blood stream (Lindsay & Bone 1997).

There are two types of hydrocephalus, communicating and non-communicating. Communicating hydrocephalus is a form of hydrocephalus which does not arise from a visible blockage in the flow of CSF, otherwise known as non-obstructive hydrocephalus. Haines 2002, states that communicating hydrocephalus occurs when the flow of CSF through the ventricular system and into the SA space is not impaired. Rather, the movement of CSF through the SA space and into the venous system is partially or totally blocked. Causes of communicating hydrocephalus include prior infection (meningitis), which leads to decreased re-absorption of CSF. Likewise bleeding into the SA space can block the normal reabsorption of CSF.

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Non-communicating hydrocephalus is caused by a visible obstruction of the flow of CSF, otherwise referred to as obstructive hydrocephalus. Most commonly this type of hydrocephalus is caused by a mass in the brain, such as a tumour or cyst but can also occur as a result of previous trauma (scarring), bleeding or infection (Bader & Littlejohns 2004).
Common signs and symptoms are headache, decreased level of consciousness (LOC), nausea/vomiting, seizures, confusion, memory loss, visual changes, lethargy, loss of coordination and balance, and urinary incontinence.

Cerebral shunts are devices which drain the extra CSF in the brain into an external chamber or other parts of the body where the fluid can be reabsorbed. There are many different types of shunts (see Table 1), however they all have three basic parts in common:

1. a ventricular catheter which is a flexible tube placed directly into the ventricles. It has small holes at the end so CSF from the ventricles can flow into the tube.
2. a shunt valve which is a one-way valve with different flow rates to control the amount of CSF drained.
3. a distal catheter which carries CSF from the shunt valve to designated parts of he body.

A VP shunt which drains fluid into the peritoneal cavity remains the gold standard of shunts (Lindsey & Bone 1997).The shunt is surgically inserted by making two incisions, one small incision in the abdomen and a larger curved incision is made in the scalp. A small hole is drilled into the skull, known as a

burr-hole. The ventricular catheter is then placed into the ventricle and connected to the shunt valve. The distal catheter is then tunnelled under the skin of the scalp, neck, chest and then finally positioned into the peritoneum. Once in position the incision areas are either stapled or sutured closed. The position of the shunt is generally checked via CT or X-ray.

Route	**Fluid drains to...**
Ventriculo-peritoneal (VP) shunt	Peritoneal cavity
Ventriculo-atrial (VA) shunt	Right atrium of the heart
Ventriculo-pleural (VPL) shunt	Pleural cavity
Lumbar-peritoneal (LP) shunt	Peritoneal cavity
External Ventricular Drain (EVD)	External drain

Table 1: *Shunt routing*

Whilst a VP shunt is considered one of the most effective ways of draining CSF in hydrocephalus and generally they function well, there are a number of complications that can occur such as infection, occlusion and disconnection/fracture.

Most infections occur within two months of surgery, including revisions, although delayed infections are possible (reference). The most common organisms found are staph epidermis and staph aureus. The symptoms are very similar to hydrocephalus but vary according to the type of infection. *Wound infection* is shown by inflammation and redness at the incision site, fever, purulent discharge and the organisms are seen on gram stain culture. The patient with *meningitis/ventriculitis* presents clinically with lethargy or decreased LOC. Leukocytes are present in the CSF and organisms are seen on gram stain or culture. *Peritonitis* is shown by fever, abdominal tenderness and the organisms are seen on gram stain and cultures. The usual treatment for infection is IV antibiotic therapy, usually consisting of vancomycin or ceftriaxone (Ghotme & Drake 2009). The infected hardware is usually removed or replaced and an EVD is surgically inserted temporarily to help drain and measure CSF. CSF cultures are taken daily and the shunt is not replaced until the cultures are negative for organisms.

Occlusion predominately occurs at the proximal end of the shunt. This is due to the build-up of excess protein in the CSF which can collect at the point of drainage and slowly clog the valve. It can also become obstructed due to kinking in the tubing or being pulled out of the abdominal cavity, which usually involves blockage at the distal end of the shunt. Diagnosis is confirmed with increased ventricular size on a CT scan compared with baseline or by shunt studies. Shunt studies involve the injection of a small amount of radioactive material into the shunt and images are taken immediately after the injection. This study is helpful in identifying blockages in the tubing of the shunt. Shunt revision is usually the treatment for this complication unless there is preoperative evidence of distal obstruction (the proximal end should be revised first). Partial or total shunt replacement is often required.

Disconnection is the loss of continuity of the shunt at connection points between catheters, valves, and/or connectors. Fracture is the actual breakage of the catheter with separation between segments. Shunt revision which could involve partial or total replacement is the best approach however reconnection is sometimes possible (Ghotme & Drake 2009).

Case Study

Rachel is a 32 year old woman, married with two small children. She has a background history of Hydrocephalus, which was present at birth, and treated with a VP shunt. Rachel also suffers from mild Asthma. Rachel and her family are all devout Christians.

Rachel presented to her local Emergency Department after being diagnosed by her General Practitioner with migraines. On presentation she was complaining of gradual onset of headaches, especially in the morning, associated with nausea and vomiting and mild photophobia. Her initial Glasgow Coma Scale (GCS) was 14/15. She was confused to place, and her pupils were equal and reactive. Vital signs were within normal limits – BP 128/71mmHg, Heart rate (HR) 66bpm, Respirations 18bpm and a Temperature of 37.9^{0}C. However her sodium (Na) level was low at 125mmol.

The Neurosurgeons were called to review Rachel. Initial treatment was to tap her shunt and take a CSF specimen. Rachel's intracranial pressure (ICP) was 12mmHg. Results showed 30 red blood cells, no leukocytes and the gram stain was positive for Propinobactrium. Rachel was commenced on Vancomy-

cin and Ceftriaxone and taken to the operating suite for a shunt revision.

Post-operatively Rachel was unwell. She complained of a severe headache for which she was given 1gm of intravenous paracetamol and 2.5mg of morphine. At this point Rachel began vomiting she was given 10mg maxolon. Her vital signs and GCS were reassessed which showed a remarkable deterioration. Her GCS had dropped to 7/15 and her pupils had become unequal and sluggish. Vitals signs showed the onset of Cushing's Triad with a BP of 192/99mmhg, HR 48bpm, Respirations 8bpm. At this point and ALS emergency call was activated.

The following treatment was initiated: - 40mcg Naloxone, 100mls Mannitol and an ABG was obtained. The results of the ABG showed PH:7.35, PO2:78, PC02: 48, HC03: 18, BE: -2. This indicates fully compensated metabolic acidosis. Rachel was taken for an urgent CT scan which showed pronounced herniation.
Rachel was taken back to theatre for the removal of the VP shunt and insertion of an EVD. On removal, the shunt was shown to be blocked at the distal end of the catheter.

After surgery, Rachel was placed into a thiopentone coma for a week. Two weeks after sedation had been weaned there was still no signs of neurological improvement. Obviously there was significant stress on this young mother's family. A family meeting was arranged to discuss the diagnosis, prognosis and further management. At the meeting the family's strong religious faith was raised and it was decided to give Rachel every opportunity to improve so full active treatment was indicated to staff.

After multiple attempts to wean Rachel off the ventilator it was decided it was in her best interests to proceed with a surgical tracheostomy and she was transferred to the high dependency unit (HDU).

