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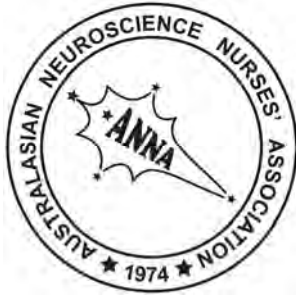
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Editorial

Editor - Vicki Evans

The 2013 ANNA Conference was held earlier this year in Sydney in conjunction with the Neurosurgical Nurses Professional Development and Scholarship Committee of the NSW Agency for Clinical Innovation.

- The Prize Paper was awarded to Linda Nichols for her paper - "Anti- N-methyl-D-aspartic acid (NMDA) Receptor Encephalitis".
- The Prize Poster was "Promoting Partnerships in Health - Through Patient Education", by Kathleen Naughton.

Congratulations to both winners. Their abstracts as well as all the abstracts for the ANNA Conference are in this edition.

There is an insightful look at nursing interventions in aneurysmal subarachnoid haemorrhage. The author acknowledges that nurses have a pivotal role in patient care post aneurysmal SAH. Exactly what that role is in management is discussed.

The journal begins with a Guest Editorial from Christi DeLemos, the new President of the World Federation of Neuroscience Nurses discussing if there is a "golden-bullet" theory for TBI. Currently, good nursing assessment, ICP monitoring and neuroprotection are part of the golden management plan.

Cheers, *Vicki*



Guest Editorial

Christi DeLemos, CNRN, MS, ACNP-BC

Where is the "golden bullet" for traumatic brain injury?

The results of two landmark studies in head trauma have caused a stir in the neurotrauma community and made us all question "What treatments are on the horizon that will work for traumatic brain injury?" Randall Chestnut and colleagues recently published a multi-centre-study (BEST-TRIP) that evaluated the benefits of intracranial pressure (ICP) monitoring in severe traumatic brain injury. 1 The trial was conducted in intensive care units in Bolivia and Ecuador where ICP monitoring was not considered a standard of care. Three hundred and twenty-four (324) subjects were randomly assigned to one of two protocols: ICP goal directed management to maintain the ICP less than 20 or a treatment protocol based on imaging and clinical exam alone. The primary outcome was survival and functional outcome at 3 and 6 months after injury.

Unexpectedly, they found no significant difference in the outcome of those with carefully titrated ICP to less than 20 and those whose care was directed by imaging and clinical examination. For nurses like me, who have never managed a severe TBI patient without the benefit of an external ventricular drain and ICP monitor, the results make us wonder if carefully correcting a number is only a piece of a very complex puzzle. The authors do point out that the ICP- based management protocol was more efficient, resulting in fewer interventions, but it did not result in a better functional outcome. It should also be noted that the ICP group used an intraparenchymal monitor for measurement rather than a transduced ventricular drain that has the inherent benefit of draining cerebrospinal fluid to reduce pressure. It's possible that the results would have been different if drainage was used.

Certainly one could argue that ICU care in South America may not be generalizable to Europe and the United States. However, one important outcome of publication of these data is defining an exam based treatment algorithm for severe traumatic brain injury. For countries

who lack the resources to provide ICP monitoring, Chestnut and colleagues have published the first ever TBI management guideline solely based on clinical examination and imaging. This is an important step in the global effort to reduce morbidity and mortality associated with TBI.

These results were preceded by another trial that examined bifrontotemporoparietal hemi-craniectomy to decrease ICP in diffuse TBI. Cooper and colleagues randomized 155 subjects with refractory intracranial hypertension to receive either decompressive craniectomy or standard care.² The primary outcome was the incidence of death, vegetative state or severe disability. Similar to the Chestnut study, subjects in the craniectomy group required fewer interventions for management of elevated intracranial pressure and fewer ICU days. But these advantages did not translate to favorable outcomes. In fact, survivors of craniectomy were at greater risk of an unfavorable outcome.

These paradoxical results make us re-examine how we currently interpret ICP values. Perhaps we have placed too much emphasis on a single variable when we should be placing equal emphasis on excellent nursing assessment skills and nursing measures to avoid secondary insults. Whether you use an exam or ICP monitor, controlling ICP is an important strategy in the management of traumatic brain injury. These studies do not dispute the value of a measurable index of ICP but rather point to the fact that brain injury is a complex problem that requires individualized nursing care.

They also reinforce the need to question treatments that become a standard without the benefit of randomized controlled trials. The negative results from the CRASH trial spurred a highly provocative editorial in *The Lancet*, which suggested that the broad application of corticosteroids to head-injured patients may have caused more than 10,000 deaths during the 1980's.³ As a nurse practitioner working in the TBI arena, I wonder if the next step is combined therapy focused on ICP control, renewed interest in excellent bedside skills to prevent secondary insults and a neuroprotective agent to shield the brain as it heals.

Several multi-center studies are underway in the US to evaluate neuroprotective agents to treat TBI. Two studies (ProTect and Synapse) that are examining the effect of Progesterone in head trauma are close to completion.

Early administration of Progesterone in both human and animal model studies has been found to reduce cerebral edema, lower mortality rates and increase the chance of a favorable outcome in brain injury.⁴ Neuren pharmaceuticals is also developing an IGF-1 analogue that suppresses seizure activity, reduces programmed cell death and improves outcome in pre-clinical brain injury studies. The Intrepid-2566 trial is currently open to enrolment at nine US centers and slated to complete in 2014. Maybe within our nursing careers, TBI management will shift to a cocktail approach: combining novel medicines for neuroprotection, astute bedside nursing exam to detect signs of neurologic change and multimodal monitoring. In the meantime, we can refocus our attention on good nursing assessment that is complemented by ICP monitoring.

~ *Christi*

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Nursing Interventions Related to Cerebral Perfusion Pressure Following an Aneurysmal Subarachnoid Haemorrhage.

Linda Nichols, Lindsay Smith, Penny Allen, Isabelle Ellis

Abstract

Nursing assessment, decisions and interventions are important in the management of cerebral vasospasm for patients following aneurysmal subarachnoid haemorrhage (aSAH). The nursing role in fluid management is complex, characterised by frequent decisions regarding flow rates of fluids and medications. Whilst there is extensive literature outlining the medical care for patients post aSAH, nurses are practising in an environment where the guidelines related to haemodynamic augmentation are varied and the evidence is lacking. A literature review was undertaken to understand the current state of knowledge relating to the role of nurses in haemodynamic augmentation and the management of vasospasm for patients post aSAH. A key word search was conducted of the electronic databases Pubmed, Proquest and Cochrane. A specific search for nursing related research identified a total of 70 articles. From this initial list, 16 articles were identified as being specific to nursing practice and interventions; 14 papers described empirical nursing research, however the articles were descriptive in nature and provided little beyond a clinical overview of the natural history of aSAH. Two studies specifically focused on the role of the nurse when caring for patients post aSAH. Whilst the nursing role is represented in the literature, the complex nature of the role is not acknowledged. Further research is needed on nurses understanding of the decisions behind nurses' choices regarding the amounts and timing of intravenous fluids, as well as the indications for inducing hypertension in patients who have experienced an aSAH.

