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In This Issue:

Editorial

Linda Nichols
Editor

Translating Research

As neuroscience nurses we aspire for best and evidenced based practice, but often we forget about the journey of research from being a new finding or information to translating into practice. Historically, there has been a disconnect between the academic researcher and clinical practice and the transfer of new knowledge has been sporadic at best.

One particular example that comes to mind is triple H therapy where the current clinical practice still continues despite more recent research findings suggesting alternative and modified approaches to care. This is not uncommon with the time lag from research to clinical practice estimated to be around 17 years.

Translating research into clinical practice is an absolute policy priority. For me as an aspiring researcher in the field of neuro epidemiology, translational research extends the basic principles of my research beyond the statistics and numbers. My aspirations are simple and include the translation of my research findings into practice, in order to offer the possibility of improving patient outcomes with a focus on improving the diagnosis and treatment and where possible identifying at risk populations and applying preventative measure.

For this to occur I have had to extend my research beyond nursing and take an interdisciplinary approach that has involved a number of stakeholders from different disciplines as well as the use of social and geographical indicators. This process and collaboration has been fundamental in understanding how my cohort can be interpreted and described to best represent the individuals in my study.

As my research continues to demonstrate degrees of socioeconomic disadvantage I find myself naturally thinking of how I can translate my research to not only address my aims but to also influence the health outcomes of specific populations at risk.

Guest Editorial

Leigh Kinsman
Professor of Healthcare Improvement

Conjoint appointment, University of Tasmania and Tasmanian Health Service (North)

What were you doing in 2001? How much has changed in the world of neuroscience in 17 years? This is the estimated gap between the conduct of high quality research, including randomised controlled trials and systematic reviews, and its eventual implementation into practice. In an era of increasingly rapid changes in technology and patient complexity, and increasing disparities in health outcomes according to geography and socio-economic status there are significant challenges around research keeping up with contemporary practice, and for practice to critique and implement research that supports optimal patient-centred care.

The timely and efficient translation of research into practice has great capacity to improve practice and patient outcomes and brings us to the world of implementation science – *"The scientific study of methods to promote the uptake of research findings into routine healthcare in clinical, organisational or policy contexts"*[1]

A well-established example of a research implementation framework is Promoting Action on Research Implementation in Health Services (PARIHS). It has been developed and tested based on the principles of the strength of the evidence for practice improvement and the preparedness of the clinical context for change.

Keeping up with the evidence highlights the importance of conferences such as the upcoming ANNA Annual conference. Mixing with experts in your field provides a fertile environment for presentation and discussion regarding the most up-to-date neuroscience nursing research.

But just knowing is not enough. There are major challenges associated with changing practice in your own context that are well described by the PARIHS framework. This framework incorporates essential elements of

The AJON and ANNA, through the annual scientific meeting, plays a significant role in this journey for any aspiring author or presenter, enabling the sharing of original and innovative research.

From this sharing effective change can occur successfully on both a national and international level. A large part of an editor's or scientific conference convenors role is providing feedback on how best to present manuscripts and work to facilitate effective translation into practice.

I look forward to continuing to collaborate with members, researchers, clinicians, and other stakeholders and working together to publish quality translational research and working to solve healthcare problems.

Linda

change, including leadership support, culture, educational needs and local receptivity to change.

While these steps sounds like common sense we know that common sense is not that common and, in the area of research translation, we see passive approaches such as distribution of guidelines or pathways consistently failing to change practice or improve patient outcomes.

Evidence-based practice needs evidence-based implementation and the PARIHS framework is one of numerous approaches available for researchers and practitioners to translate research into practice and diminish the unacceptable 17 year gap.

I wish all the ANNA members well in their collaborations and efforts to translate research into practice for optimal patient care.

Implementation Science. Journal website. https://implementationscience.biomedcentral.com/about (accessed 23/5/2018).

Leigh

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Malignant middle cerebral artery infarct: A clinical case report

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Abstract

Background:
Ischaemic stroke accounts for 87% of strokes and occurs when a clot or a thrombus blocks a blood vessel, cutting off blood flow to a part of the brain. If large areas of brain are affected, space-occupying oedema may result, leading to rapid neurological deterioration, coma and death. Malignant middle cerebral artery infarction (MMCAI) is a life-threating ischaemic stroke involving the whole middle cerebral artery (MCA) territory and comprises up to 10% of MCA infarctions.

Methods:
We report the case of a 62 year old female 'Mary' who presented with a MMCAI together with a summary of the most recent and relevant evidence for treatment options in terms of survival and quality of life for her. We also focus on the vital role of the nurse in Mary's care and treatment.

Results:
Intravenous thrombolysis and endovascular clot retrieval (ECR) during the hyperacute phase have been shown to improve outcomes but Mary did not meet the criteria for thrombolysis and received unsuccessful ECR. Her neurological condition deteriorated so she underwent surgical decompression, which is one of the major advances for MMCAI treatment together with expert neuro critical care nursing. Mary made a good functional recovery, returning home to live independently.

Conclusion:
This case highlights the need to consider all contextual and patient preferences in relation to treatment options. In addition the case emphases the vital role the neuro critical care nurse specialist plays in the complex assessment and treatment of this patient who experienced a MMCAI and underwent complex interventions.

Keywords: stroke, middle cerebral artery infarction, case study, critical care, critical illness

Introduction:

Malignant middle cerebral artery infarction (MMCAI) is the worst form of ischaemic stroke as it involves an infarction of nearly the whole middle cerebral artery (MCA) territory (>50% of the MCA territory on Computed Tomography [CT]). MMCAI is also characterised by a reduction in blood supply of >66% together with a large area of dead tissue on CT (infarct volume of >82 mL within 6 hours of onset on MRI and infarct volume of >145mL within 14 hours of onset on MRI) (Huttner & Schwab, 2009; Oppenheim et al., 2000; Thomalla et al., 2003; Vahedi, Vicaut, et al., 2007) which is usually reflected in significant motor deficits resulting in an inability to move independently. MMCAI is the most severe form of stroke and comprises up to 10% of all MCA territory infractions (Hacke et al., 1996); the annual incidence is 10-20 per 100,000 people (Treadwell & Thanvi, 2010). Unwanted sequela is space-occupying oedema leading to rapid neurological deterioration, irreversible coma and death. The prognosis is generally poor, and death occurs in approximately 80% of cases as a result of transtentorial herniation and brainstem compression (Back, Nagaraja, Kapur, & Eslick, 2015).