One month after admission to hospital Rachel showed no signs of improvement. This was taking a toll on her husband, Alex and the two children. Alex decided to go against the rest of the family's wishes and asked for the EVD to be removed and allow the patient to die. He was aware of his wife's wishes that if she could never play with her children unrestricted again, then she would not want to live. Another family meeting was held and it was agreed to allow the EVD to block naturally and to give no further treatment. It was at this point the family expressed Rachel's wishes to be an organ donor.

One week later the EVD still had not blocked. This was placing great strain on not only the family but the nursing staff as they were placed in a difficult position of not being able to intervene in such an event when it is generally seen as 'duty of care.' Rachel's prognosis was again discussed with the family and after much consideration it was decided to remove the EVD and prepare her for organ donation. It was estimated Rachel would only survive 4-6 hours post removal, given how dependant she was on needing the drain.

Twelve hours post removal, Rachel showed no signs of raised ICP or deterioration. This was frustrating to the family and became very difficult as they had all said 'goodbye' and had told the children that 'Mummy had gone to Heaven'. Given the constant stress Rachel and her family had undergone, it was decided by the family and treating team, to no longer proceed with organ donation. Rachel was removed from the ventilator again and within 4 hours passed away surrounded by her family.
In one of the lengthy family meetings with Alex he told of a memory he had recalled of Rachel on their first date. She said to him,

'I have a tube in my head that drains away all the extra fluid, but don't worry it won't kill me.'

Conclusion

This case study reveals the importance of always applying evidence based practice to our Nursing profession and that Shunts are not always so 'Black and White'.
(NB. Names have been changed for patient confidentiality).

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Pilocytic Astrocytoma in Adults. Incidence and Outcomes:- A Review of the Literature.

Linda Nichols

Abstract

Pilocytic astrocytomas are benign neoplasms that predominantly occur in children. Characterised by their slow growing nature they are almost always well circumscribed, cystic, and non-infiltrating into the surrounding brain tissue. Despite being a rare entity, the diagnosis of pilocytic astrocytoma in an adult patient does occur and should be considered as a differential diagnosis. However, as these tumours in adults are rare, the majority of published studies have limited numbers in small series, are often retrospective from single institutions and often span decades without consideration of ever developing diagnostic and surgical treatments.

The following paper will discuss the incidence and outcome of pilocytic astrocytoma in adults. Current literature will be utilised to critically analyse the clinical presentation, epidemiology, etiology, treatment and outcomes for adults diagnosed with a pilocytic astrocytoma.

Key Words: *Pilocytic astrocytoma, adult, epidemiology, etiology.*

Introduction

The diagnosis of pilocytic astrocytoma in adults although uncommon does occur; unlike other gliomas, pilocytic astrocytomas are considered benign and are generally surgically curative. Malignant progression and leptomeningeal dissemination rarely occur with pilocytic astrocytomas usually following an indolent course (Khaldi, Griauzde, DiPatri, & Prabhu, 2011). Predictive to its positive and good prognosis the classical presentation of a pilocytic astrocytoma is almost always a cystic lesion that is well-circumscribed (Griauzde, Khaldi, Rosenblum & Prabhu 2011a). The World Health Organisation classifies pilocytic astrocytomas as grade 1 neoplasm, in keeping with the non-invasive nature, low proliferative potential and possibility of cure following surgical resection. Despite this translating into long term survival and potential cure for the majority of adults, there are relatively few studies that discuss the clinical presentation, epidemiology, etiology, diagnosis, treatment and prognostic outcomes for adults diagnosed with a pilocytic astrocytoma (Kano, Kondziolka, Niranjan, Flickinger & Lunsford 2009**;** Ellis, Waziri, Balmaceda, Canoll, Bruce & Sisti 2009).

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Clinical presentation

In children, pilocytic astrocytomas are more commonly located in the infratentorial region with approximately 80% of pilocytic astrocytomas located in the cerebellum (Khaldi et al., 2011). Pilocytic astrocytomas also occur along the entire neuraxis with a proclivity for certain sites including the optic pathways, hypothalamus, basal ganglia, brainstem, cerebral hemispheres, and spinal cord (Rodriguez, Scheithauer, Burger, Jenkins & Giannini 2010). Infratentorial pilocytic astrocytomas are uncommon in adults with the majority occurring in the supratentorial region particularly in the temporal lobe and around the third ventricle, however a number of tumours have been reported in the cerebellar vermis (Brown, Buckner, O'Fallon, Iturria, Brown, O'Neill, Scheithauer, inapoli, Arusell, Abrams, Curran & Shaw 2004; Monin, Sisodia & Ghodke 2009). Pilocytic astrocytomas almost never spread outside the cerebral nervous system, with Saki, Miyahara, Tsutsumi, Kaneko, Fukushima, Tanaka & Hongo (2011) noting that the instance of leptomeningeal dissemination and malignant transformation is a rare occurrence. Dependent on location Pilocytic astrocytomas have a varied clinical presentation. There are however a number of common clinical signs including headache, nausea, vomiting, seizures, changes in level of consciousness, cognitive function, mood and focal symptoms, progressing over a span of a few weeks to

months (Grant 2004). Obstructive hydrocephalus generally occurs as a result of obstruction of the ventricular system and cerebral aqueduct; other symptoms include cranial neuropathy, ophthalmoplegia and hemiparesis (Khaldi et al., 2011). However, the indolent growth of tumours such as pilocytic astrocytomas can produce few symptoms until the tumour grows to a significant size as pilocytic astrocytomas do not infiltrate surrounding tissues and the brain's plasticity accommodates the slow compression of brain tissue.

Supratentorially located pilocytic astrocytomas are commonly associated with seizure activity both as a presenting symptom (up to 80% of patients) and as a symptom of tumour regrowth or progression (Whittle 2004; Mason 2005). Well differentiated, slow-growing tumours such as pilocytic astrocytomas, gradually exert mechanical influence on adjacent tissue inducing epileptic foci by the prevention of self-regulation of normal brain tissue (Rossetti & Stupp 2010). Headaches are also a frequent presenting symptom, with Bell, Chitnavis, Al-Sarraj, Connor, Sharr, & Gullan, (2004) identifying that headache was the most common symptom occurring in 90% of patients in their retrospective study. Headaches associated with brain tumours are often described as occurring on wakening and reducing by midmorning, secondary to positional increased intracranial pressure, irritation, compression or traction of blood vessels (Callum & Davenport 2009). Regardless of the possible causes any reported headaches, especially a new onset with patterns of awakening patients or early morning pattern, deserves investigation.

Epidemiology

Pilocytic astrocytomas occur mainly during the first two decades of life with the mean age of diagnosis 5-7 years, with almost two-thirds of patients diagnosed by the age of twenty (Central Brain Tumour Registry of the United States 2008**;** Formica, Iacoangeli, Chiriatti, Scarpelli, Salvolini, Scerrati 2010). The sex distribution is almost even with some series such as Mason (2005) indicating a 55-65% male predominance, whereas others suggest a slight female predominance. The epidemiology of paediatric brain tumours has varied over the last 20 years with changing classification systems, developments in technologies, imaging and surveillance (Kaderali, Lamberti-Pasculli & Rutka 2009). However with the emerging data from large studies including the European based study by Bauchet, Rigau, Mathieu-Daude, Fabbro-Peray, Palenzuela, Figarella-Branger, Mortiz, Bauchet, Pallusseau, Duffau, Coubes, Tretarre, Labrousse, Dhellemmes (2009) that utilised large nationwide data banks involving thousands of children diagnosed with brain tumours it is hoped that consistent and reliable data can be obtained.

