Discipline of Nursing

School of Population Health and Clinical Practice

Faculty of Health Sciences

The University of Adelaide

RESEARCH   PORTFOLIO

Stroke prevention

and

hospital management

(Albert) Man-tat Yip

RN, BHSc, MPHC

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the degree of Doctor of Nursing**

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CONTENTS

Page

STATEMENT OF ORIGINALITY

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PORTFOLIO OVERVIEW

This portfolio of research is comprised of four main sections:

Section 1.   Introduction of portfolio

Section 2.   Research study report one:
A descriptive study of l ifestyle cha nges m ade following discharge from hospital by patients who have suffered aminor stroke or transient ischaemic attack (TIA).

Section 3.   Research study report two:
The hospital management of patients with acute dysphagia following stroke. A retrospective review.

Section 4.   Conclusion of portfolio.

INTRODUCTION OF PORTFOLIO

APOPLEXY

Stroke was first recognised nearly 2500 years ago by Hi ppocrates (460 – 370 BC), a famous Greek physician – 'the father of medicine'. He called stroke 'apoplexy', which means 'struck down by violence'. In 1658, J ohann Jacob Wepfer recognised patients who died with apoplexy had a haemorrhage and blockage of cerebral blood vessels. In 1856, Rudolf Virchow, i ndicated stroke occu rred at cellular level and was caused by cerebral emboli. In 1928 the term 'apoplexy' was replaced by the term 'cerebrovascular accident' (CVA) the change was supported by ev idence of post-mortem examinations (Pound, Bury & Ebrahim 1997). This indicated that health professionals had begun to understand stroke as a disease of the blood vessels in the brain. The lay term 'stroke' first appeared in 1599 and appears to have developed from phrases such as 'the stroke of God's hande (sic)', 'the stroke of God' and 'the stroke of justice', indicating a belief in supernatural theories, and this term ha s been used in the public arena since 1930s (Chest and Heart Associatio n 1962). In recent d ecades a new term 'brain attack' was introduced to avoid the misconception that stroke is unpredictable. Health professionals wished to convey the m essage that em ergency treatm ent is required as for 'heart attack'.

Unlike stroke where the effects may be permanent, transient ischaemic attacks (TIA) or 'mini stroke' m ay provide a warning that severe cerebrovascular disease (CVD) is present. This is when there is a temporary interruption of the brain's blood flow and the signs and symptom s of s troke last just fo r a short period usually resolving within 24 hours.

The developm ent and understand ing of stroke prevention and care has been slow because of the com plex nature of the structure and functio n of the brain, which is divided into three main divisions: the cerebrum, the brainstem and the cerebellum. Each division contributes different vital functions to the body, via the delicate and com plex network of the nervous system . The brai n is covered by m eninges and requires a continuous supply of oxygen. One-sixth of blood pumped from the heart will supply the brain and one-fifth of the oxygen is consumed by the brain tissue. Without this oxygen

supply brain function is com promised. Theref ore the brain is highly dependent on oxygen to support continued cerebral function, including processing inf ormation from sensory neurones, coordinating body m ovements and communication through m otor neurones to control particular muscles accurately (Farrell, Smeltzer & Bare 2005).

Stroke is caused by the interruption of blood supply to certain parts of the brain tissue due to a blockage or rupture of blood vesse ls, and consequently functions of the body may be impaired. The brain is very sensitive to the changes in pressure, due to blockage of the flow of cerebrospinal fluid (C SF), haemorrhage, oedema or a space occupy ing lesion. Any of these conditions may cause an increase in intracranial pressure (ICP) and due to th e limited space within the skull; if this is not relieved, the b rain itself m ay herniate through the foramen magnum.

The blood brain barrier also increases the di fficulty associated with investigation, assessment and treatm ent of the brain. This barrier m akes the central nervous system (CNS): brain and spinal cord inaccessible to substances such as drugs, antibiotics and dyes circulating in th e blood, preventing them from reaching the neurons of the CNS. The blood brain barrier is created b y the lo w permeability of endothelial cells in th e brain's capillaries, which prevents large m olecules en tering the CSF and is an important protective mechanism (Farrell, Smeltzer & Bare 2005).

The cerebral functions involved in comm unication, intellectual functioning and in patterns of emotional behaviour and sensory and motor ability are difficult to evaluate and, thus require detailed clinical assessm ent and observation by health professionals. The Glasgow Coma Scale (GCS) is one of the most common methods used to record a patient's neurological functioning. Questions about the patient's m edical history, lifestyle prior and subsequent to the diseas e are also im portant in evaluating and risk factors for CVD.