Treatment options include intravenous (IV) thrombolysis within 4.5 hours of stroke onset, endovascular clot retrieval (ECR) within 24 hours of stroke onset and surgical decompressive surgery.

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Significant studies have shown that early decompressive craniectomy (DC) in patients aged <60 years within 48 hours of onset of malignant stroke have significantly reduced mortality (22% versus 71% – pooled analysis; numbers needed to treat =2) (Vahedi, Hofmeijer, et al., 2007); however, the efficacy of this treatment on functional outcome is inconclusive.

This paper provides a summary of selected published studies of relevant current treatment options for a patient who presented with malignant MCA infarct. Using the case study as an example, current treatment options including thrombolysis, ECR and DC are examined together with the research evidence for these treatments. In addition the vital role of the neuro critical care nurse specialist is highlighted.

Case Study

This case study follows Mary's (a pseudonym) journey from the time when her daughter found her collapsed on the floor in her home to the day she was discharged from the hospital. For the purposes of this paper, the clinical guideline used at the metropolitan tertiary referral facility (location of a hyperacute stroke service) in which Mary was treated (in Australia) was used as a framework. Mary gave written consent for the publication of this paper.

Presentation and health history

Mary, a 62 year old female, was found by her daughter at 03:45 on the bathroom floor of her home. Her daughter stated that Mary was apparently well when she last saw her before bed time at approximately 22:00. An ambulance was called and on examination, Mary had a left sided facial droop, gaze palsy, left visual neglect, dense left hemiparesis and sensory neglect. She was immediately transported to the nearest hospital but later was transferred to the tertiary referral facility (a 20 -30 minute drive), a thrombolysis centre of the local health district for hyperacute stroke management. Ninety minutes after being found by her daughter Mary was screened for the use of thrombolysis. Mary presented to the tertiary referral facility outside of the thrombolysis treatment window (that is >4.5 hour after stroke onset). She had a history of atrial fibrillation and aortic and mitral metallic valve replacements on warfarin (anticoagulant); hypertension managed with olmesartan/hydrochlorothiazide (a combination of angiotensin II receptor blocker and diuretic); and dyslipidaemia treated with simvastatin (lipid lowering).

On arrival, Mary was haemodynamically stable despite the presence of atrial fibrillation. All standard investigations were carried out according to the clinical guideline for stroke management including rapid clinical assessment, recommended imaging: plain CT brain scan, CT angiogram and CT perfusion, and blood tests (Stroke Foundation, 2017). At this time Mary's clinical assessment revealed a National Institute of Health Stroke Scale (Brott et al., 1989) score of 19, which correlates with 'severe stroke'.

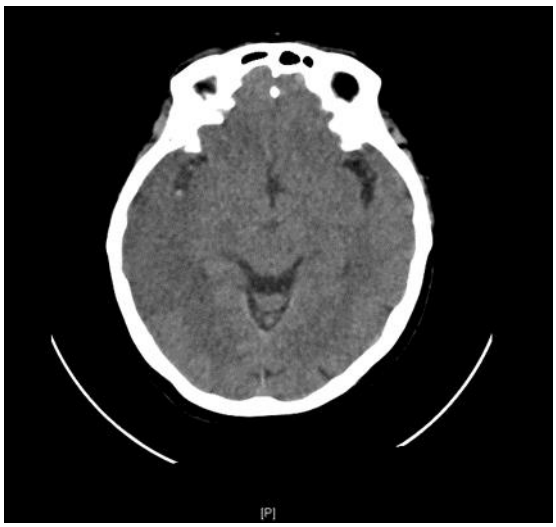

Figure 1. Computerised tomography scan

An urgent CT scan showed a loss of grey-white matter differentiation in the right insular cortex, the inferior aspect of the right frontal lobe, at the right temporal lobe and inferior aspect of the right parietal lobe (Figure 1); the CT angiogram revealed an occlusion of the right proximal M2 artery. In addition, CT perfusion findings consistent with an established infarct involving the right insula, inferior aspect of the right frontal lobe and anterior right temporal lobe were present. There appeared to be a moderate to large penumbra associated with the infarct (Figure 2). Her serum International Normalised Ratio (INR) was subtherapeutic (1.5); this indicated an inadequate anticoagulation to prevent complications related to her metallic valves and her serum creatinine level of 167umol/L revealed a degree of renal impairment.

Treatment during the hyperacute phase

Mary presented to the tertiary referral facility outside of the thrombolysis treatment window (that is >4.5 hour after stroke onset). Until recently, IV tissue plasminogen activator (tPA) was the only medical therapy approved

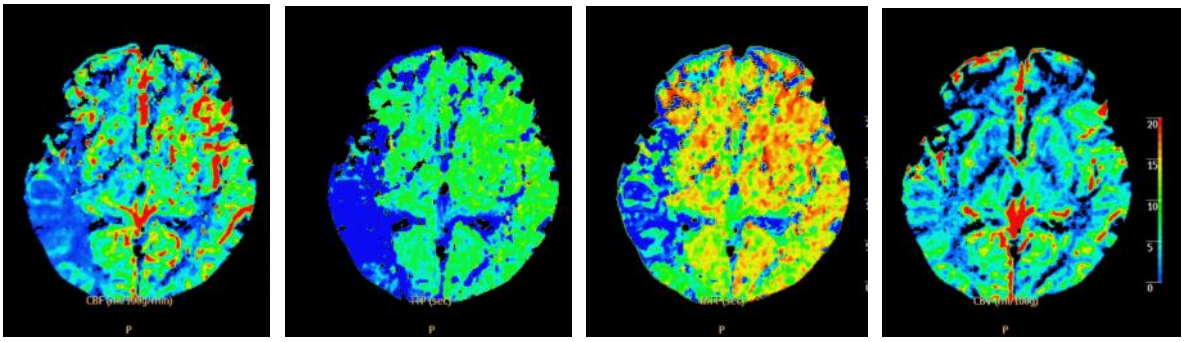

Figure 2. Computerised tomography perfusion scan

for the treatment of stroke during the hyperacute stage (<4.5 hours from onset of stroke symptoms). Approximately one third of the patients treated with IV tPA alone achieve full recovery (Hacke et al., 2008).