Key words: Neuroscience nursing, nursing interventions, aneurysmal subarachnoid haemorrhage, cerebral vasospasm, triple H therapy, haemodynamic augmentation, literature review.

Introduction

An aneurysmal subarachnoid haemorrhage (aSAH) is a devastating neurological event with 20% of patients dying as a result of their initial haemorrhage. The last 25 years has demonstrated increased survival rates for patients who reach hospital, however it is estimated that a further 32% of patients will die of secondary complications (Herrmann & Zabranski, 2007; Komotar, Schmidt, Starke, Claassen, Wartenberg, Lee, Mayer, 2009; Lovelock, Rinkel & Rothwell, 2010; Rank, 2013). Predicting functional outcomes following an aSAH remains difficult with mortality and morbidity influenced by the patient's

presenting condition and comorbidities, the severity of the bleed, the success of the securing of the aneurysm and the occurrence and severity of secondary complications (Naval, Stevens, Mirski & Bhardwaj, 2006; Anderson, 2009). Initially, medical interventions are focused on securing the aneurysm and reducing the risk of rebleeding. Following initial medical interventions monitoring for and treatment of secondary complications, particularly vasospasm, is of the utmost importance (Ohkuma, Tsurutani & Suzuki, 2001). Defined as sustained constriction of the cerebral arteries, vasospasm is the major cause of delayed cerebral ischaemia post an aSAH, with an estimated 25% of patients subsequently experiencing a cerebral infarct secondary to vasospasm (Blissitt, Mitchell, Newell, Woods & Belza, 2006). Nurses play a pivotal role in patient care post aSAH and the management of cerebral vasospasm, nurses decisions and interventions related to fluid management are integral to preventing secondary brain injury (Campbell & Edwards, 1997). However, nurs-

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es are more often following protocols and unsubstantiated regimes without questioning the origins of the practice or the physiological theory of interventions (Lowry, 1998; Cook, 2004). Whilst there is extensive literature outlining the medical care of patients following aSAH, the role of nurses has not been sufficiently researched (Cook, Deeny & Thompson, 2004). The nursing role is poorly recognised not only in terms of general patient care but also in terms of decision making and outcomes. This is particularly pertinent as nurses are practising in settings where there are variable guidelines related to the care of patients post aSAH.

Methods

An initial search was conducted utilising the Pubmed, Proquest, MEDLINE and Cochrane databases. Articles from 1965 to 2013 were analysed with older articles providing a historical perspective on the changes in practice as well as seminal pieces of work. The databases were searched utilising a number of combined search terms, articles were reviewed and relevant articles were retrieved for inclusion. The reference lists of articles were searched to identify additional publications with consideration for the differing international spelling. The search was undertaken utilising a combination of the terms subarachnoid haemorrhage and epidemiology, etiology, risk factors, smoking, alcohol, familial, triple H therapy, haemodynamic augmentation, hypertension, cardiac output, haemodilution and hypervolaemia. A specific search for nursing related papers identified a total of 70 papers. From this initial list 16 papers were identified as being specific to nursing practice and interventions. Fourteen papers reported descriptive level nursing research and provided a clinical overview of aSAH. The two articles, Cook, Denny and Thompson (2004) and Lange (2009), were the only studies that presented original research focused on analysing the role of the nurse when caring for patients post aSAH. Full copies of all the articles were obtained for analysis and because of the broad scope of the topic and the limited data pertaining to the nursing role following an aSAH, all relevant representative evidenced based literature was included in the following discussion.

Discussion

Etiology

The clinical characteristics of an aneurysm including its location, size, shape and associated blood loss are viewed as significant factors in determining clinical outcomes. It is

estimated that over 85% of aneurysms occur in the proximal arterial bifurcations of the anterior circle of Willis (Buckley & Hickey, 2009), haemodynamic forces and abnormal arterial wall stresses identified as indications for aneurysm rupture (Takao, Murayama, Otsuka, Qian, Mohamed, Masuda, Abe, 2012). The theory, of the larger the aneurysm the more likely it is to rupture (Weir, Disney, & Karrison, 2002), remains contested. More recently, prediction of the likelihood of rupture has focused on both the size of an aneurysm and the ratio with the parent vessel (Rahman, Smietana, Hauck, Hoh, Hopkins, Siddiqui, Mocco, 2010). The genome-wide linkages associated with aSAH continue to be researched however, most linkages have to date been located in noncoding DNA. It is suggested that only 5% of aSAH's are associated with inheritable connective tissue disorders, such as autosomal dominant polycystic kidney disease and type IV Ehlers Danlos Syndrome (Pfohman & Criddle, 2001). Historically it was claimed that 5-20% of aSAH patients could identify a familial history of aSAH (Schievink, 1997). However this is generally limited to first degree relatives who have a 3-7 fold increase in risk for an aSAH (Gaist, Vaeth, Tsiropoulos, Christensen, Corder, Olsen, & Sorensen, 2000), with Bromberg, Rinkel, Algra, Greebe, van Duyn, Hasan, & van Gijn (1995) suggesting that the risk for second degree relatives is similar to that of the general population.

Compared to other stroke sub types, aSAH affect a substantially disparate cohort, with the incidence plateauing and even decreasing slightly with age (Cavanagh & Gordon, 2002). Gender is consistently demonstrated to have a marked influence, with women more than one and half times more likely to develop an aSAH than men (Eden, Meurer, Sanchez, Lisabeth, Smith, Brown, & Morgenstern, 2008; Linn, Rinkel, Algra, & van Gijn, 1996). Independent of gender, hypertension is identified as a risk factor, leading to a push to treat hypertension in first-degree relatives of patients with aSAH (Audibert, Bousquet, Charpentier, Devaux, & Mertes, 2007; Broderick, Viscoli, Brott, Kernan, Brass, Feldmann, & Horwitz, 2003). There is a further suggestion that a relationship exists between hormonal status and the risk of aSAH. Okamoto, Horisawa, Kawamura, Asai, Ogino, Takagi, & Ohno (2001) suggest that hormonal factors including late age onset of menstruation, reproductive history and menopause are associated with a reduced risk of aSAH. Johnstone, Colford & Gress (1998)

and Wang, Li, Li, Sun, Jin, Sun, & Bai (2012) suggest the use of oral contraceptives as a risk factor; however Chen, Stiefel, Oddo, Milby, Maloney-Wilensky, Frangos, & LeRoux (2011) suggest that exposure to exogenous oestrogen agents is associated with a lower frequency of aSAH.