THE HISTORY OF THE TREATMENT OF STROKE

Before twentieth cen tury there were severa l different theories regarding the cause of stroke, they included humoral theories, supernatural theories, the theory of 'apoplectic

habitué', and m oral notions of intem perance and imm oderation (Pound, Bury & Ebrahim 1997). These theories influenced the perceptions and thus treatment of stroke. According to Pound, Bury and Ebrahim (1997), in the eightee nth century some physicians who supported the hum oral theories treated apoplexy with bloodletting to reduce the patient's blood pressure and rest ore the balance of the hum ours. Som e presumed a stroke was cause by an indigestible m eal, s o the patients m ight be stimulated to vomit or an enema was given (Osler 1892-1944). Stroke w as a mystery, many believed that it was punishm ent from an invisible power which attacked people who had sinned (Clarke 1824, Tanner 1854).

In eighteenth century another theory deve loped, this theory 'apoplectic habitué' proclaimed that some people had an underlying predisposition that made them prone to ill h ealth. In dications of, 'apoplectic habitué' were cons idered to be ob esity, 'strait' chests, problems with breathing, very red or pale faces and a short thick neck and large head. Indulgent, luxurious, living was also thought to be a cause of 'apoplectic habitué' with poor circulation increasing the risk of fatal stroke (Robinson 1732). There were a multitude of different lifestyle factors that were attributed to causing apoplexy, these included, diets with highly-seasoned m eats and sauces, excess alcohol consum ption, use of tobacco, severe physical strain, se xual excitement, constipation, sudden change of the air (cold weather), tight clothing around the neck, too much sleep and warm baths (Robinson 1732, Tanner 1854). Advice given to avoid apoplexy included, maintaining regular bowel movements, a quiet life, a m oderate diet and avoidance of sm oking and excessive drinking (Clarke 1824).

CARE OF THE PATIENT WITH STROKE

The prognosis of apoplexy was poor and the mortality and disability rate was very high, especially in patients who had persistent hemiplegia for more than three months. It was not until the end of the eighte enth centur y, that dis section and post-m ortem examinations demonstrated th e disease wa s caused by 'obstruction' or haem orrhage associated with the degeneration of the arterial wall (Lawrence 1994).

At the tim e, there was little agreem ent among physicians regarding the long-term

treatment for apoplexy. Until 1892 Osle r's textbook prescribed m assage of the paralysed limbs and us ing electricity to stim ulate the m uscles following stroke to maintain nutrition of the m uscles and to prevent contract ures. In 1935 it was also suggested that patients be instructed to perf orm passive and active exercises systematically, tendon transp lantation and cross suturing of nerves for patients who suffered contractures of lim bs was also recommended (Osler 1892-1944). Although these treatments were not very effective and consequently lost favour, they gave paralysed patients' hope and increased their optimism (Pound, Bury & Ebrahim 1997). In 1952 Davidson's textbook also m entioned 'physiotherapy', 'occupational therapy', and by 1965 early 'rehabilita tion' was introduced (Dav idson 1952-1987). Since the 1950s the establishment of stroke and stroke rehabilitation units has been recommended for care and are reco gnised as being associated with a lo wer mortality rate, shorter length of stay in a hospita l better long-term outcom es (Langhorne & Dennis 1998). However, the implementation of stroke units has been limited due to the high cost, related to their es tablishment and operation. Audits have indicated that in England from 2001/02 only 29% of patients w ho suffered stroke, were adm itted to a stroke un it for acute m anagement and care (Irw in, Hoffman, Lowe, Pearson & Rud d 2005).

At the beginning of the twenty-first cent ury, certain hum an genetic factors i n deoxyribonucleic acid (DNA) were discovered that indicated some people might have a higher risk of certain types of stroke (American Heart Association 2006).

DIAGNOSIS AND INVESTIGATIONS

In the twentieth century, there were several breakthroughs in the techniques used for the investigation of stroke which subseque ntly improved diagnosis, monitoring and treatment. These techniques included cont rast angiography (1920s), indicator dilution technique to m easure brain blood flow (1940s), and doppler ultrasonography for evaluating the blood flow to the brain (1960s). Another essential tool for early diagnosis of ischaem ic and haem orrhagic stroke, com puterised tomography (C T) scanning, w as introduced in 1970s, and later positron-em ission tom ography (PET) scanning was also developed to provide a sectional view which can provide vital

information in relation to brain m etabolism. In 1980s m agnetic resonance im aging (MRI) was introduced and it further improved the accuracy of evaluation with clear and detailed images to locate the source of the stroke (American Heart Association 2006).