There are very few studies that address the epidemiology of pilocytic astrocytoma in adults. Burkhard, Di Patre, Schuler, Schuler, Yasargil, Yonekawa, Lutolf, Kleihues, P., & Ohgaki (2003) assert that the incidence of pilocytic astrocytomas adjusted to World Standard Population is 4.8 per 1 million per year; however the mean age of diagnosis in the cohort was only 19.6 years. An extrapolation of this figure to the population of Australia implies 96 cases occurring per year. The paucity of data does however yield several other unverified indications of the incidence of pilocytic astrocytoma in adults compared to children with a suggested occurrence of 0.5 per million adults' diagnosed verses 8.3 per million children. This data reports the mean age of 50 years. An extrapolation of this figure to the population of Australia would imply only 10 adult cases occurring per year. This highlights the difficulties and the lack of reliable data on a total population or age specific basis. Despite accounting for up to 40% of paediatric brain tumours (Ishkanian, Xu, Millar, Payne, Mason & Sahgal, 2011), pilocytic astrocytoma remains a rare and uncommon diagnoses in adults and thus the incidence can only be predicted and extrapolated from small studies.

Pilocytic astrocytomas are increasingly being reported in older patients, where Pouratian, Mut, Jagannathan, Lopes, Shaffrey & Schiff (2008) purport that with advancing and increasingly accessible technology the medical community is pursuing diagnoses and treatments, verses managing older persons symptomatically. Bohan, Gallia & Brem (2008) assert that an increase in the incidence and diagnosis of primary brain tumours especially in developed countries can be attributed to increased life expectancy allowing for the development of tumours, the accessibility of improved diagnostic tools and imaging techniques and the incidental finding during routine screening (Khaldi et al., 2011). Giles & Gonzales (2001) suggest the difficulty in establishing the epidemiology of brain tumours results from the data often being confused by inaccurate histological confirmation and poor differentiation in studies between primary, metastatic, malignant and benign tumours. In

particular, Ostrom & Barnholtz-Sloan (2011) highlight the most common benign tumour in adults is meningioma, this in turn dominates data collection and results for low grade tumours in adults.

Etiology

The etiology of the majority of brain tumours is unknown and there are no known measures to prevent brain tumours. The majority of data available is from retrospective case controlled designs that are open to biases and vested interests questioning the validity. A small number of congenital syndromes and hereditary factors predispose individuals to tumours, with pilocytic astrocytomas being the most frequently occurring central nervous system tumour in association with neurofibromatosis type-1 (NF1) (Rodriguez et al., 2010). The only identified environmental risk factor being previous exposure to ionizing radiation, especially of the head and neck or exposure to electromagnetic fields (Bohan et al., 2008; Townsley 2011). Lifestyle and dietary habits and the hypothesised link between nitrosamines has been discussed in the literature, however these possibilities require more research as does the suggested link between allergies and gliomas (Ostrom et al., 2011). Hepworth, Schoemaker, Muir, Swerdlow, van Tongeren, & McKinney (2006) discuss the extensive media coverage on environmental factors, including the use of mobile phones however extensive research has not supported a relationship between mobile phones and the incidence of brain tumours (Khaldi et al., 2011). It is generally accepted that gene alterations are the most likely cause of tumour formation, with genome wide associated association studies demonstrating a correlation between somatic genetic changes in tumours with clinical outcomes (Ostrom et al., 2011). Brain tumours form as genetic changes transform normal brain cells into malignant cells characterised by uncontrolled cell growth resulting from mutations in genes during replication (Corner & Bailey 2001; Gabriel 2007). With no specific etiology, prevention and screening programs are not viable. However early diagnosis and treatment is directly linked to improved quality of life and increased survival.

Diagnosis

CT is generally utilised as a screening tool to initially identify if a tumour is present and to evaluate size, location, infiltration, blood and calcification (Bohan et al., 2008). The incidental incidence of brain tumours has increased with an increased use of CT investigative scans for vague neurological symptoms (Whittle 2004). MRI is preferred over CT as a diagnostic tool as it provides better visualisation as tumours can be evaluated in multiple planes, providing superior anatomical detail that enables the exact size to be determined. However, Whittle (2004) notes that while it is possible to be moderately confident with diagnosis, MRI is not definite with up to 30% of what appear to be low-grade gliomas actually being of higher grade on histological diagnosis. MRI also allows for the relationship between the tumour and blood vessels and potential haemorrhage or oedema to be assessed. It is however important to recognise that pilicytic astrocytomas have an aggressive imaging appearance and care needs to be taken to differentiate from higher grade tumours (Kumar, Leeds, Kumar, Fuller, Lang, Milas, Weinberg, Ater & Sawaya 2010). This highlights the importance of surgical interventions in the provision of definite histological diagnosis.

Treatment Options

Surgery plays an essential role in the diagnosis and management of brain tumours, with survival rates of 96% at 10 years post diagnosis and intervention (Ohgaki & Kleihues, 2005). Pilocytic astrocytomas are generally considered to be surgically curative lesions (Freyschlag, Kostron, Thomé & Seiz 2011). However, a number of tumours remain unresectable often due to their critical location, and subtotal surgical resection may only temporarily delay tumour progression (Kano et al., 2009). Aggressive surgical resection is generally attempted since the degree of surgical resection is of major importance for the patient's further clinical course (Stuer, Vilz, Majores, Becker, Schramm & Simon 2007). Surgery is also the only way to obtain tissue to provide a definite histological diagnosis. Histopathologic diagnosis of pilocytic astrocytoma is based on the characteristic biphasic pattern with compacted bipolar cells, the presence of Rosenthal fibres, microcysts and eosinophlic granular bodies (Omura, Nawashiro, Osada, Shima, Tsuda & Shinsuke 2008; Saki et al., 2011). The gross appearance of these lesions is of a cyst containing a nodule of tumour. They can however present as noncystic, solid vermian or hemispheric lesions with mass effect (Wellons, Reddy, Tubbs & Oakes 2003). However, despite the varied presentation they remain characteristically demarcated with a clear border from the surrounding brain.

The role of radiation therapy is debated in the

literature with some authors suggesting that radiation therapy should be employed to prevent tumour growth. However, the majority of patients remain stable post-surgical resection with Griauzde, Khaldi, Melian, Manera, Primeau, Aase, & Prabhu (2011b) suggesting that even suboptimal resection of brainstem pilocytic astrocytomas can present with a progression free survival at 5 years of 54%. There is also a suggested association between radiation therapy for pilocytic astrocytoma and malignant transformation (Parsa & Givrad, 2008). It is suggested that pilocytic astrocytomas that present with anaplastic features are almost always associated with a history of previous radiation therapy (Rodriguez et al., 2010). For selected patients including those with progressive residual or recurrent unresectable tumours or leptomeningeal dissemination, radiation therapy may be utilised however there are no existing adjuvant protocols published to date.

