Anticoagulant Versus Antiplatelet Therapy for Acute Ischaemic Stroke

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Abstract

Acute ischaemic stroke is a leading cause of death in Canada and should be a priority in health care. This paper defines acute ischaemic stroke and provides current statistics, economic costs, risk factors, treatments, and management options. A gap between current practice and literature is identified. Specific treatments of anticoagulant and antiplatelet therapy are explored through systematic reviews, clinical trials, and national guidelines. Considerable consistency in research findings have led to evidenced-based guidelines. Implications for practice, including barriers and facilitators to incorporating evidence-based recommendations are identified. The study concludes with an identification of the need for clinical practice guidelines in Northern Health along with the implementation of current provincial guidelines that will provide best patient care in treating patients with acute ischaemic stroke.

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Anticoagulant Versus Antiplatelet Therapy for Acute Ischaemic Stroke

Acute ischaemic stroke (AIS) is a leading cause of death in Canada and should be a priority in health care. This paper defines AIS and provides current statistics, economic costs, risk factors, treatment and management options. A gap between current practice and literature is identified, and the efficacy of anticoagulant and antiplatelet therapy are determined through systematic reviews, clinical trials, and national guidelines.

Background

Cerebrovascular disease is a frequently occurring neurologic disorder that is characterized by the sudden loss of circulation to an area of the brain (Becker, 2006). Two broad types of cerebrovascular disease resulting from brain abnormalities are hemorrhagic and ischaemic stroke (Harrison's Practice, 2007). Diseases of the circulatory system accounted for 74,824 deaths in 2001, about 34% of the total deaths in Canada; 21% of disease due to the circulatory system were attributed to stroke (Statistics Canada, 2004). Stroke is the third leading cause of death in Canada: seven percent of all deaths in Canada are due to stroke (Heart and Stroke Foundation, 2008). Between 40,000 and 50,000 Canadians are hospitalized for strokes every year (Health Canada, 2006) and about 15,000 of those strokes are fatal (Health Canada, 2006). According to the British Columbia Vital Statistics Agency, six British Columbians die each day from cerebrovascular disease (2006). British Columbia Vital Statistics Agency (2006) reports a downward trend of cerebrovascular mortality with 409 deaths from 2001 to 2006 in the Northern Health Authority.

According to the Heart and Stroke Foundation (2008), of the Canadians who have a stroke, 15% will die soon after the stroke, 10% will recover completely, 25% will recover

with minor disability, 40% are left with moderate to severe impairment, and 10% are severely disabled and require long-term care. Disabilities may range from slight weakness of a hand to permanent hemiparesis. A stroke survivor has a 20% chance of restroke within two years (Health Canada, 2006). This paper will deal specifically with AIS as it is the most common type of stroke.

Financial Cost of Stroke

Stroke costs the Canadian economy 2.7 billion dollars per year in physician services, hospital costs, lost wages, and lost productivity, with an average of $27,500 per stroke (Heart and Stroke Foundation, 2008). Stroke cost in British Columbia is estimated to be greater than $327 million annually (HSFBC&Y, 2005). Lindsay et al. (2008) contend that organized stroke care over a 20-year period could prevent 160,000 strokes; a projected $8 billion in savings to the Canadian health care system.

Risk Factors for Stroke

After age 55, the risk of stroke doubles every 10 years and more women than men die from stroke at all ages (Health Canada, 2006; Heart and Stroke Foundation, 2007). Some pre-existing medical conditions as well as some lifestyle factors can put people at a higher risk for stroke. Risk factors for stroke include hypertension, diabetes, hyperlipidemia, atrial fibrillation, atherosclerosis, recent myocardial infarction, family, and/or personal history of heart disease (Harrison's Practice, 2007; Health Canada, 2006). Other risk factors include cigarette smoking, acquired immune deficiency syndrome (AIDS), recreational drug use, and heavy alcohol consumption (Center for Disease Control and Prevention, 2007).

Causes of Stroke

While hemorrhagic or 'bleeding' stroke accounts for 15-20 % of total strokes, acute ischaemic stroke (AIS) accounts for 80-85% of all strokes. AIS is caused by emboli, thrombus, or systemic hypoperfusion that blocks an artery leading to the brain (Granitto, 2008). Embolic causes due to atrial fibrillation, patent foramen ovale, and low ejection fraction account for 45% of ischaemic strokes. Thrombus due to plaque buildup and narrowed arteries accounts for 30% of ischaemic strokes. The remaining 25% of ischaemic strokes are attributable to systemic hypoperfusion, hypercoagulable states, and cryptogenic causes (Granitto). With the major proportion of strokes being ischaemic, it is prudent for this project to determine the best evidence for treating AIS.