TREATMENT

Advanced investigation methods have greatly helped physicians to accurately diagnose and locate the source and type of stroke . M any trea tments and spec ific surgical techniques have also been developed for pr evention and intervention. For exam ple, in 1954 the first carotid endarterectomy was used to remove the plaque deposits from the carotid artery and in 1969 th e first operation of artificial heart valves in hum ans was performed to minimise the risk of stroke caused by emboli (Mackay & Mensah 2005a). In the 1980s early aneurysm surgery was developed to improve patients' outcome after subarachnoid haem orrhage and in the 1990s m ore effe ctive treatm ent such as microcoils, angioplasty and stenting were used for aneurysm s. In the 2000s neurogenesis (formation of new nerve cells) ha s been developed, this is an advanced technique which uses transplantation of replenishing brain cells with enhancing growth factors to help regenerate affected neurons (American Heart Association 2006).

Regarding medication, in the 1970s aspirin and anticoagulants were trialled and proved effective in lowering the risk of stroke from chronic atrial fibrillation. In 1990s the first emergency drug to treat ischaem ic stroke : tissue plasm inogen activator (tPA) was introduced. This drug has the best effect when used within three hours of the first onset of symptoms. Although this drug is very effective in removing cerebral blood clots with maximal reservation of brain functions, cer tain limitations and problems have altered its efficacy, such as delay in patients seeking medical advice, and inefficiency of health facilities o r schedule s, so tha t v aluable tim e and opp ortunities a re los t. Ear ly identification of stroke is im portant to provide e ffective treatment, preventing further damage.

The major risk factors for stroke have been gradually recognised over the past 50 years, these include carotid stenos is (1950s), hypertension (1960s) and in the 1970s an unhealthy lifestyle was recogni sed as a risk factor, incl uding poor diet and, physical

inactivity. Importantly, cigarette smoking was established conclusively as a major risk factor of stroke in the 1980s. In 1978 atrial fibrillation was linked to stroke and in the 1990s studies showed lowering blood pressure also reduced the risk of stroke significantly. Almost 800 million patients between the age 60 and 79 years suffer hypertension worldwide: if the patients' systolic blood pressure (SBP) could be lowered, for each 10mmHg fall there would be a direct reduction in the risk of stroke by about one-third; and if 7% of those with diastolic blood pressure (DBP) over 95mmHg were able to reduce there DBP by 2%, a million deaths a year from stroke could be prevented in Asia alone (Mackay & Mensah 2005a).

One of the first studies about lifestyle changes was commenced in 1972. The 'Stanford three community study' was the first community-based cardiovascular risk education campaign, which involved the change of lifestyle-related risk factors, including physical activity, dietary habits and cigarette smoking. This program showed a 23 to 34% reduction in cardiovascular disease risk, including dietary cholesterol and saturated fats as a result of community-based interventions (Fortmann, Williams, Hulley, Haskell & Farquhar 1981). A large scale 'Stanford five-city project' included stroke reduction and involved a total population of over 300,000 from 1979 to 1992. The project was a quasi-experimental field trial that used more lifestyle-related risk factor interventions through mass media and direct education to the citizens. The project aimed at reducing serum cholesterol levels, improving weight control through dietary change and increased exercise; lowering blood pressure through reduced salt intake, reduced weight and increased anti hypertensive medication use; and reducing cigarette smoking use through prevention and cessation programs. The results indicate that on average in all five cities there was a reduction of 3% per year of subjects with one or more of the risk factors (Fortmann & Varady 2000).

The World Health Organization also announced countries should cooperate to perform primary health care and encourage healthy lifestyle change projects to minimise the risk factors This is a cost-effective means to alleviate the health care burden and prevalence of stroke in the future, especially in developing countries, which have almost 75 to 85% of the mortality rate of stroke (World Health Organization 2003).