A number of systematic reviews and longitudinal case control studies have reviewed the modifiable and environmental risk factors for aSAH (Inagawa, 2005, 2010; Karamanakos, Von Und Zu Fraunberg, Bendel, Huttunen, Kurki, Hernesniemi, & Koivisto, 2012; Knekt, Reunanen, Aho, Heliovaara, Rissanen, Aromaa, & Impivaara, 1991; Sandvei, Lindekleiv, Romundstad, Muller, Vatten, Ingebrigtsen, & Vik, 2012; Sandvei, Romundstad, Muller, Vatten, & Vik, 2009; Teunissen, Rinkel, Algra, & van Gijn, 1996). Smoking and those with a history of smoking have been discussed as being an independent risk factor with a suggested hazard ratio for aSAH of 2.7 for former smokers and 6.1 for current smokers compared to those who have never smoked (Sandvei, et al., 2009; Clarke, Mendelow, & Mitchell, 2005). In younger patients the use of recreational drugs (in particular cocaine) has been associated with an increased risk for aSAH (Broderick, et al., 2003). Alcohol induces transient peaks in systolic blood pressure and is associated with aSAH on distinct dose relationship (Hillbom, Saloheimo, & Juvela, 2011; Leppala, Paunio, Virtamo, Fogelholm, Albanes, Taylor, & Heinonen 1999). Whilst it is proposed that it is a genetic predisposition and cumulative environmental and lifestyle choices that effect outcome, there has been limited multivariate analysis of modifiable risk factors on both aneurysm rupture and outcome.

Epidemiology

There is a significant variance in the worldwide incidence of aSAH. China reports an annual incidence of 2 cases per 100,000, while Japan and Finland report 22.5 and 23 cases per 100,000 respectively (Inagawa, Takechi, Yahara, Saito, Moritake, Kobayashi, & Sugimura 2000; Teunissen, et al., 1996). The literature also indicates a higher incidence of aSAH in the winter and spring months (Inagawa, 2002; ACROSS, 2000; Gallerani, Portaluppi, Maida, Chierrgato, Calzolari, Trapella, & Manfredini, 1996). In western countries the incidence is reported as between 4-8 per 100,000 per annum, with regional variances including southern and Central America, where the incidence is 4.2

per 100,000 per annum (de Rooij, Linn, van der Plas, Algra, & Rinkel, 2007). In 2000 an Australasian study by the Australasian Cooperative Research on Subarachnoid Haemorrhage Study (ACROSS) group reported an annual incidence per 100,000 in Hobart of 11.1. This was significantly higher than the other study centres of Adelaide (7.7) and Perth (6.9), however it was comparable with Auckland (11.2), with a total annual incidence across all centres of 8.1 per 100,000 (ACROSS, 2000). Unlike the incidence of ischaemic stroke the incidence of aSAH has not significantly changed over the last 20 years (Inagawa, 2001). Understanding the complex interplay of environmental and modifiable risk factors on the incidence of aSAH is vital to elucidating regional variances and in focusing preventative interventions.

Cerebral perfusion following aSAH

An aSAH results in increased blood within the cranial cavity and whilst autoregulation can maintain intracranial pressure (ICP) this process is limited. Unlike other organs where perfusion is dependent on the difference between mean arterial pressure (MAP) and central venous pressure (CVP) the brain is dependent on ICP. Cerebral perfusion pressure (CPP) can be expressed as MAP minus ICP. A CPP of at least 70mmHg is recommended to reduce the risk of ischaemia (Schmidt, Ko, Helbok, Kurtz, Stuart, presciutti, & Mayer, 2011). However, CPP should not be analysed in isolation, as decreased brain oxygenation is associated with the development of ischaemia post aSAH (Dhar, Scalfani, Zazulia, Videen, Derdeyn, & Diring, 2012; Eriksson, Barletta, Figueroa, Bonnell, Vanderkolk, McAllen, & Ott, 2012). Whilst haemodynamic therapies are geared towards increasing blood flow to the brain, oxygen delivery capacity is often not considered and cerebral compromise in patients is not always detectable through ICP and CPP monitoring (Chen & Lin, 2011). The nursing management of patients post aSAH risks becoming focused on chasing parameters and numbers rather than the optimisation of perfusion and oxygenation when practices are focussed on pre-set parameters with little or no consideration of desired outcomes. Cook et al. (2004) reporting on the management of fluid and hydration post aSAH, found the mean arterial blood pressure of patients was below recommended levels with the results indicating variability of practices and insufficient MAP. Despite this being a limited study it does highlight whilst numbers are recorded and fluid charts are balanced for patients fol-

lowing an aSAH there is often little or no analysis of the implications of haemodynamic and neurological monitoring such as MAP and CPP. It is debated as to whether ICP and/or CPP should be utilised as a target therapy to predict outcome (Springborg, Frederiksen, Eskesen, & Olsen, 2005). While the use of jugular venous oximetry and brain tissue oxygenation serve as measures of cerebral blood flow and oxygenation, access to the monitoring equipment is limited in many areas and ICP remains the mainstay of practice.

Vasospasm following aSAH

Following an aSAH blood is released into the subarachnoid space, with volume, density and prolonged presence predictors for vasospasm (Frontera, Claassen, Schmidt, Warthenberg, Temes, Connolly, & Meyer, 2006; Reilly, Amidei, Tolentino, Jahromi, & Macdonald, 2004). Vasospasm typically occurs 3-14 days following an aSAH, with an increased incidence between days 5-12 and generally resolves by day 28 (Blissitt, et al., 2006; Connolly, Rabinstein, Carhuapoma, Derdeyn, Dion, Higashida, & Vespa, 2012; Kosty, 2005). As the blood within the subarachnoid space begins to dissolve there is interference with the movement of calcium into and out of the cells, spasmogenic substances such as serotonin, prostaglandins, catecholamines and histamine are also released and are thought to contribute to vasospasm (LeStrange, 2003; Rusy, 1996). It is suggested that 30-60% of individuals will experience vasospasm following an aSAH, however only half of these patients will experience symptoms (Rabinstein, Lanzino, & Wijidicks, 2010; Doerksen, Naimark, & Tate, 2002). Vasospasm can present with sudden, gradual or insidious signs and symptoms and nurses are often the first to recognise the deteriorating or fluctuating patient. This highlights the need for incorporating broader clinical observations that are flexible and not reliant on singular scales (Kosty, 2005).