The use of chemotherapy is generally reserved for patients with NF1 and those suffering from non-resectable progressive disease. It is often used for children under the age of three as an option to delay radiation therapy due to the increased susceptibility of the young brains to irradiation. However, the use of chemotherapy in adult cases is poorly reported and chemotherapy is generally only a salvage option in cases of leptomeningeal dissemination or as a last option for recurrent unresectable tumours. There is minimal data regarding the use of chemotherapy, the follow up in adult cases is limited and there remains no consensus on the use of chemotherapy for adults diagnosed with pilocytic astrocytomas at present (Kano et al., 2009). Despite this chemotherapy protocols for grade II and II gliomas continue to be extrapolated to treat pilocytic astrocytomas in difficult circumstance.

Outcomes

Five–year survival rates for pilocytic astrocytomas are reported as high as 92% (Central Brain Tumour Registry of the United States 2008). When compared to survival rates of less than 4% for glioblastoma multiforme at 5 years the prognosis is generally good, with Belirgen, Berrak, Ozdag, Bozkurt, Eksioglu-Demiralp, & Ozek (2012) placing the 10-year survival at 80-100%. Despite this a number of tumours are not amenable to complete surgical resection and leptomeningeal seeding and malignant transformation is a rare but a documented occurrence (Freyschlag et al., 2011). Prognosis is also influenced by tumour recurrence, with recurrence rates of up to 30% reported in adult cases (Stuer et al., 2007). Rapid recurrence is a documented phenomenon with Ellis et al (2009) noting a median time to recurrence of 16.5 months in their cohort of 20 patients; there were 6 (30%) recurrences that all occurred within 4 years of initial surgery, with those patient requiring surgery presenting within 17 months of initial surgery. Despite this cystic and circumscribed pilocytic astrocytomas are associated with a 25-year survival rate of 95% (Griauzde et al., 2011b). Although survival rates are exceptionally good, quality of life remains a key issue with cognitive deficits, poorer long-term functional and neuropsychologic outcomes recognised as barriers to productive lives. The need for long term support and monitoring cannot be underestimated for adults diagnosed with a pilocytic astrocytoma.

Conclusion

The outcome for adults diagnosed with a pilocytic astrocytoma is generally positive due to the low-grade nature and indolent tumour growth rate. The location of a tumour is clearly of critical importance when determining progression free survival and overall survival, nevertheless the survival rates for patients with a pilocytic astrocytoma are positive. Despite being a rare diagnosis in adults, pilocytic astrocytoma is a known and documented occurrence. Its actual occurrence in adults is yet to be established with a lack of reliable data on a total population or age specific basis. Treatment options continue to evolve, however total macroscopic treatment remains the treatment of choice. As with any brain tumour early diagnosis and treatment remains directly associated with improved quality of life and increased survival. Despite pilocytic astrocytomas being the only glioma that is amenable to complete surgical resection, the need to provide long-term support for patients cannot be underestimated.

Acknowledgements

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The Louie Blundell Prize

This prize is in honour of our colleague Louie Blundell and will be awarded for the best neuroscience nursing paper by a student submitted to the Australasian Neuroscience Nurses Association for inclusion in the *Australasian Journal of Neuroscience* yearly. The monetary value of the prize is AUD$500.

For further details and criteria guidelines please visit the ANNA website at www.anna.asn.au

In The News

From the Editor

You may have seen it on TV or in print media - Human Angiostrongyliasis, the rat lungworm. Rat Lungworm disease, caused by angiostrongylus cantonensis (adult worm pictured above), has been documented in Australia, Asia, the Pacific region, Caribbean and the United States.

This deadly parasite lives prolifically in rats. However, it has found its way into unsuspecting humans via our garden snails and slugs. That is, by eating snails and slugs or material contaminated by snails and slugs.

The first reported case in Australia of infection in humans was from Brisbane in 1971. More recently, a child died in Brisbane after ingesting a mollusc, a toddler died and another became ill in Sydney after crawling on the deck that had 'slime' contamination. A Sydney teenager is still hospitalised more than a year after ingesting a slug on a dare. Most infections are not severe, but in the worst cases rat lungworm disease causes severe meningitis, brain damage and death. Increased levels of eosinophils in the CSF is a trademark of the eosiniphilic meningitis.

The best way to prevent infection is good sanitation; always wash hands after touching slugs and snails or surfaces contaminated by them. The 'slime' that these creatures leave eg: on lettuce, can harbour the parasite. If eaten, it then makes its way out of the gut, into the CSF and into the brain itself.

Awareness and prevention are key factors to avoiding contamination and illness. It is imperative that all garden vegetables and fruit be washed thoroughly and/or cooked prior to consumption. That children do not have the opportunity to inadvertently, or on a dare, consume garden snails or slugs, especially after rain when the snails and slugs are more prevalent. Thorough hand hygiene and with food preparation is paramount.

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Conference Prize Poster Perth, WA. 2011

Coordinating Neuro-oncology Care: A Primary Health Care Framework

Linda Nichols, BN, MCN

SCHOOL OF NURSING AND MIDWIFERY

Context

Over 1400 primary brain tumours are diagnosed in Australia annually. In Tasmania this equates to 1 case per 10 000 people annually. However, recent data predictions place this figure at a much higher rate, highlighting the need to improve services and outcomes for patients diagnosed with primary brain tumours in Tasmania. Whilst being one of the less common forms of cancer, primary brain tumours are aggressive and devastating cancers. The care of patients diagnosed with a brain tumour is multifaceted and complex, with a number of national reports highlighting the need to improve the coordination of cancer care in Australia. In 2003 the consultative report *Optimising Cancer Care in Australia* was released by the Clinical Oncological Society of Australia, the National Cancer Control Initiative and the Cancer Council Australia. It was a groundbreaking document that was the blueprint for cancer care reform in Australia, highlighting that poorly integrated systems were a major failing of modern health care systems. The National Service Improvement Framework for Cancer (2006) highlighted the optimal cancer service, as being seamless, coordinated, continuous and integrated.

In response to these reports, the role of the Cancer Care Coordinator rapidly emerged as a solution to achieving system reform and improving patient outcomes (Yates 2004). However it was rapidly recognised that optimal seamless and integrated care required a broader system approach that was sustainable, supported and not the sole responsibility of individual practitioners (Yates 2007; Evans 2008). Whilst neuro-oncology nurses have identified with and developed the role of the Cancer Care Coordinator, Lapum et al. (2009) highlights that there needs to be an increased focus on the identification of nurses as primary health care providers, this being fundamental to legitimising and developing the social structures to support this role.

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Collaboration

Initiatives focused on a National and local level include:

- Improving intersectoral collaboration with non-Government organisations including The *Cancer Council of Tasmania* who provide information, psychosocial support, financial assistance, and transport services.
- The *Brain Tumour Alliance of Australia* are active in providing a National voice to support and inform patients and families.
- Pharmaceutical companies for e.g. *MSD Oncology* provide patient support resources including medication diaries.
- A multidisciplinary Brain Tumour Support Group within the Tasmanian Neurosurgical Unit is working towards changing practices and improving collaboration across services.