Clinical Presentation of Stroke

The usual clinical presentation of AIS include neurologic impairment such as transient blindness, diplopia, dizziness, headache, sensory deficiencies, speech problems, motor difficulties, and weakness or numbness (Heart and Stroke Foundation of Canada, 2007). Severe impairment may include a loss of consciousness after the event, coma, or death (Tierney, 2007). Generally, the greater or larger the cerebral vessel involved, the greater the risk of morbidity and mortality.

Diagnosing Stroke

Emergency non-contrast head computed tomography (CT) is mandatory for distinguishing ischaemic from hemorrhagic stroke. A head CT scan is a crucial diagnostic tool in the evaluation of this cause of stroke, since patients with AIS may be eligible to receive thrombolytics therapy, while patients with hemorrhagic stroke are best treated with a completely different therapeutic pathway (Becker, 2006). This paper will focus on the

treatment of AIS with specific interest in anticoagulant and antiplatelet therapy. Treatment of AIS with thrombolytics will be briefly discussed due to the importance of the medication in treating AIS.

Treatment of AIS

The guiding principle in AIS treatment is the phrase *Time is Brain.* This refers to the need to act quickly because brain tissue is lost with every minute that passes. Treatment of AIS includes three different medications: thrombolytics, anticoagulants, and antiplatelets. This paper will define the three classes of medications, however, the focus will be on antiplatelet therapy versus anticoagulant therapy because there appears to be a considerable discrepancy between individual practice and recommended guidelines with regard to the two treatments.

Thrombolytics

Granitto (2008) asserts that to date, the use of intravenous tissue plasminogen activator tPA is the sole thrombolytic agent approved for use in patients with AIS. This drug class is commonly referred to as 'clot buster' medication and has been used since 1996. Dissolving the clot will reduce damage to the brain, therein reducing the effects of the stroke and decreasing permanent disability (AHA, 2008). Tierney (2007) states that tPA decreases the risk of disability by 30% in patients who receive the drug within 3 hours of onset of AIS. Effective and rapid treatment of AIS increases quality of life and decreases the mortality rate. The use of tPA carries the risks of intracerebral hemorrhage and angioedema with possible airway compromise, all which are serious and life threatening side effects (Adams et al., 2007). TPA should therefore only be used within the confines of stroke guidelines, and initiated only after AIS is confirmed by a head CT scan. Since ischaemic stroke must be

accurately diagnosed by CT scan, many patients are unable to receive the clot busting therapy due to time constraints. The 3 hour time frame for use of tPA limits its use in rural and remote areas of British Columbia. In addition to time, there are many inclusion criteria that must be met for a patient with AIS to receive tPA such as medical history and current illnesses. TPA has substantial costs including the medication itself and the specially trained medical/nursing staff required to administer it.

Anticoagulants

Anticoagulant drug therapies include heparin, low molecular weight heparin (LMWH), and warfarin. Warfarin reduces the synthesis of clotting factors by depleting the body's store of vitamin K and takes 48 to 72 hours to become therapeutic (Valentine & Hull, 2008). Warfarin causes twice as many hemorrhages as aspirin, particularly in patients with a history of bleeding or genetic disorder and in elderly patients (Hankey, 2005). Warfarin has a narrow therapeutic window, requires frequent dosing changes, continuous monitoring, and is affected by numerous drug and food interactions (Hankey). Heparin and LMWH prevent blood clotting by potentiating the action of antithrombin therein inactivating thrombin and preventing the conversion of fibrinogen to fibrin (Valentine & Hull, 2007). While the heparins also have a narrow therapeutic window, and require twice daily injections, the duration of action is about 12 hours compared to 3-5 days for warfarin. However, like warfarin, the heparins also have similar bleeding complications, which could offset any benefits. Hemorrhagic stoke will develop if an AIS is treated with warfarin or heparin 50% more frequently than if treated with aspirin (Berge & Sandercock, 2002).