A meta-analysis from nine randomised controlled trials (RCTs) (n=6756) found that the earlier patients began thrombolysis with altepase, the better the outcome (Emberson et al., 2014). A good outcome is defined by a modified Rankin Score (mRS) (Rankin, 1957) of 0-1 (i.e. symptom free with no loss of function) at 3-6 months. Three different altepase treatment sub-categories based on time from symptom onset were altepase administered: within the first 3 hours of onset; between 3 hours to 4.5 hours of onset; and between 4.5 hours to 6 hours of onset. Within these three sub-categories: 1549 patients received altepase within the first 3 hours of onset had a good outcome 32.9% versus 23.1% (OR 1.75 95% CI 1.35-2.27); 2768 patients who received altepase after 3 hours of onset but within 4.5 hours had a good outcome 35.3% versus 30.1% (OR 1.26 95% CI 1.05-1.51); and 2394 patients found that patients who received alteplase more than 4.5 hours of onset but within 6 hours had a good outcome 32.6% versus 30.6% (OR 1.15, 95% CI 0.95-1.40) (Emberson et al., 2014). Results showed that 5024 patients 80 years or younger who had a good outcome was 39.4% versus 33.9% (OR 1.25 95% CI 1.10-1.42) who did not (Emberson et al., 2014). Of the 1729 patients older than 80 years, 17.6% had a good outcome and 13.2% did not (OR 1.56 95% CI 1.17-2.08) (Emberson et al., 2014). Therefore a widely accepted recommendation for the treatment of stroke is IV tPA (0.9mg/kg, maximum dose 90mg) to be administered within 3 hours of onset of ischemic stroke (Class I, Level of Evidence A)' (Powers et al., 2018).

Thrombolysis should commence as early as possible (within three hours) after stroke onset but may be used up to 4.5 hours after onset (Wardlaw, Murray, Berge, & del Zoppo, 2014). The complications of IV thrombolysis including intracranial haemorrhage and angioedema (Emberson et al., 2014; Powers et al., 2018) are significant and must be considered on an individual basis.

The time of her onset of stroke to the time she was assessed in the emergency room was seven and a half hours, which was still within the ECR treatment window (24 hours from stroke onset) (Nogueira et al., 2018). Current stroke guideline states that undergoing ECR is beneficial beyond six hours of stroke onset if a CT angiogram shows a large vessel occlusion (LVO) (Stroke Foundation, 2017). After Mary's son provided informed consent for the procedure, ECR for recanalization was performed. Recent trials have shown that ECR significantly improves functional independence in patients with a large vessel occlusion, a large CT perfusion mismatch and a good collateral circulation (Lambrinos et al., 2016).

A meta-analysis of five major trials revealed that ECR led to significantly reduced disability at 90 days compared with control (adjusted cOR 2.49, 95% CI 1.76–3.53; p<0.0001) (Goyal et al., 2016). The number needed to treat with ECR to reduce disability by at least one mRS level was 2.6 (Goyal et al., 2016). As a result of these impressive outcomes, the current American Heart Association/American Stroke Association recommends that patients should receive ECR if they meet the criteria (Class I, Level of Evidence A) (Powers et al., 2018) which includes stroke symptoms within 24 hours of onset or time last known well in wake-up stroke; a non-contrast CT without a large infarct (>1/3 MCA territory) or haemorrhage; and a CT angiogram (aortic arch to vertex of the brain) showing a large vessel occlusion of the internal carotid artery, M1 (first segment) or proximal M2 branches of the MCA or the basilar artery (Lambrinos et al., 2016; Powers et al., 2015). Mary's MMCAI was extensive

and she met many of these criteria i.e. a moderate to large penumbra associated to infarct and an occlusion of right M2 artery.

After the ECR, Mary was admitted to the neurosurgical Intensive care unit for more continuous monitoring of her condition. Neurologically she was alert. Her GCS after the ECR was 13/15 (Eye opening=3, Verbal response=4, Motor response=6) and her National Institute of Health Stroke Scale score was 15 (Answers both questions incorrectly =2, partial facial palsy=2, no movement on left arm=4, no effort against gravity on left left=3, partial sensory loss=1, severe aphasia=2, and partial neglect=1). Her respiratory function was good; she was maintaining her own airway and was breathing without difficulty. Haemodynamically she was stable; normotensive without support with vasoactive medication, despite atrial fibrillation (heart rate: 65-105bpm) and she was normothermic.

Day 1 after the stroke, a repeat CT scan revealed an acute cortical and intraparenchymal haemorrhage involving the right cerebral hemisphere with moderate marked mass effect. The infarction may increase in size during the acute phase causing clinical deterioration resulting from raised intracranial pressure (ICP) and tentorial herniation (Neugebauer et al., 2016). Conservative medical management, including hyperventilation, mannitol and sedation aiming to reduce oedema and mass effect in malignant MCA infarctions is considered minimally effective with associated high mortality (Powers et al., 2018) so this was not a treatment option. A DC procedure was therefore considered.