The dihydropyridine calcium antagonist nimodipine is currently the only recommendation post aSAH that is evidence-based. However, when administered in isolation it is associated with hypotension and it is almost always administered in conjunction with haemodynamic measures aimed at avoiding volume depletion, restoring and maintaining normal circulating intravascular volume and subsequent tissue perfusion (Rabinstein, et al., 2010; Bederson, Connolly, Batjer, Dacey, Dion, Dringer, & Rosenwasser, 2009; Kronvall, Undren, Romner, Saveland, Cronqvist, &

Nilsson, 2009; Dorhout Mees, Rinkel, Feigin, Algra, van den Bergh, Vermeulen, & van Gijn, 2007; Stiefel, Heuer, Abrahams, Bloom, Smith, Maloney-Wilensky & LeRoux, 2004; Monterio, 2001). Despite the literature supporting practices that are focused on euvolaemia with or without hypertension, there is still a tendency to treat patients with rebound aggressive hypervolaemia, haemodilutic and hypertensive measures that are more commonly referred to as triple H therapy (Macdonald, 2006). Although medical practitioners are ultimately responsible for determining appropriate treatment options, including the prescription of treatments and parameters, it is the nurse's role to interpret and implement orders.

Nursing role

The nursing role post aSAH is mired by a lack of quality evidence that has resulted in a multitude of approaches to care. Whilst existing guidelines provide detailed descriptions of the natural history and best medical practice following an aSAH (Bederson, et al., 2009; Thompson, 2009), they do not focus on the complex care issues, interventions, assessments and decision making undertaken by nursing staff following an aSAH (Wuchner, Bakas, Adams, Buelow, & Cohn, 2012; Diringer, Bleck, Claude Hemphill, Menon, Shutter, Vespa, & Zipfel, 2011). Early detection of vasospasm allows for prompt interventions that can prevent ischaemia and subsequent infarction (Doerksen & Naimark, 2006). While it is the nurse's role to construe and adjust interventions to meet prescribed observations and parameters, knowledge of the nurse's role in the application and monitoring of interventions is limited. Cook et al. (2004) purport that for nurses to achieve a high-quality holistic role they must have a sense of autonomy regarding their role in fluid and medication management post aSAH. It can be argued that nurses do practise independently in that they are frequently making decisions regarding flow rates of fluids and medications; however they are still chasing pre-set parameters with little or no consideration of individual patient needs, electrolyte values or blood results. Crimlisk & Grande (2004) suggest that nurses must utilise their skills to draw conclusions from this data regarding the patient's clinical condition. Nurses are undoubtedly competent at completing fluid balance charts and balancing numbers, however the reasoning behind decisions supporting care changes is often not included in progress note documentation. Historically the administration and monitoring of intravenous fluids

has been a nursing task (Cook, et al., 2004; Edwards, 2001), however, Gelling & Munn-Giddings (2006) suggest that it is misleading to claim that the delivery of triple H therapy is a unique nursing role. Whilst the prescription of fluids is the responsibility of medical staff, following an aSAH haemodynamic augmentation requires nurses to make decisions regarding fluid choices and rates within the parameters of the prescribed order.

Triple H therapy

Since its introduction in the literature and popularisation in the late 1970's Triple H therapy has been widely utilised both prophylactically and as a therapeutic intervention following an aSAH. The three pronged approach of hypervolaemia, haemodilution, and hypertension is utilised in varying degrees in most facilities despite the lack of prospective, randomised studies to support its efficacy (Ogungbo, Prakash, Ushewokunze, Etherson, & Sinar, 2005; Zubkov & Rabinstein, 2009). Its wide use is based on the clinical observation that some patients improved dramatically following hemodynamic augmentation and despite the prominence of the practice in the neurosurgical setting the physiological basis upon which Triple H therapy is based remains questionable (Myburgh, 2005). The original basis of Triple H therapy was that autoregulation is lost when vasospasm occurs, thus the pressure dependence of blood flow is altered and as vessels spasm they can no longer dilate or constrict to regulate blood flow (Kosty, 2005). Triple H therapy is proposed to support CPP however, the practice of routine Triple H therapy is questionable and should only to be practised on an individual needs basis that considers respiratory and cardiac comorbidities and neurological condition (Lazaridis & Naval, 2010; Myburgh, 2005; Rinkel, Feigin, Algra, & van Gijn, 2004).

Hypervolaemia

Following an aSAH the literature supports euvolaemia as best practice, however this practice continues to focus on rebound hypervolaemic augmentation therapy (Dorhout Mees, et al., 2007; Myburgh, 2005). Whilst the elevation of arterial blood pressure has been demonstrated to increase cerebral blood flow and oxygenation, the benefit is reversed when volume expansion is added to the regime (Muench, Horn, Bauhuf, Roth, Philipps, Hermann, & Vajkoczy, 2007). Historically, hypervolemia has been achieved through the administration of 4-12 litres of intravenous fluids per day to reach positive

fluid balances and target CVP. The central aim is to expand intravascular volumes with the hypothesis that this will dilate cerebral vessels through the forced administration of fluid through them (LeStrange, 2003). The effect of hypervolaemia on regional or microvascular flow and cerebral autoregulatory processes is contentious. Whilst hypervolaemia is successful in its elevation of cardiac filling pressures it does not influence cerebral blood flow and needs to be supported by hypertension and increased cardiac output (Kim, Van Ginhoven, & Milewicz, 2003; Macdonald, 2006; Myburgh, 2005). The practice is also questionable on the basis that the administration of large volumes of fluid in individuals with intact renal and preserved cardiac function is unlikely to achieve a sustained hypervolaemic state and the correlation of daily fluid balance with actual circulating blood volume is established as being poor (Hoff, Rinkel, Verweij, Algra, & Kalkman, 2008; Kasuya, Onda, Yoneyama, Sasaki, & Hori, 2003). The monitoring of patients fluid status remains an integral part of nursing care following an aSAH; however this practice remains focused on chasing pre-set parameters. CVP and haemodynamic parameters such as heart rate, blood pressure and the calculation of daily fluid balances are often the main guiding influence for the choice and volume of the fluids administered (Rank, 2013; Hoff, et al., 2008) despite nurses identifying that neurological status is the important indicator when monitoring the effects of fluid administration (Cook, et al., 2004).