Antiplatelets

Antiplatelet drug therapies include aspirin and thienopyridine derivatives (clopidogrel and ticlopidine). Aspirin, clopidogrel, and ticlopidine block prostaglandin synthetase action which prevents formation of the platelet aggregating substance thromboxane (Lexi-Comp, 2008a; Lexi-Comp, 2008b). Aspirin has been used for centuries for medicinal purposes and is also quite inexpensive compared to newer antiplatelet drugs. Aspirin is easy to administer and continuous monitoring is not required for patients who receive this medication. Aspirin is not without potential side effects, which include allergic reactions, upper gastrointestinal upset, gastrointestinal bleeding, and rash (Hankey, 2005). However, the side effects of the theinopyridine derivatives are greater in severity compared to those occurring with aspirin and include hemorrhage, diarrhea, rash, and neutropenia (Hankey). Current Canadian and American clinical practice guidelines state that anticoagulant therapy is not recommended for AIS and that antiplatelet therapy using aspirin should be initiated immediately after confirmation of AIS by computed tomography (CT) scan (Adams, et al, 2007; Canadian Stroke Strategy, 2006).

Management of AIS

Physicians have used anticoagulants to treat patients with AIS for over 50 years, yet despite its longstanding and widespread use, anticoagulant therapy is the subject of much debate (Adams et al, 2007). Adams et al. assert that disagreements exist regarding the usefulness of emergency anticoagulation, the best agent to administer, the preferred route of administration, use of a bolus dose to initiate treatment, the level of anticoagulation required, and the duration of treatment. Physicians often erroneously prescribe anticoagulants to patients with recent stroke in an effort to prevent early recurrent stroke and to improve

neurological outcomes (Adams et al.). Nurse Practitioner Stroke Guidelines assert that early anticoagulant therapy does not decrease the risk of neurological worsening (Granitto, 2008).

In the past decade, guidelines for stroke management have included recommendations on medication use in AIS. These recommendations have changed over the years to incorporate new research findings. Because health care providers continue to prescribe both anticoagulant and antiplatelet therapy for AIS, the current evidence on these therapies merits review.

Study Question

The study question explored in this project is: *In patients with acute ishaemic stroke, does antiplatelet therapy as compared to anticoagulant therapy reduce the incidence of restroke and mortality?* The patient population consists of people diagnosed with AIS. The intervention of interest is the use of antiplatelet therapy compared with anticoagulant therapy. The outcome of interest is which group of patients has had a more positive outcome, specifically, reduced incidence of restroke and decreased mortality.

Literature Review

Sources and Research Processes

Databases used to find evidence to address the question include: Cochrane Database of Systematic Reviews (CDSR), National Guidelines Clearinghouse (NGC), Cumulated Index of Nursing and Allied Health Literature (CINAHL), MEDLINE, Science Direct, Pubmed, Ovid, Blackwell Synergy, Evidence-based Medicine (EBM) reviews, and UpToDate. The key words used included: acute ishaemic stroke, antiplatelet, anticoagulant, aspirin and stroke, stroke nursing care, antiplatelet$ and anticoagulant$, stroke prevention, ishaemic stroke and study$, acute ishaemic stroke and trials, cerebrovascular accident,

vascular infarct, evidence and prevention, and stroke and guidelines. Inclusion criteria were patients diagnosed with AIS and treated with either anticoagulant, antiplatelet therapy, or combination therapy. The patients in the studies included men and women of varying ethnicities and ages. The systematic reviews were chosen because the reviewers independently selected studies for inclusion, assessed the quality of trials, and extracted the data. The search resulted in three single studies and trials (a RCT, a multi-centre trial, and a case cross-over study) totaling 4,900 patients, four systematic reviews totaling 104,160 patients, and six national guidelines for review and analysis.

Single Studies and Trials

Randomised controlled trials and observational studies provide complimentary evidence to the more powerful systematic review (Barton, 2000). The following single studies and trials compare antiplatelet agents for the treatment of diagnosed AIS. The antiplatelet agents included in these studies and trials are aspirin, ticlopidine, clopidogrel, and a combination of aspirin and clopidogrel.