A family conference was led by the neurology medical team and facilitated by the neuro critical care nurse specialist. The neurology consultant explained to the family that Mary was likely to deteriorate as there was evidence of haemorrhagic transformation and swelling. In addition, the team explained the controversy and uncertainty regarding DC, especially in Mary's age group. They were careful to discuss the likelihood that the procedure would increase her chances of survival but would not necessarily reverse her current neurological deficits and that many patients in a similar condition are then dependent on others afterwards. The nurse encouraged the family to share information about Mary: her wishes, perspective on life and current quality of life. The family was informed that DC is a major operation requiring prolonged treatment in intensive care, including mechanical ventilation and its associated risks. In particular the need to reverse Mary's anticoagulation was a concern (risk of recurrent stroke was high as she had a metallic mitral valve and was in AF). A neurosurgical opinion to explore this treatment option was offered and the neurosurgical team was consulted. The family were of the opinion that Mary would have considered her functional deficit and dependence on others acceptable. The family provided informed consent for DC surgery if her neurological condition deteriorated.

Forty-two hours after the onset of stroke symptoms Mary's level of consciousness decreased (GCS 12 i.e. Eye opening=2, Verbal response=4, Motor response=6) and the neurosurgical team was immediately notified. Mary underwent a DC soon afterwards.

Three initial RCTs conducted in Europe revealed an excellent to favourable outcome for early DC for MCI for patients younger than 60 years (absolute risk reduction in mortality of 50% with 43% of survivors able to walk at six months) (Vahedi, Hofmeijer, et al., 2007). However, three recent RCTs in which patients >60 years were included reported worse outcomes for early DC for MCI. None of the older patients achieved an excellent functional outcome (mRS 0-2) and very few patients reached mRS 3 (Streib, Hartman, & Molyneaux, 2016). An Absolute Reduction Incidence (ARI) of 4% and numbers needed to treat 25 indicates favourable outcomes and for unfavourable outcomes, the ARI was 32.5% and numbers needed to treat was 3.1 (Streib et al., 2016). The decision to proceed with DC in Mary's case was based on the knowledge that it would likely improve her chances of survival but not necessarily her functional recovery together with information provided by the family.

The contemporary philosophy of nursing encompasses a holistic view of the person in order to deliver patient centred care (McCormack, 2003); nurses are required to know the patients' and their carers' perspectives on life. Quality of life (QoL) studies had been conducted and three major outcomes including functional status, depression and QoL have been explored after DC (Green, Demchuk, & Newcommon, 2015; McKenna, Wilson, Caldwell, & Curran, 2012; Middelaar, Nederkoorn, Worp, Stam, & Richard, 2015; Rahme, Zuccarello, Kleindorfer, Adeoye, & Ringer, 2012). Main assessment tools used to assess functional outcomes include the modified Rankin Scale (mRS) and Barthel Index (BI) (Green et al., 2015; Rahme et al., 2012) and the Zung Self-Rating Depression Scale and Hospital Anxiety and Depression scale (HADS) were used to assess depres-

sion outcome (McKenna et al., 2012; Rahme et al., 2012). Questionnaires or visual analog scale were used to assess QoL outcomes (Middelaar et al., 2015).

Of note in a study examining functional outcome between 3-114 months (mean: 19 months) after experiencing a stroke (n= 156, mean age: 50), moderate disability (mRS 4) was reported in 46%, severe disability was reported in 10% and a further 41% had some disability (mRS □ 3) (Rahme et al., 2012). In the same study depression was reported in 56%. and over 76% of patients were satisfied with life (Rahme et al., 2012) Many patients in these studies state that they would consent again for DC (Green et al., 2015; McKenna et al., 2012; Rahme et al., 2012).

Based on these results MMCAI patients after DC appear to experience moderate to severe disability and varying degrees of depression. One study showed some patients had a relatively good mood as they were able to maintain close relationships with families and friends, whereas others experienced depression (Green et al., 2015; Rahme et al., 2012) because of their inability to return to their pre-illness function and lifestyle. Other frequent findings include neuropsychological impairments (McKenna et al., 2012), alterations in personality and loss of independence (Green et al., 2015).

However, the findings for QoL and patient satisfaction showed that despite their physical disability, their QoL and satisfaction with life remained high. One study stated that patients reported only a small decrease in QoL long term (7-51 months) when compared to the general population (Middelaar et al., 2015). This finding contradicted the neurosurgeons or neurologists' perceptions that patients had a poorer QoL due to severe disability after DC. The review suggested that patients had better coping mechanisms than previously thought, despite their poor physical functioning and dependence on others for the activities of daily living (Middelaar et al., 2015). This may have been a result of response shift (a recalibration in the perception of QoL over time after experiencing a disability). Regardless, clinical guidelines for stroke management recommend that DC is offered to all MMCAI patients if extensive discussion about the risks and benefits is undertaken (Stroke Foundation, 2017).

Intra-operatively, there were signs of vasoparalysis in Mary's brain but later pulsation returned. Four burrholes and a large craniotomy were performed (and two parts of skull bone were inserted in a fat pouch in her abdominal cavity). In order to monitor ICP, an intraparenchymal catheter was inserted (Codman EXPRESS® Monitoring System). Mary experienced episodes of asystole and long cardiac sinus pauses but these resolved without the need for treatment.

Early recovery and rehabilitation after decompressive craniectomy:

Mary was admitted to neurosurgical intensive care unit after DC. Supportive care and treatment of acute complications were established. Her assessment findings indicated that she was breathing without difficulty or the assistance of an artificial airway or respiratory support other than 2L/min of oxygen via nasal cannula and was haemodynamically stable (systolic pressure: 100-140mmHg). Her neurological assessment revealed that her eyes opened to voice, she obeyed commands although she was confused (GCS 13/15: E=3, V=4, M=6). She had normal power in her right arm and leg but mild weakness in her left arm and leg. Her pupils were equal and reacting briskly to light. A repeat CT brain scan showed an increase in the acute haemorrhage. There was also some slight worsening of the mass effect and midline shift with a slight increase in uncal herniation (Figure 3).