Haemodilution

Haemodilution remains the most controversial component of triple H therapy, occurring secondary to hypervolaemia it is suggested that decreased blood viscosity indirectly augments blood flow (Bederson, et al., 2009; LeStrange, 2003). Altered rheological properties of blood are thought to theoretically improve flow through vessels (Myburgh, 2005). However, the net benefit is questionable, as the increased cerebral blood flow of isovolaemic haemodilute blood must be offset with dilutional haematocrit values and compromised oxygen delivery capacity (Ekelund, Reinstrup, Ryding, Andersson, Molund, Kristiansson, & Saveland, 2002). Fluid choices are varied with both crystalloids and colloids utilised to produce haemodilution and this uncertainty continues due to a lack of randomised control trials (Rabinstein, et al., 2010; Tseng, Hutchinson, & Kirkpatrick, 2008). The administration of large volumes of intravenous colloids or crystalloids is addi-

tionally questionable as it invariably results in a polyuric state, often complicated by electrolyte disturbances. Isotonic fluids such as normal saline have a negligible effect and are associated with only brief increases in intravascular volume and the administration of large volumes can result in dilutional acidosis (Moritz & Ayus, 2007). Nurses are often faced with the decision of intravenous fluid choice, whilst maintenance fluids are prescribed in terms of types and hourly rates it is often the nurse's role to select fluids that will be administered for boluses and ascertain the timing and number of boluses. The autonomy of this practice is not supported by nursing assessments, with Cook et al. (2004) indicating that the nurses in their study felt that it was not their role to be aware of electrolyte values when administering 'regular' fluids. However what is 'regular' when it is established that nurses may have a selection of both colloids and crystalloids to select from? The monitoring of haematocrit levels is claimed as being an important nursing role (Iskhandar Shah & Christensen, 2012; Mower-Wade, Cavanaugh, & Bush, 2001), however the literature fails to establish if this practice is consistent across centres and valued by nurses as a nursing role.

Hypertension

The elevation of blood pressure is associated with improved cerebral blood flow in areas where autoregulation is absent or decreased (Macdonald, 2006). The practice, however, has become focused on indiscriminate interventions and parameters rather than haemodynamic optimisation. Ideally, induced hypertension is aimed at achieving a 20-30% rise in mean arterial blood pressure in accordance with the patient's pre-morbid blood pressure (Allyson, Nanda, & Barker, 2008; Buckley & Hickey, 2009; Egge, Waterloo, Sjöholm, Solberg, Ingebrigtsen, & Romner, 2001; Myburgh, 2005). Manipulation of cardiac output is often preferred as a primary intervention and is identified as a safer option (Joseph, Ziadi, Nates, Dannenbaum, & Malkoff, 2003) with increased cardiac output without an elevation in blood pressure associated with increased cerebral blood flow. Regardless of whether it is cardiac output or blood pressure that is being manipulated it is generally the nurse's role to titrate medications, often following instructions that are focused on parameters rather than dosage instructions. The monitoring of cardiac function and blood pressure are integral nursing roles and have been identified by nurses as the most important neurophysiological parameter

(Wuchner, et al., 2012). Induced hypertension has been linked with improved outcomes particularly in patients with angiographic vasospasm (Gura, Elmaci, Cerci, Sagiroglu, & Coskun, 2012; Darby, Yonas, Marks, Durham, Snyder, & Nemoto, 1994). Neurological function is purported as the indicating factor for the augmentation of blood pressure (Diringer, et al., 2011), with nurses correlating increased blood pressure with improved neurological function (Wuchner, et al., 2012).

Findings and Future Directions

There is a dearth of literature that pertains to the role of nurses in the management of patients following an aSAH. Despite promising search responses to the combination of terms 'subarachnoid haemorrhage and nurses/nursing' the contents of the articles still does little to provide insight into the complex care issues, interventions, assessments and decision making undertaken by nursing staff. Nurses need to be open to critiquing the literature and evaluating practices with reference to research; this includes being prepared to challenge current practices in an aim to improve patient outcomes (Lange, 2009). Further research in this area is required. Whilst Cook et al. (2004), to some extent, begin to clarify the role of the nurse their study is limited by participant numbers and the results are constrained by a lack of comparative studies. The second study of interest, Lange (2009), provides insight into nursing roles post aSAH, however the reflective framework and case study approach limits the research to the identification of key discussion points without analysing the unique role that nurses undertake when caring for patients post aSAH. There is no consistency between studies and this limited data does not allow for comparisons between practice areas including neurosurgical intensive care units and neurosurgical high dependency units. With a focus on establishing the context in which nurses practise, no attempt was made in this review to critically analyse interventions following an aSAH. It is recognised that this is an area for further research.

Conclusion

Practised to varying degrees of complexity and aggressiveness, haemodynamic augmentation following an aSAH continues to be standard practice despite the paucity of well-constructed, randomised control trials to support the practice. Nurses have a pivotal role in patient care post aSAH and are often responsible for managing haemodynamic status and administration of fluids, making nurs-

ing treatment decisions about bolus administration based on their clinical judgement. However, a focus on meeting parameters risks an emphasis on monitoring each haemodynamic aspect individually and a failure to focus on cerebral perfusion and oxygenation. This practice is further complicated by the lack of quality evidence and the multitude of approaches to post aSAH care. Given that the choice and augmentation of fluids and titration of hypertensive agents are predominantly the role of nursing staff, it is imperative to understand the decisions behind nurses choices regarding the amounts and timing of intravenous fluids, as well as the indications for inducing hypertension in patients who have experienced an aSAH. Whilst the nursing role is represented in the literature, the complex role that nurses undertake is not acknowledged and requires further research.