Grau et al.'s, (2003) case-cross over study of 31 patients compared clopidogrel 75mg and aspirin 300 mg each as monotherapy and as combination therapy. Patients diagnosed with AIS and treated with aspirin for secondary prevention, received clopidogrel alone, or a combination of clopidogrel and aspirin for four weeks. Grau, et al. found that while combined therapy indicates a lower risk of thrombosis, it increases the risk of hemorrhage. However, in a multi-centre trial involving 1809 African-American patients diagnosed with stroke, within 90 days of onset, in over 60 cities, aspirin 650 mg was found to be as effective as ticlopidine 500 mg in preventing restroke (Gorlick, 2003). The potential for serious side effects was found in the patients receiving ticlopidine, therefore outweighing the benefits of

administering the medication. Hass et al.'s (1989) RCT involving 3069 patients diagnosed with recent transient or mild persistent focal cerebral or retinal ischaemia compared ticlopidine 500 mg to aspirin 1300 mg. Hass et al. found ticlopidine to be only 2 percent more effective than aspirin for preventing restroke or death in the following three years. However, the study also found that the side effects of ticlopidine were doubled in comparison to those of aspirin. Noted in this study are the large dose of aspirin and the age of the study. While the above three studies are not as credible on their own as are systematic reviews and national guidelines, the findings are similar to the findings of the more credible evidence and are useful in the context of this paper. They were chosen for this project because they address the pressing study question, were in peer reviewed journals, and are examples of well done studies. Evidence from the above studies and trials clearly determines that aspirin should be administered instead of other antiplatelet medications, however, the question of appropriate aspirin dosage remains. While these single studies and trials are included in systematic reviews and national guidelines, they are also valuable as evidence to support individual health care providers as they search for evidence-based provision of care to patients with AIS.

Systematic Reviews

Systematic reviews of randomized controlled trials are "traditionally the gold standard for judging the benefits of treatments, mainly because it is conceptually easier to attribute any observed effect to the treatment being compared" (Barton, 2000). In the following four systematic reviews, one examines the use of antiplatelet therapies clopidogrel and ticlopidine compared to aspirin for the prevention of AIS. The second examines the anticoagulant therapy of unfractionated and low molecular weight heparin compared to

aspirin. The third examines the anticoagulants heparinoids and warfarin compared to aspirin. The fourth compares patients given aspirin versus no aspirin therapy.

Hankley, Sudlow, and Dunbabin's (2000) systematic review of four double blind randomized trials included 22,656 patients diagnosed as high risk. The study compared clopidogrel and ticlopidine versus aspirin for preventing AIS in high risk patients. High-risk patients were defined as those identified as having TIAs or previous clinical manifestations of disease in cerebral, coronary, or peripheral circulation systems. The average age was 63 and two thirds of the patients were men. The study sample may not be completely generalizeable in that stroke occurs more frequently in women. Comparisons were made between clopidogrel 75 mg, ticlopidine 250 mg, and aspirin 325 mg. The theinopyridines were found to be slightly more effective than aspirin in preventing stroke in high risk patients, however, the side effects of skin rash and diarrhea increased with clopidogrel (30%) and ticlopidine (>60%). Neutropenia was seen in patients who were administered ticlopidine. Given the cost comparison and the side effects of the theinopyridines compared to aspirin, aspirin administration is clearly the first choice in treating patients with AIS.

Berge & Sandercock's (2002) systematic review of 16, 558 patients in four RCTs compared unfractionated heparin (UFH) with low molecular weight heparin (LMWH). Aspirin was used as a control in all trials however, and no specific dose of aspirin was identified. The patients had been diagnosed with AIS by CT Scan or MRI within 48 hours of onset of symptoms. Berge & Sandercock found that treatment with the anticoagulant heparin was of no more value than treatment with aspirin. They noted that heparin use caused increased bleeding complications equivalent to 20 more deaths per 1000 patients and restroke equivalent to 10 more restrokes per 1000 patients. Berge & Sandercock contend that aspirin

is inexpensive, easy to use, and is the "standard" treatment for patients with AIS. This systematic review should be recognized as one of the higher levels of evidence in the recommendation of using aspirin instead of anticoagulant therapy based on the large number of participants and the generalizability of the findings.