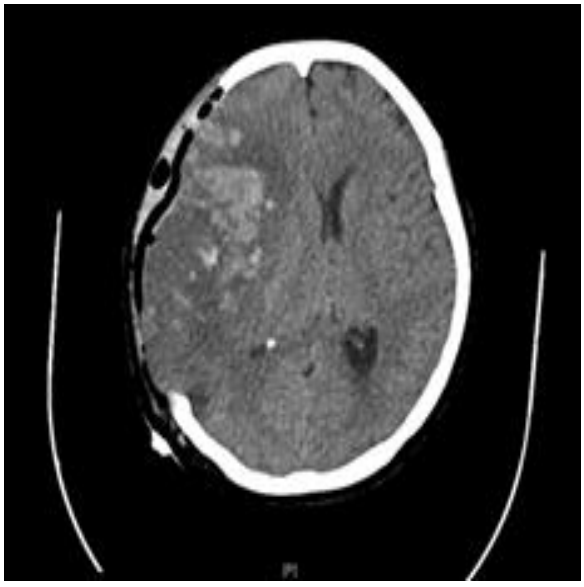

Figure 3. Repeat Computerised tomography scan after the decompressive craniectomy (DC)

She was enterally fed via a nasogastric tube (NGT). Mary developed deep vein thrombosis (DVT) and she was anaemic (haemoglobin (Hb): 79 g/L). She was treated with intravenous heparin and an iron infusion. Both the medical and nursing team regularly

provided updates of Mary's progress to her family.

The goal of post-operative care was to prevent or minimize complications related to anaesthesia and the surgical procedure. The focus was on smooth and timely emergence from anaesthesia while optimizing haemodynamic, respiratory and electrolyte conditions (Bose & Luoma, 2017; Liddle, 2013). This is vital to ensure adequate brain perfusion and healing because postoperatively the body undergoes significant physiological stress that may be manifested as fluctuations in homeostasis. This stress state is modulated by changes in sympathetic tone that controls body temperature and vascular tone (Tsaousi, Pourzitaki, & Bilotta, 2017).

Neurosurgical procedures have an overall complication rate of 14.3% (Badenes, Prisco, Maruenda, & Taccone, 2017). Moreover, patients have a high risk of experiencing neurological complications postoperatively and require advanced (ICP) neuromonitoring and frequent neurological assessment. deep vein thrombosis rates after craniectomy are as high as 34% (Nyquist et al., 2016). Current evidence supports combined mechanical and chemical thromboprophylaxis within 24 hours after surgery (Tsaousi et al., 2017). However, there is a higher risk of postoperative haemorrhage for patients who receive heparin (Wang et al., 2017). It is therefore important to monitor closely for signs of postoperative haemorrhage, particularly intracranial haemorrhage (ICH). Which can occur in 1-3% of cases with mortality rates as high as 30% (Siegemund & Steiner, 2015). Neuro critical care nurse specialists can positively affect the mortality rate by identifying signs of neurological deterioration early, alerting the neurosurgical team and preparing the patient for surgery. This is particularly important within the 24 hours after surgery when the risk of haemorrhage is greatest (Nittby, Maltese, & Ståhl, 2016).

Comprehensive and frequent neurological assessments and vital sign observations are the cornerstones of post-operative neurosurgical care in the unit in which Mary was treated (Northern Sydney Local Health District, 2009). In addition, Mary's post-operative care included: 1) positioning the head of bed at 30 degrees and not lying on the operative side; 2) monitoring the scalp at the craniectomy site for a "boggy" appearance – oedema which is expected in the initial post – operative period, due to CSF recirculation & wound healing; 3) assessing pain and giving analgesia; 4) meticulous wound care and checking daily for signs of infection; 5) checking other surgical wound sites; 6) consulting with physiotherapy regarding the provision of a helmet to protect Mary's brain until cranioplasty was performed 7) communicating with Mary in terms she could understand and ongoing communication with the family.

Progress during treatment on the neurology ward:

Although Mary progressed well, she experienced complications. She had some partial facial seizure activity which was controlled by the antiepileptic medication, Sodium Valproate. Her liver function tests were elevated (thought to be an unwanted effect of the statin medication and paracetamol) and improved after withholding the statin and only administering paracetamol when required. Mary experienced hallucinations; the contributing factors were likely to be medication and illness-related but this was never clearly elucidated. Nocturnal temazepam was given and the symptoms subsided. In addition, she had constipation resulting in overflow diarrhoea and abdominal pain which resolved after a fleet enema and regular aperients.

Mary was reviewed by the rehabilitation team and enrolled in Stroke Acute Rehabilitation Therapy (START). She responded well to rehabilitation walking independently and managing to perform activities of daily living such as showering, dressing and cooking with minimal assistance.

Cranioplasty (bone was reinserted in her cranium) was performed 6 weeks after her craniectomy and the wound healed well. Mary's function improved and she was discharged home with few symptoms or deficits aside from mild left sided weakness and cognitive impairment.

Conclusion

This paper summarises the treatment journey for Mary, a 62 year old female who presented to our facility with MMCAI and the effectiveness of both thrombolysis and ECR in improving outcomes for patients who experience ischaemic stroke. Our examination of the evidence suggests that although life saving the functional outcome for DC varies and QoL differs. Our case report highlights the complexity in managing patients who experience MMCAI. It highlights the vital role the neuro critical care nurse specialist played in not only assessing, monitoring and treating Mary but also facilitating discussions and providing information and advice to her and her family prior to making the important decision to undergo DC.

Acknowledgement:

The authors acknowledge the generosity of 'Mary' and her family in providing permission to write about Mary's treatment in our facility.

Conflict of interest:
The authors declare that they have no conflicts of interest.

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Navigating Unchartered Waters: A Nursing Perspective on Lewy Body Dementia

Madelaine B Rañola

Abstract:

Although Lewy body dementia (LBD) is the second most common form of dementia to Alzheimer's disease, this more rapidly progressive neurodegenerative disorder remains largely unknown to the public and is under-recognised by health care professionals.

Early and accurate diagnosis is complicated by many different presentations of the disease which can include a mixture of clinical features seen in both Alzheimer's disease (AD) and Parkinson's disease (PD). Motor and cognitive dysfunction as well as behavioural and mood disturbance are common overlapping features. What sets LBD apart however, is the variability and unpredictability of the disease and sensitivity to conventional anti-psychotic medications

The ambiguous nature of LBD places significant stress on caregivers and presents unique challenges for the long-term clinical management of the disease. This paper is aimed at raising awareness of LBD and proposing key nursing interventions to enhance both quality and length of life.