A primary health care framework is a transformative approach that encompasses a broad spectrum of activities that focus on recovery from illness, guarding against deterioration of health, restorative and rehabilitative care (Starfield 2006). Most importantly, whilst advantaged from a Cancer Care Coordinator, the framework is not dependant on an individual role. Focusing on the components of care coordination is central to improving patient outcomes in areas that do not have access to a Cancer Care Coordinator.

The five tenets of primary health care (appropriate technology; collaboration; accessibility; health promotion; and public participation) have emerged repeatedly throughout the literature. Although not specifically addressed or incorporated as a principle framework of practice for cancer care coordination, they are addressed and presented in a variety of contexts, and strongly associated with improved patient outcomes for individuals diagnosed with a primary brain tumour. This poster examines how an innovative PHC framework can be applied to the nursing care of people with primary brain tumours, discussing both current initiatives and proposed future projects.

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Health Promotion

Health promotion Initiatives include:

- Ensuring that all patients have clear appointment cards, and promoting the use of diary systems.
- Linking patients with non-government organisations who offer information, across a number of different medias.
- Ensuring that all patients have access to sufficient, appropriate and timely information including information packs that nursing staff can work through prior to discharge.
- Building capacity and resilience skills through education and support days.
- Empowering individuals to have more control over their health through informed decision-making.

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Accessibility

Initiatives focused on improving accessibility include:

- Linking patients and families with services and non-Government organisations.
- Ensuring medical and community allied health referrals occur prior to discharge.
- Improving communication with GPs to ensure that discharge information is transferred prior to initial appointments.
- Participating in State and National projects including the Cancer Service Networks National Program (CanNET), who are currently developing a number of cancer specific *Patient Management Frameworks* and a directory of cancer services.

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Appropriate Technology

Initiatives focused on appropriate technology include:

- Increasing focus on patient's advocacy, ensuring that care is administered by the right provider and in the right setting whether that be surgical, medical or palliative.
- Utilising appropriate technology to improve information sharing between health care providers, and in turn ensuring that seamless care is provided.
- Researching and proposing a number of initiates including a post discharge telephone support system.
- Providing links to reliable Information and Internet providers to ensure health equity for this vulnerable population.

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Public Participation

Initiatives to increase public participation include:

- Supporting individuals to participate in the planning, implementation and evaluation of their care, through the development of referral pathways and service directories.
- Recognising health professionals as partners rather than leaders in the decision-making process.
- Supporting initiatives including the inaugural 'Patient and Care Giver Brain Tumour Educational Day' where families, patients and health professionals are able to engage.
- Planning for future initiates including the use of narrative to research the lived experience of a brain tumour.

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Conclusion

The literature supporting the coordination of cancer care is unanimous in its support of improved outcomes; Cancer Care Coordinators will always play a crucial role in coordinating care. However, changing systems at a broader level requires the development of innovative and sustainable solutions, including addressing the needs of patients who do not have access to a Cancer Care Coordinator. With the application of a primary health care framework, support systems can move away from the biomedical model where the focus is the management of brain tumours towards a more holistic framework of care.

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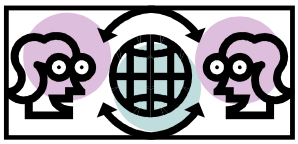


Conference Reports

The 16th Annual Scientific Meeting of the Society for Neuro-Oncology (SNO), In Collaboration with the Section on Tumors of the American Association of Neurological Surgeons (AANS). November 17-20, 2011
Orange County, California. USA.

By Rochelle Firth & Kate Becker, Nurse Practitioners, Neurosurgery. Royal North Shore Hospital, NSW.

The 16th annual meeting of SNO was held in California in November 2011. It was held in collaboration with the section on tumours of the AANS. It was reported that there were 1400 registrants at the meeting, representing health professionals from approximately 36 countries. Rochelle Firth and Kate Becker were part of the Australian contingent representing Royal North Shore Hospital. Funding to attend was gratefully assisted by the Sydney Neuro- Oncology Group (SNOG) and Merk Sharpe and Dohme (MSD).

SNO's overarching aim is stated to be "a multidisciplinary organization dedicated to promoting advances in neuro-oncology through research and education." SNO aims at providing representation for all health professionals involved in the care of neuro-oncological patients including physicians, basic scientists, nursing and allied health. It was inspiring to be part of a meeting that was dedicated to improving the management of patients and their carers living with the diagnosis of a brain tumour. It was difficult not to become overwhelmed with the feeling of commitment felt amongst the meeting participants, all so focused on brain tumours.

There were endless opportunities to listen and interact with experts in the field of neuro-oncology. There were over 90 oral presentations within the meeting program. Much like the diverse representation of health professionals amongst the audience the program also captured the multidisciplinary aims of SNO. Subjects covered within the program ranged from basic science and the cellular biology of cancer through to how this science was driving and influencing clinical practice. The first day of the program was an education day were there were two concurrent sessions, one focussing on radiation oncology and the second session focussing on quality of life and symptom management. The second session was extremely informative and thought provoking. As always in neuroscience it was reassuring that the difficulties we face in Australia are similar to those the world round. Issues of neurocognitive sequelae of brain tumours and caregiver burden and interventions were raised. Emerging research was discussed and resources and assessment tools were presented.

The general program commenced at 7am with concurrent sunrise sessions. Although it was somewhat challenging to focus so intensely at this early hour topics such as advances in neuroimaginig, neurological complications of cancer therapy, atypical and malignant meningiomas to mention a few were stimulation in itself.

There were two evening Satellite Symposia held on Thursday and Friday. On each evening there were two concurrent sessions. Of particular interest were the two symposia discussing GBM, best practices, current standards and novel approaches to management. An interactive medium was used throughout, requiring the audience to individually respond to what they felt was best practice to questions raised. It was both encouraging and pleasing to see that responses reflected Australian practice and reflected personal knowledge. Again it was inspiring to be interacting with experts amongst the field to listen to authors of papers that are commonly referenced in Australia.

From the neuroscience nurse perspective it was interesting to observe the diverse role of the neuroscience nurse amongst neuro- oncological multidisciplinary teams. Presentations were given by nurses conducting clinical research as an arm of larger scientific research projects. It was motivating to observe the collegial nature of this work and something that would be of merit to replicate in Australia. As with all International meetings it is refreshing to meet with professionals that share common challenges and goals.

SNO
Society for NeuroOncology

Conference Reports

AANN American Association of Neuroscience Nurses

A dynamic network of professionals dedicated to the care and quality of life of patients with neurological disorders.

New learning format revitalises annual AANN conference

By Christi DeLemos, CNRN, MS, ACNP-BC

More than 500 neuroscience nurses from across the US and abroad converged in Seattle Washington for the 44th annual American Association of Neuroscience Nurses (AANN) educational meeting. The AANN launched a new conference format at their 2012 annual conference aimed at increasing learning opportunities and making the conference relevant for all of their membership. The conference also embraced international colleagues, welcoming participants from Australia, Canada, Japan, the Netherlands and Uganda. The meeting was held April 28th-May 2nd and featured bite size sessions sorted by skill level with extended hours, allowing more flexibility and choice for attendees.