Gubitz, Sandercock & Counsell's (2007) systematic review of 23,547 patients in 22 RCTs compared the anticoagulants, unfractionated heparin, low molecular weight heparin, and warfarin versus aspirin control groups. They found that the immediate use of low-molecular-weight heparin, heparinoids, oral anticoagulants, and thrombin inhibitors increased the risk of major extracranial and intracranial hemorrhages equivalent to nine people per 1000 and prevented the equivalent of nine recurrent ischaemic strokes per 1000 patients compared to the aspirin control group. They concluded that the use of anticoagulant therapy is not associated with short or long term benefit and is associated with an increased risk of major intracranial and extracranial hemorrhages. Gubitz et al. found no evidence that anticoagulant therapy reduced the odds of death from all causes at the end of follow-up (odds ratio =1.05, 95%; confidence interval 0.98 to 1.12). This systematic review should be recognised as having major implications for clinical practice and stronger than the previous 2000 and 2002 systematic reviews in that it is 5-7 years newer.

Sandercock, Gubitz, Foley, & Counsell's (2007) systematic review of nine RCTs of 41,399 patients assessed the efficacy and safety of aspirin in patients diagnosed with AIS. They found that aspirin (160 mg – 300 mg) given within 48 hours of stroke onset reduced the risk of restroke equivalent to 7 per 1000 patients at a six month follow up compared to patients not given aspirin. They concluded that aspirin reduces the risk of restroke without major risk of hemorrhagic complications and improves long term outcome. Sandercock et al.

found that mortality was reduced equivalent to 13 patients per 1000 for patients allocated to aspirin. This systematic review is different from the previous ones in that aspirin and aspirin dosage is the only agent studied, most likely due to the fact that aspirin has been the presumed treatment for AIS. Of major importance in this systematic review is the dosage of aspirin recommended, which is a range of 160 - 300 mg.

Clinical Practice Guidelines

Fletcher (2007) states that clinical practice guidelines (CPGs) are the new reality in medicine and that CPGs are "recommendations for clinicians about the care of patients with specific conditions…based on the best available research evidence and practice experience". CPGs contain two parts, beginning with the foundation of a systematic review of the current research evidence-based on a specific clinical question which is focused on the strength of evidence on which clinical decision making for the particular condition is based. The second part, "which involves both the evidence and the value judgments, is a set of recommendations for how patients with that condition should be managed, everything else being equal" (Fletcher). The purpose of a CPG is to guide and help the health care provider take better care of patients. CPGs are suggestions for care, rather than rules, and there will always be patients who require independent management. However, it is crucial to critique and recognise credible guidelines because thousands of guidelines, which vary in quality have been published. Fletcher states that the hallmarks for credible guidelines can be recognized by several easily identifiable characteristics which include: expertise, evidence-based, broad-based, regency, imprimatur, implementation, and renew (Appendix A). Fletcher also defines the criteria for reporting clinical practice guidelines (Appendix B).

National Guideline Clearinghouse

The National Guideline Clearinghouse (NGC) web site is maintained by the United States Federal Agency for Healthcare Quality in conjunction with the American Medical Association and the American Association of Health Plans. The NGC database houses guidelines from most major medical organizations but does not include every guideline (Fletcher, 2007). The NGC does not develop, produce, approve, or endorse the guidelines represented on the website. All guidelines on the website "are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, healthcare organizations or plans, and similar entities" (NGC, 2007).

The following four guidelines from NGC state specifically the appropriate use and dose of aspirin, and discuss other antiplatelet and anticoagulant therapies. Anderson et al. (2007) sponsored by the Institute for Clinical Systems Improvement (ICSI) and funded by seven insurance companies found that there is no evidence to support the use of anticoagulant therapy for the treatment of AIS. They recommend that aspirin (160 mg – 325 mg) should be given orally, rectally or by nasogastric (NG) tube when treating patients with confirmed AIS. Anderson, et al. recommends that patients who receive thrombolytics should also receive aspirin 24 hours post thrombolytics to prevent restroke. Clopidogrel 75 mg orally may be used in those who are allergic to aspirin. Anderson et al. do not support the use of anticoagulants (heparins) for treatment of acute ishaemic stroke. While this guideline is similar in its recommendations to the above systematic reviews, the fact that this guideline was sponsored by 7 insurance companies make it less likely that health care providers will

incorporate it into their practice. As Fletcher (2007) states "clinicians as less likely to believe in guidelines prepared by managed care organizations and insurance companies".