Key words: *Lewy Body Dementia, Parkinson's Disease Dementia, Dementia with Lewy Bodies, Caregiver Burden, Nursing Care*

Introduction:

Definition

"Lewy body dementia" (LBD) is broadly considered to consist of two related disorders- Parkinson's disease dementia (PDD) and dementia with Lewy bodies (DLB) (Connors et al., 2017). Neuro-pathologically, these spectrum disorders are characterised by the widespread distribution of aggregated a-synuclein, forming structures called Lewy bodies in neuronal cell bodies and processes (Galasko, 2017; Stubendorff, Aarsland, Minthon & Londos, 2012). The abnormal clumping and accumulation of a-synuclein alters chemical processes causing a loss of functionality and eventually cell death (Fields, 2017; Perkins, 2017).

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The diffuse distribution of pathology in LBD gives rise to a diverse and challenging range of symptoms including Parkinsonism, autonomic dysfunction, recurrent hallucinations, cognitive fluctuations, mood disorders, REM sleep behaviour disorder and moderate memory impairment (Jellinger, 2017; Killen et al., 2016; McKeith et al., 2017).

PDD vs. DLB Debate

Sharing of pathophysiological findings between PDD and DLB has sparked controversial debate regarding whether these are two distinct disease processes or whether they are the same entity that occurs on a continuum (Fields, 2017). A 1-year rule was proposed to split DLB and PDD; PDD is diagnosed if motor symptoms precede cognitive symptoms by more than a year; DLB is used if cognitive decline precedes or presents with the initial motor symptoms (Galasko, 2017).

Some consider the separation of the two entities as being useful to enhance diagnostic awareness and to encourage the study of both phenotypes so that one day their distinct pathophysiology can be better understood

and lead to the development of disease-modifying treatments (Friedman, 2018; Galasko, 2017).

Others would argue that with disease progression, the course of the dementia, the symptoms and underlying brain changes are more similar than different. Therefore, with management being the same, regardless of diagnosis, clinically the most appropriate and helpful term to encompass these two overlapping syndromes is LBD.

Early Diagnosis

Early identification of patients at risk of severe cognitive impairment and dementia can help to inform choice of pharmacotherapy and assist with a personalised approach to treatment (Kehagia, Barker & Robbins, 2010). Distinguishing LBD from other dementias can be difficult particularly when shared Alzheimer's (AD) pathology exists and often a misdiagnosis of AD is made (Galasko, 2017; Walker, Possin, Boeve & Aarsland, 2015).

A lack of awareness of typical symptoms, poor familiarity with the value of obtaining a diagnosis and variable general practitioner knowledge can cause delays in obtaining an accurate diagnosis which contribute to overall feelings of burden for caregivers (Jackson et al., 2016; Legett, Zarit, Taylor & Galvin, 2010). LBD is a more rapidly progressive disease than AD, early diagnosis allows caregivers and families to access interventions, plan for unexpected deteriorations in cognition, motor function and behaviour and utilise supportive resources (Galvin et al., 2010). Careful monitoring can assist with the prevention of a variety of complications and minimising exposure to medications that may provoke symptoms or cause potentially life-threatening conditions such as severe neuroleptic sensitivity (Mueller, Ballard, Corbett & Aarsland, 2017).

Core Clinical Features:

Fluctuating Cognition

Patients with LBD are prone to spontaneous alterations in cognition, attention, alertness and arousal including staring spells, confusion and incoherent speech (Galasko, 2017; McKeith et al., 2017). These episodes of fluctuating behavioural inconsistencies discriminate LBD from other dementias and are correlated with increased caregiver distress (McKeith et al., 2017; Mueller et al., 2017). Planning activities in advance and scheduling rest periods may help to prevent tiredness and episodes of confusion (Londos, 2017). Large, randomized placebo-controlled trials show good evidence that the cholinesterase inhibitors (AchEI), Donezepil and Rivastigmine can improve cognition, agitation and attention (Stinton et al., 2015).

Recurrent Hallucinations

Cortical Lewy bodies in LBD are associated with complex recurrent visual hallucinations (Galasko, 2017). Vivid and well-formed false perceptions of people, insects or animals are difficult to manage because of their realistic details (Perkins, 2017; Walker et al., 2015). These phenomena are rarely reported on voluntarily due to variations in patient insight and emotional reaction and the suggestion that something might be wrong with them (Londos, 2017; McKeith et al., 2017). This can contribute to carer strain as a failure to disclose hallucinations delays treatment, affects quality of life (QOL) and can ultimately lead to hospital admissions.

The timely identification of hallucinations ensures access to pharmacological and psychosocial interventions (Tang, Burn, Taylor & Robinson, 2016). With careful blood monitoring for agranulocytosis, Clozapine may help to reduce hallucinations (Walker et al., 2015). Sertraline is well tolerated due to being short-acting but must be monitored for drowsiness (Galasko, 2017). Input from liason neuropsychologists can assist with the design and implementation of treatment plans that can improve the management of this disturbing and destructive complication (Fields, 2017).

Parkinsonism

The probable or possible diagnosis of LBD requires one or more spontaneous cardinal features of parkinsonism: Bradykinesia (slowness of movement and in amplitude or speed), rigidity or resting tremor (McKeith et al., 2017). The management of motor symptoms in LBD is complicated by a poor response to dopaminergic treatments and an increased risk of psychosis (Mc Keith et al., 2017). Levedopa is commenced slowly and kept to the lowest effective dose with the least amount of adverse reactions (Galasko, 2017; Perkins, 2017). Dopamine agonists can be problematic due to their high risk of provoking behavioural symptoms therefore carers and nursing staff must maintain careful vigilance. Patients at risk of falling should be referred to physiotherapy and occupation-

al therapists for safety assessments. Additionally, bone density screening and assessment of Vitamin D status should be done to minimise the risk of potentially life threatening fractures (McKeith et al., 2017).