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2013 ANNA Conference



The Effect of Swallowing Therapy on Swallowing Functional States of Stroke Patients with Dysphagia

*Enny Mulyatsih, Ratna Sitorus, Sigit Mulyono
Indonesia.*

The aim of this study was to examine the effect of swallowing therapy on the swallowing functional states for stroke patients with dysphagia. A quasi-experimental design with control group pre test and post test was used. Two General Hospitals in Jakarta were selected, 18 subjects from RSUPN Dr Cipto Mangunkusumo as the intervention group and 18 subjects from RSUP Fatmawati as the control group. All subjects in the experimental group received a swallowing therapy program. The subjects from the intervention group were given the swallowing therapy three times a day at meal times during 6 days consecutively. The subjects from the control group have received the nursing care as usual. The results of the swallowing therapy mean swallowing functional states differences between pre - and post-swallowing therapy of the experimental group were significantly higher than for the control group (p value= 0,002). Although the control group has also experienced improved swallowing status at the 6th day, but they still had the status of swallowing dysfunction, i.e. 66.78, which is consistent with the study report by Broadley, et. al (2008) indicating that when the score is less than 80, there is a swallowing dysfunction. In contrast, the mean score of swallowing functional status in the treatment group reached 82.33, which indicated that there was an improvement of swallowing function. It's concluded that the swallowing therapy could increase the swallowing functional states of stroke patients with dysphagia. Furthermore, it is recommended that nursing professionals should conduct swallowing therapy protocols in stroke patients with dysphagia.

Familial Schwannomatosis - A Family's Journey; Part 2...

*Karen Morrison, Shuvai Gaka-Chisoro,
Catherine Solley
North Shore Private Hospital*

Schwannomatosis is rare. It affects 1 in 40,000 individuals, 15% being familial. It is genetically and clinically distinct from Neurofibromatosis type 1 (NF1) and type 2 (NF2). Individuals usually present with benign tumours that have no influence on life expectancy, however less than 1% are capable of undergoing malignant transformation becoming highly aggressive resulting in death (Malignant Peripheral Nerve Sheath Tumour). Tumours characteristically arise on peripheral nerves often affecting the spine, the main symptom being pain.

In 2005 we presented a case study 'Familial Schwannomatosis – A Family's Journey' It described 'Gemma' the older of three siblings who was diagnosed with familial schwannomatosis aged 17 in 2002. Gemma developed multiple Malignant Peripheral Nerve Sheath Tumours and passed away two years later. The family's journey continues.... This case study will examine the journey of her two younger brothers, 'Jordan' and 'Lewis'. Jordan's journey began 1999 aged 17. After several surgeries Jordan was diagnosed in 2008 with malignant peripheral nerve sheath tumour. Despite multi disciplinary management involving chemotherapy, surgery and pain management Jordan too passed away in 2011.

Lewis' journey began in 2006, aged 18. Lewis' journey continues.....Being the only reported case of familial schwannomatosis that has undergone malignant transformation in what is otherwise a benign disease, this case study serves to raise awareness that although rare and considered benign, schwannomatosis can become malignant. Treatment involves a multidisciplinary team approach. Genetic testing continues in an attempt to identify the genetic element responsible for familial schwannomatosis and its malignant changes.



2013 ANNA Conference



Guillain-Barré Syndrome: a review of the literature

*Trudy Keer-Keer
New Zealand*

This presentation is a summary of the available nursing literature on Guillain-Barré Syndrome. The aim of this literature review was to explore the current available information and research that was nursing orientated and focussed on care of a patient with Guillain-Barré Syndrome.

Guillain-Barré Syndrome is a rare autoimmune disorder that causes generalised muscle weakness, often in the weeks following an infection. The immune-mediated response triggers the destruction of the myelin sheath that surrounds and protects nerve fibres, preventing effective nerve transmission. Other symptoms of this disorder can include numbness, pain, altered cranial nerve function and autonomic dysfunction. Although many people make a full recovery, some people live with permanent neurological deficits. Without recognition and treatment, Guillain-Barré Syndrome can be life threatening.

A diagnosis of Guillain-Barré Syndrome can be a life changing experience for a person and neuroscience nurses are involved at every stage along the disease continuum. The results of this literature review provide a deep insight and understanding of the nursing implications of people with Guillain-Barré Syndrome. It is important that nurses are equipped with up-to-date knowledge and evidence to help them plan care and educate their patients in hospital and community settings.

Patient centered rehabilitation through recreational activities

*Sandra Krpez
Liverpool BIU*

Traumatic brain Injury rehabilitation addresses cognitive, physical, speech and occupational therapy as its core components to the restoration of a person's functional status as clinically and functionally as the injury allows. An important aspect often not focused on is the recreational and diversional therapy regime for the patient as the patients rehabilitation journey following a traumatic brain injury may often result in a lengthy hospital in-patient stay.

Due to this length of stay, several issues can arise such as loss of self, low/flat mood and poor motivation.

The Brain Injury Rehabilitation Unit (BIRU) at Liverpool has embarked on a journey of recreational enjoyment to aid in decreasing these ideas and thought processes and engage in a collaborative process that is patient centred.

So where to from here? There has been a greater increase in the use of the courtyard and with having had the courtyard initially revamped, phase two will bring in garden beds to increase therapy by growing vegetables and plants, pots big and small for additional planting and a painted mural. In addition, staff will look to revamp the lounge room to create a room for calm and a place to relax in. What is however evident is that the relationship between nursing staff and their patients in the Brain Injury Rehabilitation Unit is inclusive of the patients' needs and the introduction of Weekend Activities has expanded the relationship that focuses on the patients, holistically, emotionally and spiritually. This all through the EOC process and allowing nursing staff to have the capacity to voice their ideas and allow the patients a sense of worth.



2013 ANNA Conference



Acromegaly & Neurosurgery - A Nurses' Perspective

Vicki Evans
RNSH, Australia.

Acromegaly is an uncommon condition and it is estimated that about 1000 people in Australia have this disease. The physical changes of acromegaly occur gradually, due to an increase in bone and tissue growth from an overproduction of Growth Hormone (GH). The condition often isn't recognised until middle age, often when looking back at photos. Mortality in this disease is increased mostly because of cardiovascular and respiratory complications. However, available treatments for acromegaly can reduce the risk of complications and significantly improve symptoms. Surgery aims to remove the pituitary adenoma without affecting other normal parts of the pituitary gland – via a transsphenoidal hypophysectomy.

After surgery, the pressure on regions of the brain that surround the tumour is relieved and growth hormone levels are reduced. It is not always possible to remove all the abnormal tissue in the pituitary and other follow-up treatments may be needed. Medication can be used to shrink large tumours before or after surgery, or may be used instead of surgery. Radiation is sometimes used as the main treatment for a pituitary adenoma, but can also be combined with surgery and/or medication.

The nursing care of the patient with acromegaly is specialised and important. Unlike other neuro endocrine tumours (NETs), where patients do not look like they have 'cancer' or even appear sick, the acromegaly patient is quite noticeable in a crowd due to the thickening and growth of bones, especially in the face and hands. The way one looks is crucial to interpersonal relationships – socially and professionally.