An earlier NCG guideline by Albers, Amarenco, Easton, Sacco, and Teal (2004), which was sponsored by the American College of Chest Physicians - Medical Specialty Society and funded by five insurance companies, recommends aspirin (160 mg - 325 mg) in favour of anticoagulant therapy in patients diagnosed with AIS and aspirin (50 - 325mg) in patients with transient ischaemic attack (TIA). The authors also recommend aspirin-clopidogrel combination, or clopidogrel 75 mg for patients who are intolerant of aspirin. However, Coull et al. (2002), whose study was funded by the American Academy of Neurology (AAN), recommend aspirin (160 mg -325 mg). They do not recommend any other antiplatelet therapy or anticoagulant therapy for AIS. Coull, et al. recommend that patients who have not been given thrombolytics and present within 48 hours of stroke should be administered aspirin. Goldstein, et al.'s (2006) guideline which is supported by the Cardiovascular Nursing Council and the Agency for Healthcare Research and Quality states that aspirin is useful to prevent first stroke in women. Goldstein, et al. does not recommend aspirin as prevention for the first stroke in men however, "[t]he use of aspirin is recommended for cardiovascular (including but not specific to stroke) prophylaxis among persons whose risk is sufficiently high for the benefits to outweigh the risks associated with treatment". Goldstein, et al. recommend aspirin as prevention for the first stroke in women, but does not state the dosage or the reasons supporting the recommendation. According to Fletcher (2007), clinicians are most likely to accept recommendations from their own specialty area and less likely to trust those from a government agency, therefore the

recommendation from the AAN is a major reason why physicians and Family Nurse Practitioners could support aspirin use over other antiplatelet therapy.

National Recommendations

The American Stroke Association (ASA) is a division of the American Heart Association and is dedicated to improving stroke prevention, treatment, and rehabilitation therapy, research, education, advocacy, and the development of scientifically based standards and guidelines (Acker, et al. 2007). The ASA developed a multidisciplinary Task Force that determined that there is a fragmented approach to care which currently exists and thereby poses significant obstacles to reducing the morbidity and mortality of stroke.

The American Heart and Stroke Association (2007) state that "anticoagulation with the goal of preventing recurrent stroke, halting neurological worsening, or improving outcomes" after AIS is not recommended. Adams et al. (2007) prepared the American Stroke Association guidelines. Adams, et al. recommends administration of aspirin (325 mg) within 24-48 hours after AIS is diagnosed. Adams et al., do not recommend clopidogrel or clopidogrel combined with aspirin for AIS.

The Canadian Stroke Strategy (CSS) (2006) states that all ischaemic stroke patients should be administered at least 160 mg of aspirin as a loading dose and then 50-325mg daily. For patients treated with tPA, aspirin should be delayed until 24 hours post thrombolysis. The Canadian Stroke Strategy does not support the use of other antiplatelet therapies unless aspirin is contraindicated (such as allergy). Acute aspirin therapy reduces the risk of early restroke and long term therapy reduces the risk of ischaemic stroke, myocardial infarction, and vascular death. The Canadian Stroke Strategy recommends against the use of anticoagulant therapy for AIS. The American and Canadian national guidelines use multiple

sources of information including the Cochrane Database of systematic reviews, clinical evidence, clinical practice guidelines, meta-analysis, case reports, and journal reviews to make best recommendations.

Discussion

Evidence in the literature review clearly demonstrates that there is no benefit in using anticoagulant therapy over antiplatelet therapy in AIS prevention or treatment. In fact, anticoagulant therapy for patients with AIS is not recommended because anticoagulants cause more harm than benefit. Aspirin 160 - 325 mg/day for patients with acute ischaemic stroke is the evidence-based recommendation emerging from the literature. Basically, the only clinical questions remaining are regarding the best loading does of aspirin (160mg or 325mg) to treat AIS, and the daily dose of aspirin (50mg or 325mg) to prevent restroke.

Implications for Practice

Best practices are not consistently applied to all people diagnosed with AIS resulting in a significant gap between what should be done and what is actually being done to provide quality care to Canadians (CSS). The major implication for practice within the primary health care setting is that the use of aspirin should be the preferred for treatment and prevention of acute ishaemic stroke and restroke. Daily aspirin can be used in primary, secondary, and tertiary health prevention of acute ischaemic stroke. Usual daily prophylactic dosage is 50 - 325 mg depending on the patient's tolerance and the clinical situation (Gray, 2003). Best practices that include these recommendations for AIS care have been developed and are in the process of being implemented in Canada and British Columbia.