REM Sleep Behaviour Disorder

REM Sleep Behaviour Disorder (RBD) is a parasomnia manifested by vivid dreams and complex motor movement (McKeith et al., 2017). Dreams often have a chasing, arguing or attacking theme where the patient is trying to protect themselves. RBD is thought to arise due to a lack of motor inhibition during REM sleep (Galasko, 2017). Unfortunately for the carer, sleep deficit occurs for them also and it may be necessary to change sleeping arrangements to avoid injury from flailing limbs. RBD can be managed with the use of Mirtazepine and can be complemented by low-dose Melatonin (Londos, 2017, Walker et al., 2015). In exceptional cases, Clonazepam may be useful with careful monitoring for hypotension. Patients and carers must be educated about improving safety to minimise injury (Walker et al., 2015) and the potential risks of sedation, falls, cognitive changes and agitation with prescribed treatments.

Autonomic Dysfunction:

Dysfunction of the autonomic system is common in LBD due to the a-synuclein pathology in central autonomic pathways (Galasko, 2017). Symptoms such as excess salivation and sweating can be distressing and embarrassing and erectile dysfunction inevitably impacts on intimacy.

Hypotension & Syncope

According to Barone et al., 2009 (as cited in Robertson et al., 2015) light-headedness, fatigue, generalised weakness, headache, nausea and impaired cognition can impact on independence and decrease QOL. Postural blood pressure should be checked routinely and side effects from anti-parkinsonian medications and antidepressants should be closely monitored (Stubendorff et al., 2012). Low-dose fludrocortisone may be prescribed after careful consideration and review of any concomitant anti-hypertensives. LBD patients tend to have a prolonged period of orthostasis after standing, therefore education about slow transitions from lying to sitting and standing position should be given. Additionally, where appropriate salt and fluid intake should be encouraged and compression stockings and abdominal binders may be considered (Walker et al., 2015).

Urinary Incontinence

Urinary incontinence contributes to sleep disturbance, social isolation and carer burnout. Management involves regular toileting to prevent anxiety and incontinence and forward planning for travelling. Referral to a continence nurse for continence aids and advice can be helpful. Oxybutynin and Solifenacin succinate may be prescribed to prevent urgency, frequency and leakage however, the potential benefit must be weighed against the risk of worsening cognition and delirium (Walker et al., 2015).

Constipation

Constipation in LBD is thought to be linked with Lewy body cholinergic impairment of the enteric nervous system (Lepkowsky, 2017). A weakening of the bowel muscles, poor muscle coordination and anal rectal changes make it difficult for bowel motions to occur (Vandergriendt, 2017). Encouraging a balanced diet, exercise and fluids is essential for prevention. Patients can be guided by their clinicians about the best use of laxatives, stool softeners and probiotics.

Cognitive Decline:

Executive Dysfunction

Deficits with working memory, set shifting and planning make it difficult to multi-task, and follow conversations and directions. Distraction and the loss of train of thought during household sequential tasks can have implications for personal care and safety within the home and ultimately leads to an early loss of independence.

Attention

Fluctuations in attention and mental flexibility are associated with driver difficulty (Fields, 2017). Slow reaction to sudden changes and a decreased ability to identify landmarks and traffic signs can contribute to at fault safety errors (Uc, Rizzo, Anderson, Spark. Rodnitzky & Dawson, 2006)

Visual Spatial Disability

Depth perception and judgement of distance are altered in LBD. Severe difficulties with visuospatial functioning can predict rapid decline and the development of hallucinations (Walker et al., 2015). Clumsiness, trips, falls, mishaps around the home and misjudging distances are sensitive issues to report but need to be explored to inform treatment choices and ensure patient safety.

Mood and Personality Changes:

Anxiety

Fluctuating cognitive and motor function in LBD can contribute to worry, phobias and panic attacks. Heightened levels of anxiety can worsen parkinsonism leading to the avoidance of activities, social and emotional isolation and poor QOL (Fields, 2017). New situations and surroundings can cause confusion and panic which places limits on socialising and holidaying. These unpredictable mood changes can be a major stressor for carers and family members. The provision of education and early referrals for respite support can help to alleviate carer burden.

Benzodiazepines, such as Diazepam and Lorazepam can be prescribed cautiously for their calming effect with careful monitoring for sedation, confusion and paradoxical agitation.

Apathy

Reduced initiative and motivation combined with overwhelming fatigue and hypersomnia can be some of the most disabling features of LBD. Seretonin norepinephrine reuptake inhibitor (SSRI) anti-depressants may be worth a try and can be combined with Modafanil as a stimulant (Bomasang –Layno, Fadland, Murray & Himelhoch, 2015).

Depression

The unpredictability of LBD makes it a very isolating condition with patients often feeling like they are trapped in their own bodies. During times when insight and clarity are retained, patients can become frustrated with the increasing perception of burden. Impulsivity, disinhibition and emotional lability can contribute to awkward interactions and contributes to high dependency on spouses and carers and restrictions in social and living arrangements (Mueller et al., 2017). Venlafaxine and Melatonin can be used to improve sleep and reduce depressive symptoms

(Londos, 2017). SSRIs such as Sertraline and Citalopram are most commonly used due to safer tolerability (Perkins, 2017) however, Fluoxetine and Paroxetine may also have a role in managing anxiety and depression with careful monitoring for gastrointestinal side effects.

Neuropsychiatric Complications:

Ilusions

Objects, shadows and patterns can often be misinterpreted as people or animals (Galasko, 2017) and these misperceptions can have implications for mood and safety depending on a patient's reaction to these distorted visual stimuli.

Delusions

There is often a paranoid theme to delusions in LBD with a focus on spousal infidelity, theft and home intruders (Goldman et al., 2014; Perkins, 2017). *Capgras Syndrome* is the most common unusual delusional syndrome where the spouse or close relative of a patient is believed to have been replaced by an imposter (Perkins, 2017; Moro et al., 2013). *Reduplicative Paramnesia* occurs when it is believed that a place simultaneously exists in 2 or more physical locations (Devinsky, 2009).