BURDEN OF STROKE

Although knowledge regarding stroke and in terventions has greatly im proved in the last cen tury, surveys dem onstrate the gl obal prevalen ce of stroke has increased dramatically and is no w shif ting f rom Western developed na tions to developing countries. For example: in Britain the absolute numbers of deaths from stroke increased rapidly from 20,000 per year in the 1930s to 80,000 in the 1980s, an alm ost four-fold increase within half a century (Char lton, Murphy, Khaw, Ebrahim & Davey Sm ith 1996); how ever, the mortality rate decreased to 60,000 in the 2000s. There is now considerable evidence indicating th at due to globalisation, people in developing countries have adopted unhealthy lifestyle s and nor ms from Western countries. The ageing population is also an i mportant pr oblem as the world population increased rapidly after the Second W orld War, in addition, people now have longer lif e expectancy due to the introduction of i mmunisation and advanced medical care, improved living standards and services in many countries (Oldenburg, Burton & Parker 2004). However, certain chronic illnesses, particularly hypertension, diabetes and heart disease are increasing following the rise in unhe althy lifestyles, increasing the risk of stroke. There is recognition that the increasing incidence of stroke may greatly escalate the cos t of health care, and community s ervices and m ost im portantly incr ease th e social burden related to stroke (Palmer, Valentine, Roze, Lammert, Spiesser & Gabriel 2005). Thus effective prevention strategies and hospital care and m anagement are of paramount importance.

Human life is invaluable; however, governm ents and hospitals have lim ited resources to expend on health care m anagement and services. Globally, stroke causes 10% of total deaths every year and places a significant burden on health care providers, families and communities due to patients' disability and complications. This is because patients may not be able to continue their previous employment and their families have to care for them at hom e resulting in reduced co mmunity productivity. For example, in 2004 the American Heart Association estim ated that stroke would cost a total of US $53.6 billion, including direct costs ($33 billion) for m edical care and therapy and indirect costs was $20.6 billion from lost productivity in United States of America (Mackay & Mensah 2005b). Furthermore, the cumulative Medicare cost of treatm ent of CVD for Americans aged 65 years to death f or the risk factors including high blood pressure,

high cholesterol, cigarette smoking, a history of diabetes or previous heart attack was between US $30,000 and $76,000 per person, depending on their number of risk factors (Mackay & Mensah 2005b). In regard to the current major preventive measures and treatment of stroke, which are highly dependent on cardiovascular medications, the percentage of total annual drug expenditure on cardiovascular medications has gradually increased from 9.4% to 11% in Organization for Economic Co-operation and Development (OECD) countries between the years 1989 and 1997 (Mackay & Mensah 2005b).

In Australia in 2003 there were an approximate 346,700 stroke survivors and 282,600 (80%) had significant disabilities and needed assistance for activities of daily living (ADL), however only 128,000 survivors (45%) received formal assistance and 169,000 (60%) depended on an informal carer (Senes 2006). In 2002-2003 patients who suffered stroke as a principal diagnosis accounted for 1,073,645 patient days in hospitals and rehabilitation units. Since then the average length of stay for initial hospital care for stroke has been shortened to 12.6 days from 18 days (Senes 2006), this indicates the high admission rate and the rehabilitation required for these patients. Most survivors live at home and half of these require assistance for ADL, only 12% are cared for in institutions. Fifteen percent of all residents in aged care facilities are disabled from stroke. This situation indicates the high demand for formal and informal care. Projections in Australia also indicate that the number of older people with profound disabilities will increase 70% over the next 30 years (from 2006 to 2031), with stroke being one of the main causes. Hence, there will be more challenges for families, friends, volunteers and health care providers (Giles, Cameron & Crotty 2003).

The economic loss and burden on health care resources from stroke is clearly huge and is increasing. However, the burden on the patients, their families and carers is even more significant. The emotional and psychological impact associated with stroke particularly when patients suffer significant physical impairment may be severe. The patient's role in the family and thus the structure may be changed with associated problems involving finance, socialisation, sexuality, communication and behaviours. Patients may also be prone to injury, such as falling, choking and, scalding. These problems can only be alleviated with appropriate support and education for patients and their carers (Hankey 2004, Smith, Lawrence, Kerr, Langhorne & Lee 2003). It is

reported that patients who have a disability and are unable to live independently, have a poorer health related quality of life (Senes 2006). Although stroke can happen at any age, the rate increases significantly with age from about 65 years (Thrift, Dewey, Macdonell, McNeil & Donnan 2000). Patients and carers who have inadequate knowledge and skills may increase the risk of stroke recurrence and deterioration of health. Consequently, more hospital readmissions and more vigorous treatment may be required.