Canadian and British Columbia Stroke Strategies

The Canadian Stroke Strategy (CSS) is a joint initiative of the Canadian Stroke Network and the Heart and Stroke Foundation of Canada. The goal of the CSS is to help support an integrated approach to stroke prevention, treatment, and rehabilitation in every province and territory by 2010 (CSS, 2006). A national working group of the CSS developed the *Best Practice Recommendations for Stroke Care: 2006* using a consensus-based process and extensive consultations in addition to a comprehensive literature review. Best practice guidelines prepared by national organizations that undergo careful review by representatives are of the most credible and influential as they are endorsed by respected national bodies and are subject to intense scrutiny by health care professionals (Fletcher, 2007). The CSS recommendations include everything from blood pressure management to brain imaging and treatment to patient rehabilitation (CSS, 2006). The CSS established the National Stroke Nursing Council in 2005 to promote leadership, communication, advocacy, education, and research into the area of stroke. The CSS states that there are frequent reports that new research in stroke does not always reach primary care providers and patients.

The goal of the British Columbia Provincial Stroke Strategy (BCPSS) is to "reduce the social and economic burden of stroke in BC through optimal prevention and care, excellence in rehabilitation, and facilitation of successful community re-integration" (HSFBC&Y, 2005, p. 15). The BCPSS is based on four principles: comprehensive, coordinated, evidence-based, and province-wide care. The principles, when implemented, will improve the continuum of care, in that all health care providers throughout the province would follow the same standardized guidelines, which are based on evidence. The recommendation of the BCPSS is to adopt the national guidelines as outlined in the

Canadian Stroke Strategy Best Practice Recommendations: 2006. The Canadian Stroke Strategy (CSS) will provide "the impetus for all provinces and territories to achieve a coordinated and integrated approach to stroke prevention, treatment and rehabilitation by 2010" (HSFBC&Y, 2005, p.8).

Barriers and Facilitators

In implementing or planning for change, barriers must be identified in order to choose the most appropriate intervention technique. Although the identification of barriers and facilitators to the implementation of clinical practice guidelines for stroke care goes beyond the purpose of this project, a few observations are made here. Lindsay et al. (2008) report that 77% of hospitals do not have a formal protocol for managing stroke and that the major factor accounting for varying stroke care is due to the lack of implementation of guidelines. Rita Sweeney RN, Clinical Lead in Acute MI and Stroke Project, who is identifying and implementing evidence-based practice recommendations for NHA based on the Provincial Stroke Strategy (Personal Communication, July, 2008) contends that there are similar barriers in Northern Health.

Guideline implementation may also be hindered by individual barriers. A clinical practice guideline may be perceived as inconvenient or difficult to use. A guideline that recommends the elimination of an established clinical practice of administering anticoagulants for stroke and implementing a new behaviour such as administering aspirin may be difficult for practitioners to accept (Buchan, 2006). The individual health care provider may not agree with a specific guideline or even the concepts of guidelines in general. Health care providers may also lack the motivation to change or may not feel competent to change. McKenna & Keeny (2004) found several specific barriers for

physicians to implement evidence-based guidelines: limited relevance of research to practice, difficulty keeping up with all of the current changes in primary care, and the ability to search for evidence-based information. The ability to search for evidence-based information is also noted by Gronseth (2004) as a barrier "results are mixed on whether educating physicians about evidence-based recommendations is sufficient to change physician behaviour" (p. 335). Gronseth attributes the barriers as physician skepticism, patient expectations, fear of legal action, and distorted reimbursement systems. Similarly, Miles, Loughlin & Polychroius (2007) found that although physicians have a positive view of the evidence-based recommendations and easy access to them, the majority seldom use the internet to search for information due to time constraints. The Centre for Health Evidence (CHE) (2007) states that using the findings from systematic reviews constitutes evidence-based medicine and thereby "de-emphasizes intuition, unsystematic clinical experience, and pathophysiological rationale as sufficient grounds for clinical decision making, and stresses the examination of evidence from clinical research". However, CHE also appreciates the new skills required by physician which includes efficient literature searching as well as the application of formal rules in evaluating the clinical literature. It is likely that inconsistent care of patients with AIS is related to the lack of clinical practice guidelines for AIS, differing opinions and interpretations of evidence by physicians, and differing physicians' training and experience (Grimshaw et al., 2001).

Although inconsistent practices in the treatment of AIS are experienced in Northern Health facilities, there are current actions underway that have the potential to remedy this concern. The work of the Acute MI and Stroke Project which includes assessment of facilities and staff, education, and guideline implementation, is an important initiative for the

health of the people who reside in the Northern Health Authority (Grimshaw et al. (2001). supports this approach, in stating that the 'effects of implementing guidelines across a range of settings generally observe improvement in the process of care" (p. 41).