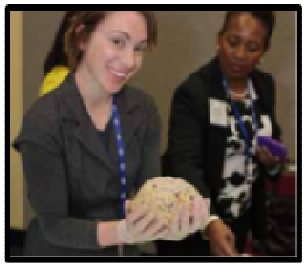
With more than 5000 AANN members across the US, the skill level of each nurse varies based on experience and training. Organising conference sessions by skill level, ranging from beginner to expert, was well received by attendees. Participants were provided with a conference schedule of more than 30 concurrent sessions that provided clear information on the session topic and skill level required to understand the lecture. Conference hours were also extended from 7AM until 9PM on several of the conference days allowing members to accrue up to 22.5 continuing education hours to maintain licensure. In todays' economic climate, fewer US nurses enjoy funded registration and conference costs. Employing a compact learning format increases the value to our membership by condensing a large number of continuing education hours into one conference.

Pre-conference workshops were offered to hone specialised neuroscience nursing skills. One of the pre-conference workshops offered this year was a neuro simulation lab aimed at improving bedside skills with neuro-monitoring. Participants joined in a hands-on simulation which featured interpretation of values, creation of a differential diagnosis and development of an individualised plan using a case-based approach to care. Other pre-conference workshop topics included a guideline review for sub-arachnoid hemorrhage, acute stroke management and development of stroke centers, evidence based guidelines for use of anticoagulants with neurologic injury and care of special populations with traumatic brain injury.

A highlight of the conference included key note speaker, Carl Macintyre, who provided an inspiring talk titled "Aphasia: Hope is a four letter word." His lecture provided a personal account of his experience and triumph in overcoming overwhelming odds to reclaim his life after suffering a major stroke at age 44. His life-affirming, candid recollections about his struggles with loss of language resonated with attendees who care for patients with neurological disease.

In addition, the annual AANN meeting provided attendees with opportunities to connect with other nurses within their sub-specialty in focus group sessions. Unlike the static learning environment of a lecture, this format allowed attendees direct interaction with experts in their own field. "Focus groups promote an open dialogue about best practice and encourage networking with other nurses who share your passion for a sub-specialty population." Said Karen Smith, RN, CNRN and neuro-oncology focus group member. Sub-specialty sessions were available for nurses with a practice focus of epilepsy, neuromuscular disorders, neuro-oncology, paediatrics, neurotrauma, movement disorders, spine, stroke and geriatrics.

The AANN Annual Meeting Planning Committee is accepting abstracts to present at the 45th Annual Educational Meeting of the American Association of Neuroscience Nurses titled "Listen, Learn, Lead" on Saturday, March 9 - Tuesday, March 12, 2013 in Charlottle, NC. The abstract submission deadline is **Monday, July 9, 2012**. We welcome Australasian members to our meeting and will look forward to seeing you in 2013!



Above, *AANN Conference anatomy session., used with permission.*

Global News

Robert Ślusarz
Editor-in-Chief

"Pielegniarstwo Neurologiczne
i Neurochirurgiczne"

The Polish Association of Neurological Nurses (PTPN) and the Nursing Section of the Polish Society of Neurosurgeons (PTNCh) are pleased to take this opportunity to announce the introduction of *The Journal of Neurological and Neurosurgical Nursing – "Pielegniarstwo Neurologiczne i Neurochirurgiczne".* I would like to thank all the members of the Editorial Board and the Scientific Council for taking such a difficult challenge of overseeing the development and the scientific merit of the magazine. In particular, I welcome and thank all the distinguished experts from other countries including: Australia, Croatia, Canada, the United States, Serbia, Turkey, Italy and Great Britain, whose huge scientific and professional experience will surely emphasize the special importance of this magazine.

In order to meet the expectations of our readers, I assure you on behalf of the whole of the Editorial Board that we will make every effort to ensure that this journal will become a respected acquisition in the field of nursing and health sciences. I am sure that it will be the beginning of the modern approach to neuroscience nursing in Poland, as well as encouraging the integration of joint activities and experiences in the care of patients with dysfunction of the nervous system across many boundaries.

It is you, as readers and authors of the published works, who will co-create the magazine, towards which I and the Editorial Board would like to encourage and thank you.

WFNN Update

Vicki Evans
WFNN Vice President

Executive Meeting: May 2012, Seattle, Washington State, USA. The main issues for discussion here was the Gifu Congress and the Global Education Initiative.

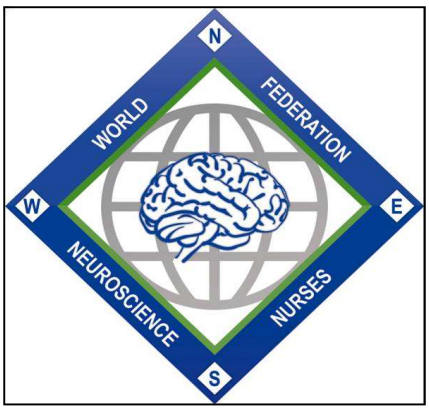
Gifu Congress 2013: As you have seen in the Guest Editorial earlier, plans are coming together well for the 2013 WFNN Congress in Gifu, Japan. The Japanese have secured sponsorship and are pleased to be able to welcome "the world" to their country—a country full of colourful history, tradition, respect, art, technology and cherry blossoms!

Scholarship packages are available through entities such as ANNA, local networks and The Ministry of Health or State Nursing Boards.

I challenge you all to make the trek to Gifu, afterall, it's in our neck of the woods!

Please visit the websites for more information **www.wfnn2013.jp** or **www.wfnn.org**

Global Education Initiative: is the group spearheading the drive to have NeuroBlend enabled as a teaching tool for nurse education throughout the world. This tool can be used globally but will mainly be processed for use amongst areas outside of teaching hospitals in particular for less developed countries. More information will follow in the near future as University and The Ministry of Health talks occur.



The World Federation of
WFNN | Neuroscience Nurses

Agnes Marshall Research Grant Award (AMRGA)

The Agnes Marshall Research Grant Award is named in honor of Agnes Marshall, founder of the World Federation of Neuroscience Nurses (WFNN).

The purpose of this award is to foster neuroscience nursing research and advance the scientific base of neuroscience nursing. The WFNN offers you the opportunity to submit an application for the Agnes Marshall Research Grant Award.

Criteria:

- The principle investigator must be a registered nurse and current member of the WFNN.
- Members of the WFNN Scientific Committee may not apply for, or benefit from, funding.
- The research project must be pertinent to neuroscience nursing.
- The application must be submitted prior to initiation of data collection.
- The principle investigator must sign an agreement with the WFNN.
- The principle investigator must assume responsibility for the conduct of the research.

Amount of Research Grant:

Total maximum amount of award: US$4,000.

Procedure:

- Application forms and instructions are available from the WFNN website: www.wfnn.org
- Applications are to be submitted to the Chair, WFNN Scientific Committee
- Applications are to be received no later than **February 13, 2013.**
- Award will be presented at the WFNN Congress - Gifu, Japan 2013.
- Completed research is to be presented at the WFNN Congress in 2017.

For further information, contact your WFNN representative through your WFNN Membership Association, or send an email to:

Vicki Evans, WFNN Scientific Committee Chair at vevans@nsccahs.health.nsw.gov.au

Scholarship Requirement

Scholarship Award Requirement

Applicants receiving an award/scholarship for their paper/poster at the annual ANNA conference are required to submit their written paper for publication in the *Australasian Journal of Neuroscience* as part of their scholarship guidelines. The successful applicants name will be forwarded to the Journal Editor for follow-up.