The reoccurrence of these symptoms contributes to carer burden which ultimately leads to more frequent hospital admissions, longer length of stay and accelerated nursing home placement compared to AD (Mueller et al., 2018). Clinicians need to be aware of these rare conditions so that factors such as pain, infection and interpersonal and environmental triggers that impact on delusions and agitation can be treated appropriately (Galasko, 2017; Moro et al., 2013). Carers should be encouraged to utilise family and community supports for regular scheduled respite to prevent carer burnout. A reduction of higher doses of levodopa may lead to an improvement in symptoms

(Galasko, 2017; Moro et al., 2013). Case reports have shown that Gabapentin can reduce the symptoms of agitation (Stinton, et al, 2015). Pimavanserin recently received FDA approval for hallucinations and delusions associated with PD psychosis (Cummings, Isaacson , Mills, Williams, Chi-Burris, Corbet, Dhall & Ballard, 2014).

Care Planning:

In LBD cognitive decline, greater caregiver burden and a greater effect on quality of life seems to be more accelerated than in AD. These circumstances need to be considered when contemplating long-term treatment (Mueller et al., 2017). The extent of the burden on people with LBD and their carers calls for the development of comprehensive and individualised care plans including pharmacological and non-pharmacological

interventions (Morrin et al., 2018). As the disease progresses, this complex, multi-system disease requires multiple providers and ongoing communication and collaboration.

Nurses as often the first point of contact, are in a unique position to assess the need for caregiver support and education and to refer to social networks, community organisations and aged care and disability assessment teams for personal care, respite and permanent care approvals.

Early referral to allied health professionals for safety concerns can assist with keeping patients in the home for as long as possible. Social workers can assist with understanding government carer entitlements and the legalities of Patient Consent, Living Wills, Power of Attorney and Guardianship. Furthermore, nurses can help carers and families prepare for emergencies by providing education about the disease and medication complications and empowering them to be able to advocate for the patient in acute care settings where LBD may be poorly understood.

To alleviate any pressure on family members to make difficult decisions during a crisis, early discussions about Advanced Care Directives and long-term care preferences should be conducted and documented while the patient has insight and can have input into their future care.

Since patients may not always be forthcoming about their level of functioning and carers may be reluctant to speak out of turn, clinicians need to be astute in their assessment of their patient's situation. Questions regarding personal care, managing medication and finances, driving, falls, safety in the home, exercise, cognitive stimulation and social interaction should be included in consultation to gain further insights into the day-day issues.

Conclusion:

In the absence of any cure or protective therapies for LBD, we need to take a wider approach to research and the provision of specialty health services.

The poor prognosis and high burden of care call for new treatment studies for LBD to be prioritised (Mueller et al., 2017). A better understanding of the pathophysiologic mechanisms and prodromal states of these diseases may lead to more accurate diagnosis and the development of disease modifying and symptomatic treatments. Eligibility criteria need to be considered so that trials can be designed specifically to investigate LBD and expand the evidence base (Morrin et al., 2018). The development of comprehensive clinical guidelines for the management of LBD will require robust interventional trials evaluating the efficacy of combined pharmacological and non-pharmacological interventions to inform best practice (Morrin et al., 2018).

By raising awareness in the general community and developing more support resources specific to LBD, this may help to generate interest and understanding and reduce the stigma associated with this more rapidly progressive but lesser known form of dementia (Legett et al., 2010). Additionally, addressing the gap in knowledge of clinicians, patients and caregivers should be prioritised to ensure patients receive timely and appropriate treatments and support to be able to face the unique challenges of navigating these largely unchartered waters.

Disclosures:

Madelaine Ranola has served as an advisor for Pfizer and Global Kinetics and has received honoraria from Merck Sharpe and Dohme outside the submitted work

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Vale: Sr. Elizabeth Naigaga

Last month the Neuroscience Nursing community lost a great and inspiring nurse. Elizabeth Naigaga was the head nurse of the first ICU at Mulago National Referral Hospital in Kampala, Uganda. Through her tenacity and perseverance she strived to improve both care and facilities in Uganda, including the development of a neurosurgical high dependency unit. It was through her mentoring and leadership that she continued to improve care and services at the Mulago ICU

In 2013, some of us were lucky enough to meet and hear Elizabeth present at the11th Quadrennial WFNN Congress in Gifu, Japan.

Elizabeth lost her battle with cancer in May. This, the loss of a truly incredible, dedicated and passionate neuroscience nurse.

Elizabeth's passion to change the world she lived in will be honoured by a creating a scholarship fund in her name to benefit an African nurse with limited resources to attend an international nursing conference with WFNN, NCS or AANN. (Original story https://wfnn.org/)


2018 ANNUAL CONFERENCE
Australasian Neuroscience Nurses' Association
Gold Coast, Australia
KEY DATES
Abstract submissions open on 6 February 2018
Abstract submissions close 6 April 2018
Registrations open 26 February 2018
AUSTRALASIAN NEUROSCIENCE NURSES' ASSOCIATION
ANNA
1974
30 - 31 AUGUST 2018
SHERATON GRAND MIRAGE RESORT
GOLD COAST
AUSTRALIA
Visit our website for further details at www.anna.asn.au

Calendar of Events

2018:

- **ANNA Conference**
  30-31st August Gold Coast
- **World Federation of Neuroscience Nurses Meeting**
  19-20th October 2018, Toronto Canada

2019:

- **EANN Congress**
  19-22nd March 2019, Manchester
- **AANN Educational Meeting**
  21-24th March 2019, Denver
- **ANNA Conference**
  TBA

2021:

- **WFNN Congress**
  20-23rd July, Darwin Australia

ANNA
Australasian Neuroscience Nurses' Association

Post Scholarship Requirements

Successful applicants presenting an oral paper **must** submit their written paper to be published in the *Australasian Journal of Neuroscience* as part of their award requirements. The successful applicants name will be forwarded to the Journal Editor for follow-up.

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**

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 double-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.
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 using the APA 6th edition referencing style. 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.

Please see the ANNA we page and or APA style guides for further guidance

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Checklist

Letter of submission; all text 10 font Arial typed double-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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