Implementing Evidence-based Practice

Evidence-based practice (EBP) "is the conscientious use of current best evidence in making decisions about patient care" (Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000 in Melnyk & Fineout-Overholt, 2005, p.6). It is crucial that all health care providers working in primary care base their practice on the most current evidence. Family Nurse Practitioners have been introduced as primary health care providers in British Columbia, and are accountable for providing quality patient care. As Family Nurse Practitioners are prescribing medication, caring for people with chronic diseases, and most importantly, helping to prevent disease and injury and to promote health, they must be current in their knowledge because so much of the FNP's role is teaching patients and their families about their disease and their medication. FNPs, who are increasingly important members of primary healthcare teams have a responsibility to communicate guidelines effectively to colleagues through continuing education activities within the team. Through such venues as weekly rounds, newsletters, email, or journal clubs, FNPs may effect change to health care providers and health care recipients.

Recommendations

After a thorough review of the current available literature on the treatment of AIS, it is recommended that the CSS Canadian Best Practice Recommendations for Stroke Care be incorporated into the treatment of patients with AIS across Northern Health in particular with relation to the use of antiplatelet therapy and the avoidance of anticoagulant therapy.

The CSS recommendations are evidence-based and meet the criteria for credible guidelines as defined by Fletcher (2007). Further investigation in identifying and choosing appropriate interventions that will overcome the barriers to implementing new evidence-based clinical practice guidelines would merit investigation.

Conclusion.

Acute ishaemic stroke is a significant health concern for both health care practitioners and patients in Northern Health Authority. While there is an identified gap between current theory and practice of the administration of antiplatelet versus anticoagulant therapy, substantial evidence-based research has demonstrated best treatment for patients with AIS. The research evidence recommends the administration of aspirin 160 mg – 325 mg over other antiplatelet agents, and recommends against anticoagulant therapy for the treatment of AIS. Implementing aspirin therapy in the prevention and treatment of AIS has considerable economic clinical and economic benefits in Northern Health. Additionally, it is essential for primary health care providers to develop or follow clinical practice guidelines based on research to support the best possible patient care. FNPs can play a significant role in this regard in the primary care team. FNPs emphasize health promotion and disease prevention in primary, secondary, and tertiary care.

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Appendix A (reprinted from R. Fletcher, (2007). Clinical practice guidelines. UpToDate)

Hallmarks of a credible guideline

Expertise	Should include all relevant expertise bearing on the clinical decision
Evidence-based	Should have explict, scientifically credible, plans for finding all relevant research results, weighing the strength of the evidence, and providing rationale for decisions
Broad-based	Should go beyond effectiveness to look at harm, cost, and other clinically-relevant factors
Recency	The guideline should not be out of date, relative to developments in its field
Imprimatur	Guidelines by respected national organizations are more likely to be credible
Implementation	Guidelines should pay attention to how the recommendations can be accomplished in practice, including the workforce and expertise necessary to do so
Review	Guidelines should be shaped not just by the particular panel that drafted them, but also by other members of the sponsoring society and other organizations

Appendix B (Reprinted from R. Fletcher. (2007) Evidenced-based medicine. UpToDate

Criteria for reporting clinical practice guidelines

Objective
A succinct statement of the objective of the guideline, including the targeted health problem, the targeted patients and providers, and the main reason for developing recommendations concerning this problem for this population.
Options
Principle practice options that were considered in formulating the guidelines.
Outcomes
Significant health and economic outcomes identified as potential consequences of the practice options.
Evidence
Methods used to gather, select, and synthesize evidence, and the date of the most recent evidence obtained.
Values
Persons and methods used to assign values (relative importance) to potential outcomes of alternative practice options.
Benefits, Harms and Costs
The type and magnitude of the main benefits, harms, and costs that are expected to result from guideline implementation.
Recommendations
A brief and specific list of key recommendations.
Validation
The results of any external review, comparison with guidelines developed by other groups, or clinical testing of guideline use.
Sponsors
Key persons or groups that developed, funded, or endorsed the guideline.

Adapted from Haywood, SA, Wilson, MC, Tunis, SR, et al, Ann Intern Med 1993; 118:731.