PREVENTION

Stroke is a non-communicable and very preventable disease. Many people recognise stroke as an emergency, however few are aware of the risk factors and signs and symptoms (Senes 2006). Although recognising and understanding these is very important, it is also essential that patients do not delay seeking medical advice when they are first detected. Transient ischaemic attack (TIA) and minor stroke are very important warning signs of major stroke, however, many patients and even some health professionals are not fully aware of this and may not take appropriate actions such as investigation or referral. Studies indicate that about 30% of people with a major stroke have had an earlier TIA and 9% have a stroke within one week, 12% in the first year and then about 7% a year thereafter (Lovett, Dennis, Sandercock, Bamford, Warlow & Rothwell 2003). Therefore, patients who suffer TIA or minor stroke should be important candidates for treatment and preventive measures such as healthy lifestyle modification programs.

Some patients decide not to adopt healthy lifestyles or sustain changes for a short period only (Malfatto, Facchini, Sala, Bragato, Branzi & Leonetti 2000). Since these patients are at high risk of stroke, it is crucial to find out the factors that influence this behaviour. Thus the first study in this portfolio was designed to explore patients' understanding of modifiable risk factors of CVD. It investigated the lifestyle changes actually made following stroke or TIA as well as the factors affecting patients' decisions about whether to make lifestyle changes. The two major factors considered were patients' sources and level of knowledge and their attitudes and beliefs around making changes. In order to assist the patients to minimise the risk of stroke and recognise healthy

lifestyle change as one of their preventive measures, health professionals have to understand the main issues and barriers that cause patients to have difficulties or be unwilling to adopt healthy lifestyle changes.

MANAGEMENT

Stroke is a medical emergency and patients are admitted to hospital for acute care and rehabilitation. Patients who suffer severe stroke may be critically ill, lose consciousness and suffer disability. Health care professionals should provide high-quality stroke care saving patients' lives, preventing complications and promoting recovery, thus the severity of disability can be minimised and length of stay in hospital can be minimised. Nurses are the conduit of all patients' care and they liaise with the multidisciplinary team to provide the best interventions and maintain good outcomes. Stroke care management focuses on rehabilitation to assist patients to restore their ability to care for themselves.

Oral intake is essential for nutrition and hydration, especially in patients being rehabilitated who may require more energy to meet their needs and restore their bodies' resistance (Finestone & Greene-finestone 1999). If patients suffer dysphagia following stroke, this may impede recovery and may cause severe complications. The incidence of acute dysphagia following stroke is high and some patients die from complications (Dennis, 2000). A review of the literature revealed little research has been conducted about the nurses' role in holistic management of patients with dysphagic stroke and the cooperation of the multidisciplinary team. In addition, audits have shown that general stroke care management is not satisfactory and some nurses' knowledge and training regarding dysphagia is limited (Kowanko, Simon & Wood 1999). The quality of hospital care and management may be influenced by policies, collaboration of the multidisciplinary team, protocols, and staff education or training. An in-depth study may assist in evaluating the management of these patients. Thus the topic of the second study in this portfolio was to explore the hospital management of patients who suffer dysphagia following stroke. This was done through a review of medical records to assess the nurses' role and the cooperation of the multidisciplinary team. The results of this study may assist health policy makers and health care providers in the development

10

of hospital policies and interven tions, to enhance the m anagement and quality of care for these patients.

CONCLUSION

The prevalence of stroke is increasing rapidl y worldwide at huge cost both financially and in term s of hum an life. The increas ing burden falls not only on health care professionals and f amilies and care rs, but will inevitab ly affect the f uture health car e planning and, development. A lthough in m any developed na tions the mortality rate from stroke has declined, the m orbidity and disability rates are increasing. In addition in m any de veloping countries the incidence of stroke is increas ing as sociated with unhealthy lifestyles. Hence, governm ents ma y be required to spend more on health resources, including medications, and health care facilities for the increasing number of stroke p atients with d isabilities. However, as stroke is a highly preventable disease, governments m ay consider increasing com munity-based program s for health promotion to enhance people's awareness and knowledge of stroke prevention, care and management. These strategies are important to lower the cost and social impact of stroke (Dzator, Hendrie, Burke, Gianguilio, Gillam, Beilin & Houghton 2004).

This research portfolio reports on tw o studies related to the management and care of patients who have suffered a stroke.

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