Anti-N-methyl-D-aspartic acid (NMDA) Receptor Encephalitis

Linda Nichols
University of Tasmania, Australia

Prize Paper

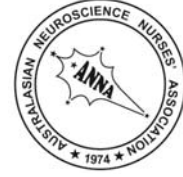
Officially identified in 2007, Anti-NMDA receptor encephalitis is a relatively new diagnosis however there has been significant reference to the description of the disease process in the literature prior to this. Described by some as being "driven insane by your own immune system", Anti-NMDA receptor encephalitis is considered a rare diagnosis that has an alarmingly high incidence of misdiagnosis. It is suggested that many cases continue to be misdiagnosed as supposed psychiatric presentations, often resulting in severe neurological sequelae or death that would otherwise have been preventable.

Paralysis, hallucinations, seizures, facial twitching, paranoid delusions, agitation & anxiety are all common presentations to medical facilities either as a single symptom or as a combination of symptoms. More readily recognised as psychiatric symptoms, they are the common symptoms of Anti-NMDA receptor encephalitis. Rapid referral to psychiatric teams for assessment and diagnosis has long been criticised for its ethical abuses and the ability that psychiatry has to ultimately cancel all other medical interventions and investigations. A psychiatric diagnosis can involve individuals being committed for treatment with the forced prescription of psychotropic drugs, often occurring without the benefit of a full neurological examination, diagnostic investigation, imaging as well as serum & CSF analysis for anti-NMDA receptor antibodies.

There has been a recent epidemic of published case studies where young girls are initially identified as psychiatric cases only to be diagnosed with Anti-NMDA receptor encephalitis. Often, as presented here, individuals are healthy with no history of mental illness, illicit drug/alcohol use & it is only the astute observations & openness for a differential diagnosis that results in patients receiving appropriate treatment & intervention.



2013 ANNA Conference



A Place to Call Home: When Surviving Medical Tragedy Meets Reality

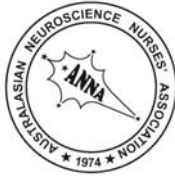
Kathi Evans

Meet Grace, who presented with ataxia 6/9/2010, for endoscopic transphenoidal debulking of a tumour. This tumour was a slow growing meningioma, located at the clivus, close to and compressing her brainstem, with Rt vertebral artery and PICA located at its superior margin. On 9/9/2010 she underwent an endoscopic transphenoidal procedure. After dural opening the procedure was abandoned as the Stealth was inaccurate. Post -op a CSF leak was managed with insertion of lumbar drainage. She returned to surgery 10/9/2010 for revision and dural repair. With more accurate navigation, the clival opening was extended and the exposure was much better, but only biopsy of the tumour was possible. Debulking was not possible as the tumour was firm and rubbery. The dura was repaired and the nose packed. Post-op Grace was irritable, alert, orientated and moving all limbs. On 12/9/2010 she developed respiratory distress with hypoxia, and dropped her GCS. She was intubated on the ward and transferred to ICU. When she was weaned it was clear that she was quadriplegic. The MRI showed an upper cervical cord stroke, likely related to poor flow in the anterior spinal artery. After her acute treatment, sadly, she remained in a "locked-in" state. With the nursing and medical ability to increasingly "save" patients who have suffered a tragic medical complication, long term placement for patients with a requirement for a high degree of care becomes a desperate issue. Currently in New Zealand, for Ministry of Health patients not eligible for Accident Compensation, there is a ceiling of related costs for patients deemed to need "hospital level care" within a nursing home environment. My dilemma as a CNM was to find an appropriate residence for Grace, whose needs were not met within this current structure. In conjunction with this are the family's beliefs and expectations regarding their mother's potential for improvement and the fiscal restrictions inherent within a public health system.

When the going gets tough the tough get tougher

*Kristina Cassels-Brown
Auckland, New Zealand.*

A case study presentation sharing the lived experience of a man with progressive leg weakness. During the long course of finding the cause he has endured some of the classic complications of immobility. The discussion uncovers the patient's perspective - how he has 'survived' two and half months in an acute hospital setting. Many members of health care team have contributed to the study with their unique views about the highs and lows of the management of this case. This presentation puts the patient and the neuroscience nurses at the forefront in the care pathway. The case study reveals the patient's courage and the intense, skilled and time-consuming caring required of neuroscience nurses.



2013 ANNA Conference



POSTER

**Promoting partnerships in health -
through patient education**

Kathleen Naughton

Liverpool Hospital, Australia

Prize Poster

POSTER

**The lived experience of adults with myas-
thenia gravis: a phenomenological study**

Trudy Keer-Keer

Christchurch, New Zealand

One of the most significant challenges of the 21st century is to make health information accessible to everyone. The past 10 years has seen an explosion of knowledge via the Internet which has led to a hyper-production and hyper distribution of information, overwhelming the average persons' capacity to process it. Today's health care environment is a world of increasing costs for health care, sicker patients, shorter hospital stays and fewer available resources. It is only with a clear understanding of the disease, prognosis, and possible methods of management and or treatment that the health consumer is empowered and able to step up to become an equal member of the health care team in managing their disease.

The project management team felt creation of a website to allow early referral to community support groups and exposure to the many fact sheets created by professional organisations such as Cancer Council Australia, Brain Injury Association of NSW, Brain Injury Australia, Synapse would allow the patient and their significant others to define their own priorities for knowledge acquisition. This issue was prioritised as it would empower the patient to become an equal partner in their health care and ultimately improve customer satisfaction.

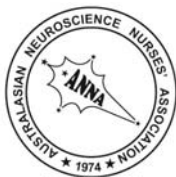
This website will be used as an educational tool to link our patients with support networks and accurate, up to date information. This will enhance health outcomes by informing, educating and empowering the stakeholders in their role, as equal partners, in the health care process. At all times, the health care consumer will have the freedom to outline, define and meet their personal needs for information regarding community services and support groups (and their websites).

This poster outlines a qualitative study undertaken for the author's thesis. The aim was to explore and develop an understanding of the lived experience in people with myasthenia gravis.

Myasthenia gravis is a rare disease of the neuromuscular junction. Symptoms include fatigue and fluctuating muscle weakness. Without recognition and treatment myasthenia gravis can be life threatening.

Seven people were recruited and interviewed for this phenomenological study. Their transcripts provided rich data that produced clear themes during analysis. The core concepts of unknown, weakness and change are presented in diagram form in this poster and discussed using van Manen's (1990) interpretive approach.