All members presenting at the ANNA Conference are encouraged to submit their work for publication in the *Australasian Journal of Neuroscience*. Assistance is available.

Instructions for Authors

The *Australasian Journal of Neuroscience* publishes original manuscripts on all aspects of neuroscience patient management, including nursing, medical and paramedical practice.

Peer Review

All manuscripts are subject to blind review by a minimum of two reviewers. Following editorial revision, the order of publications is at the discretion of the Editor.

Submission

A letter of submission must accompany each manuscript stating that the material has not been previously published, nor simultaneously submitted to another publication. The letter of submission must be signed by all authors. By submitting a manuscript the authors agree to transfer copyright to the *Australasian Journal of Neuroscience*. A statement on the ethical aspects of any research must be included where relevant and the Editorial Board reserves the right to judge the appropriateness of such studies. All accepted manuscripts become copyright of the *Australasian Journal of Neuroscience* unless otherwise specifically agreed prior to publication.

Manuscripts

Manuscripts should be typed using 10 font Arial in MS Word format. It should be 1.25 spaced with 2cm margins. Number all pages. Manuscripts should be emailed to the AJON Editor at: editor@anna.asn.au

TITLE PAGE: Should include the title of the article; details of all authors: first name, middle initial, last name, qualifications, position, title, department name, institution: name, address, telephone numbers of corresponding author; and sources of support (e.g. funding, equipment supplied etc.).

ABSTRACT: The abstract should be no longer than 250 words for an original paper, 100 words for a short report.

KEY WORDS: 3 to 6 key words or short phrases should be provided, below the abstract, that will assist in indexing the paper.

TEXT: Use of headings within the text may enhance the readability of the text. Abbreviations are only to be used after the term has been used in full with the abbreviation in parentheses. Generic names of drugs are to be used.

REFERENCES: In the text, references should be cited by author's name and year of publication in parentheses. For example (Lloyd, 2002). The reference list, which appears at the end of the manuscript, should list alphabetically all authors. References should be quoted in full or by use of abbreviations conforming to Index Medicus or Cumulative Index to Nursing and Allied Health Literature. The sequence for a standard journal article is: author(s), year, title, journal, volume, number, first and last page numbers. The sequence for a book is: author(s), year, title of book, edition number, place of publication, publisher, first and last pages of reference. The sequence for an author(s) in an edited book is: author(s), year, title of reference (chapter/article), in editor(s), year, title of book, place of publication, first and last pages of reference.

Example — electronic material:
author, editor or compiler; date of creation or latest revision of document, title, name of sponsor, date viewed, URL

Example – journal article:
Chew, D and Woodman, S (2001) 'Making Clinical Decision in Neuroscience Nursing', Australasian Journal of Neuroscience Nursing, Vol. 14 , No 4: pp.5-6.

Example – book:
Buckland, C (1996) Caring: A Nursing Dilemma. Sydney: WB Saunders.

Three or more authors:
List all authors the first time the reference is cited. Thereafter cite first author and et al. Example: (Thompson, Skene, Parkinson, and Baker, 2000). Thereafter (Thompson, et al., 2000).

Example electronic document in web site:
Brown, LG (2005) R*eview of nursing journals*, 30 June, Department of Nursing Knowledge, Penrith, viewed 30 September 2007, http://www.nurs.journ-index/ju_22/.html

ILLUSTRATIONS: Each figure must be professionally drawn on a separate page. Each table must be double-spaced on a separate page. Figures and tables must be consecutively numbered and have a brief descriptor. Photographs must be of a high quality and suitable for reproduction. Each photograph must be unmounted and be labelled on the back indicating the number of the photograph, with an arrow indicating the top of the illustration. On a separate sheet photograph numbers with a brief title are listed. Authors are responsible for the cost of colour illustrations. Written permission must be obtained from subjects in identifiable photographs of patients (submit copy with manuscript). If illustrations are used, please reference the source for copyright purposes.

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Final proof corrections are the responsibility of the author(s) if requested by the Editor. Prompt return of proofs is essential. Galley proofs and page proofs are not routinely supplied to authors unless prior arrangement has been made with the Editor.

Discussion of Published Manuscripts

Questions, comments or criticisms concerning published papers may be sent to the Editor, who will forward same to authors. Reader's letters, together with author's responses, may subsequently be published in the Journal.

Checklist

Letter of submission; all text 10 font Arial typed 1.25-spaced with 2cm margins; manuscript with title page, author(s) details, abstract, key words, text pages, references; illustrations (numbered and with captions); permission for the use of unpublished material, email manuscript to editor@anna.asn.au

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Indexed

The *Australasian Journal of Neuroscience* is indexed in the Australasian Medical Index and the Cumulative Index of Nursing and Allied Health Literature.

Calendar of Events

2012:

- **April 28 – May 1, American Association of Neuroscience Nurses Conference.**
  Washington State Convention & Trade Centre. Grand Hyatt. Seattle, WA. USA
  www.aann.org

- **16-19 May**, **7th World Congress of Neuro Rehabilitation** (WCNR2012) Innovations in Neuro Rehabilitation. Melbourne Convention & Exhibition Centre. Melbourne, Victoria. Australia.
  www.dcconferences.com.au/wcnr2012

- **27 May – 1 June, 12th International Child Neurology Congress and 11th Asian and Oceanian Congress of Child Neurology** Brisbane Convention and Exhibition Centre, Brisbane, Australia. www.icnc2012.com

- **26-28 October,** British Association of Neuroscience Nurses Conference. Edinburgh, UK. www.bann.org.uk

2013:

- **9 – 12 March, American Association of Neuroscience Nurses Conference**
  Charlotte Convention Centre.
  Westin Charlotte. Charlotte, NC. USA
  www.aann.org

- **18-23 May, International Council of Nurses.** Melbourne, Victoria. Australia.
  www.icn2013.ch or via
  www.anna.asn.au

- **13-17 September, World Federation of Neuroscience Nurses Congress**
  Nagaragawa Convention Centre.
  Gifu, Japan.
  www.wfnn2013.jp or via
  www.wfnn.org

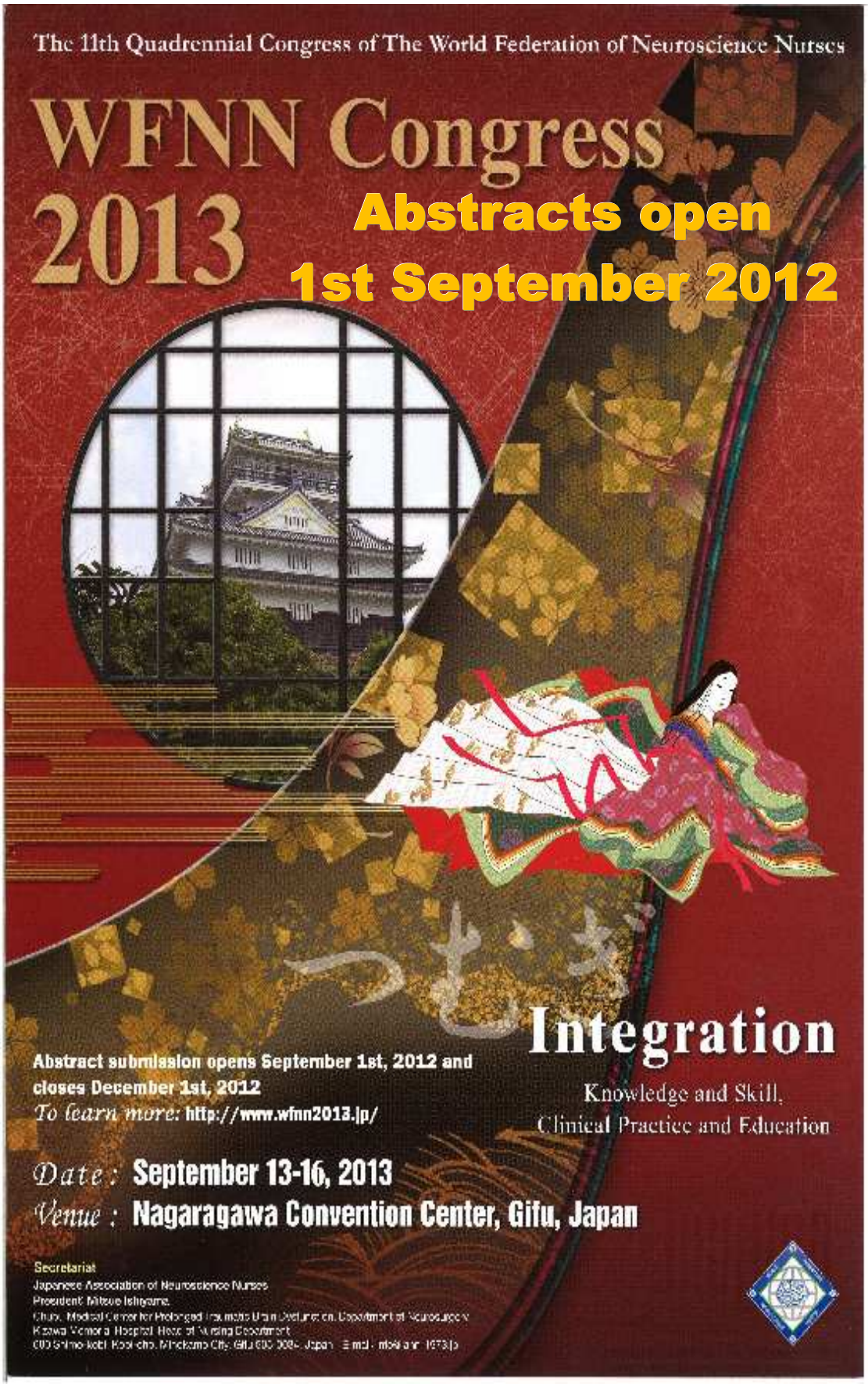
- **1-4 October, World Parkinson Congress** Montreal, Canada.
  www.worldpdcongress.org
  Email: Info@worldpdcongress.org

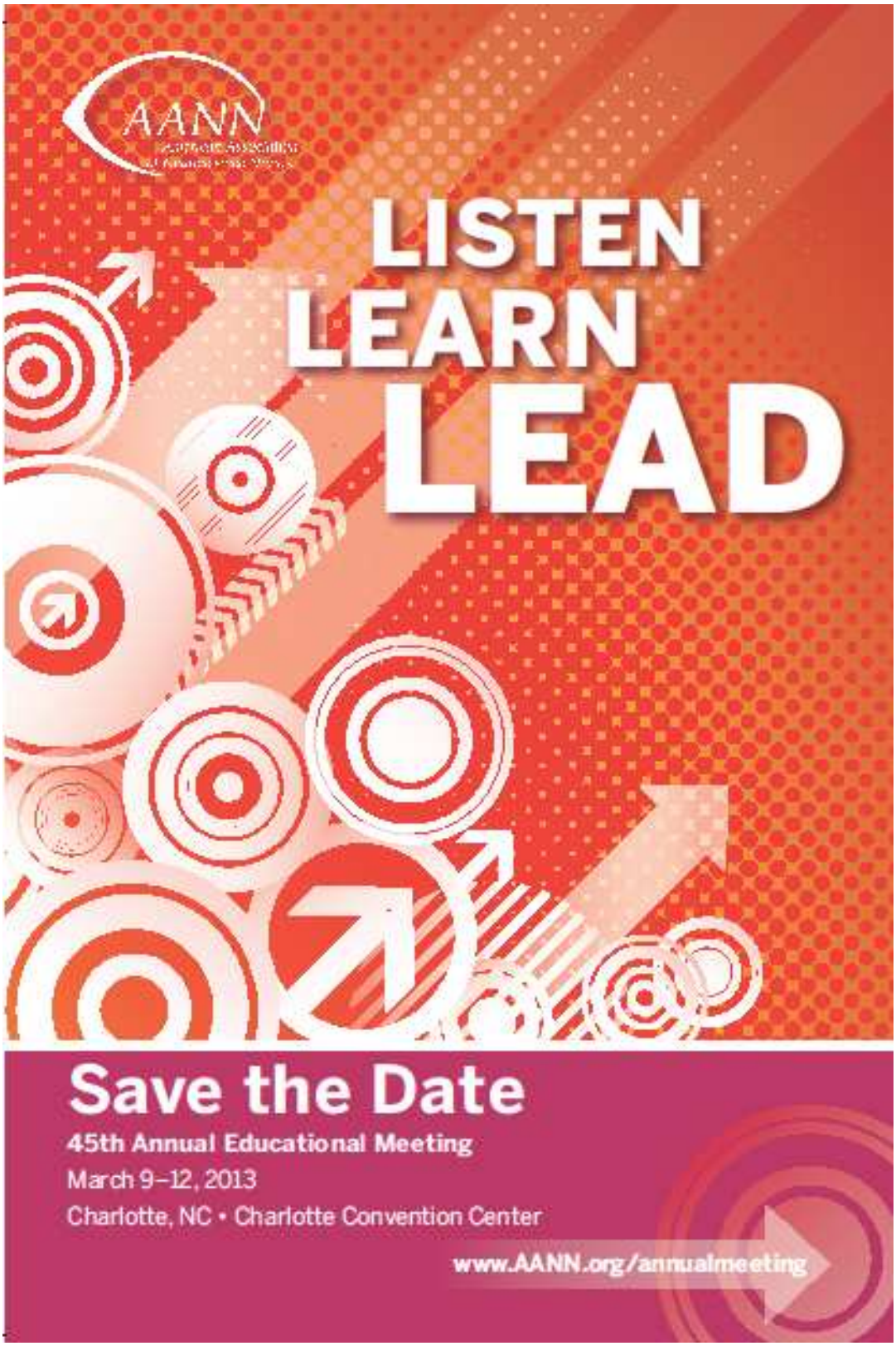
2015:

European Association of Neuroscience Nurses Congress

Belgrade, Serbia.

Dates: TBC


The 11th Quadrennial Congress of The World Federation of Neuroscience Nurses
WFNN Congress 2013
Abstracts open
1st September 2012
Integration
Knowledge and Skill,
Clinical Practice and Education
Abstract submission opens September 1st, 2012 and closes December 1st, 2012
To learn more: http://www.wfnn2013.jp/
Date : September 13-16, 2013
Venue : Nagaragawa Convention Center, Gifu, Japan
Secretariat
Japanese Association of Neuroscience Nurses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