The results of this study provide a unique perspective into the lived experience of myasthenia gravis that has not previously been researched and are significant for neuroscience nurses caring for patients with this disease.



2013 ANNA Conference



Beneath the Skin in HD land (Art Therapy)

Stephen Dernocoure

Lottie Stewart Hospital, Australia

Invited Speaker

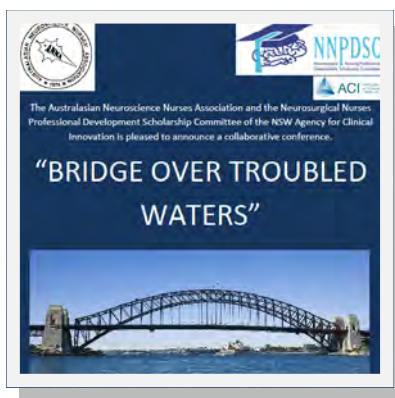
Getting “Beneath the skin” of another symbolises deep contact between the two – namely, a person with HD as an artist, and the art therapy facilitator. This presentation reports 8 years of a fortnightly art group in a NSW HD care facility. All residents were eligible. Artistic expression is one of the few statements of self accessible throughout the course of HD. The choreography utilising hand movements validates the individual. This interactive group intervention is part of the care plan using tailored art forms. The facilitator also uses art to debrief.

A review of art group attendances provided overview data. Art works were reviewed for evidence of improved quality of life, personal validation, strengthened functions, and reduced HD disability. We also sought increased knowledge of the artist through their abbreviated artistic communications.

Over eight years, from May 2003, 25/29 (86%) permanent residents participated in some of the 185 fortnightly Art group sessions. Nine (36%) of the participants (High user group) attended more than half the sessions held during their tenure. Positive comments by high and moderate users were recorded. Observations of the works and case notes demonstrated increased communication of thoughts with deep and complex meanings through symbols (art).

Art groups with skilled leadership in care facilities are utilised by those with moderate to advanced HD. They increase communication and quality of life, reduce tension and the potential for negative behaviours.

ANNA would like to sincerely thank the sponsors of the 2013 Conference, held Thursday 20 –Friday 21 June, 2013....



Also thanks to B Braun, ANZAN, Australian Orthotic Technologies, Lippincott Williams & Wilkins and Pelikan, and Artline.



WFNN Congress

**Nagaragawa Convention
Center.
Gifu, Japan 13-16
September, 2013.**



Congress Summary:

The 11th WFNN Congress was a great success with 485 delegates as well as 203 students, giving a total of close to 700 attendees travelling from around the globe, including countries such as Australia, Austria, Belgium, Brazil, Cameroon, Canada, China, Croatia, Denmark, Finland, Ghana, Hong Kong, India, Iran, Japan, Korea, Mongolia, New Zealand, Norway, Sweden, Switzerland, The Netherlands, United Kingdom and the United States.

The Japanese were very hospitable and included hands-on sessions for Kimono, Tea Ceremony, Calligraphy and Origami. Delegates were treated to a “dinner cruise” experiencing the ancient art of Ukai (cormorant) fishing. Luckily this occurred before typhoon Man-yi advanced toward central Japan with heavy rain, flooding and strong wind warnings. It was good to see that our overseas mobile phones could pick up (albeit Japanese character writing) the emergency alert signals!

The Scientific Program was vast, covering a wide range of neuroscience topics. There were several other lectures as well including the -

- Pre Congress Workshop by Linda Littlejohns—“Tying Brain Anatomy to patient assessment”,
- 3 x Special Lectures—“Nursing patients with long term disturbance of consciousness: current status and future prospects in Japan”; “Brain-Machine interface”; “Origin and essence of caring in healthcare”.
- 3 x Luncheon Seminars—“Lessons learned in WFNN”; “NeuroBlend”; “Concussion in school sport”.
- 45 x oral concurrent sessions
- 36 x posters

There was a change in the WFNN Executive with Virginia Prendergast stepping down after 20 years in the leadership position. The new WFNN Executive Committee is -

President: Christi DeLemos (USA)

Vice President: Vicki Evans (Australia)

Secretary/Treasurer: Dawn Tymianski (Canada).

Please do not hesitate to contact any of the team if you have any questions or suggestions.

The next WFNN Congress in 2017 will be held in Opatija, Croatia. Dates will be confirmed in the coming year.



The World Federation of
WFNN | Neuroscience Nurses



The 2013 Agnes Marshall Award ~ USD\$500 for Best Paper:

was presented to **Ayako Suzuki**

for the paper **“Preoperative orientation improves patient’s understanding and cooperation during awake craniotomy”**.

The 2013 Agnes Marshall Award ~ Best Poster:

was presented to **Kristine Hojme Nielsen**

for the poster **“Competence card—a tool that ensures quality and patient safety”**.



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 (ANNA) for inclusion in the Australasian Journal of Neuroscience by the designated date each year. The monetary value of the prize is AUD\$500.

Louie Blundell, was born in England, and although she wanted to be a nurse she had to wait until after World War II to start her training as a mature student in her late twenties. Later she and her family moved to Western Australia in 1959. She worked for a General Practice surgery in Perth until a move to the Eastern Goldfields in 1963. Subsequently, she worked at Southern Cross Hospital and then Meriden Hospital. During this time she undertook post basic education to maintain her currency of knowledge and practice, especially in coronary care.

Louie was also active in the community. She joined the Country Women's Association and over the years held branch, division and state executive positions until shortly before her death in 2007. She was especially involved in supporting the welfare of students at secondary school, serving on a high school hostel board for some time.

She felt strongly that education was important for women and was a strong supporter and advocate of the move of nursing education to the tertiary sector, of post graduate study in nursing and the development of nursing scholarship and research, strongly defending this view to others over the years.

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



Calendar of Events

2014:

- **American Association of Neuroscience Nurses Conference** March 8-11
Disneyland Hotel,
Anaheim, CA. USA.
www.aann.org



- **ANNA Conference**
Hotel Realm. Canberra, ACT.
Date: 7-9 May
www.anna.asn.au



2015:

- **European Association of Neuroscience Nurses Congress** May 13-16
Belgrade, Serbia.
www.eann2015.rs
- **American Association of Neuroscience Nurses Conference** 21-24 March
Nashville Convention Centre,
Nashville TN. USA .
www.aann.org

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

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Example – book:

Buckland, C (1996) *Caring: A Nursing Dilemma*. Sydney: WB Saunders.

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(Thompson, Skene, Parkinson, and Baker, 2000).

Thereafter (Thompson, et al., 2000).

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