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**A summary of the guidance relating to four lifestyle risk factors for recurrent stroke:  
tobacco use, alcohol consumption, diet and physical activity.**

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tobacco use, alcohol consumption, diet and physical activity.

## ABSTRACT

### *Background*

Stroke is a major cause of mortality, disability and family disruption; yet prevalence continues to rise despite advances in prevention and treatment. Many risk factors for stroke are modifiable, including life style behaviours i.e. tobacco and alcohol use, diet and physical activity. Patterns that influence lifestyle behaviour are believed to be embedded in family life. Primary and secondary prevention of stroke are important health promotion issues.

### *Objective*

To summarise government recommendations and contemporary evidence-based guidelines regarding four lifestyle risk factors for recurrent stroke.

### *Methods*

Structured review methods were used.

### *Conclusions*

Modifiable lifestyle risk factors for stroke and recurrent stroke have been identified and brief interventions are known to be cost effective health promotion tools. However, very few studies have tested the effectiveness of behavioural interventions designed to address lifestyle risk factors for recurrent stroke and none have tested the effectiveness of family-centred behavioural interventions. Recommendations for education, practice and research are presented.

## KEY WORDS

Alcohol drinking, Diet, Physical activity, Secondary Prevention, Recurrent stroke,  
Tobacco

## INTRODUCTION

Each year, approximately 15 million people worldwide have a stroke; of these, 5 million die and another 5 million are chronically disabled, resulting in considerable burden for individuals, families, wider communities and government exchequers (Mackay and Mansah, 2004). In 2002, ischaemic heart disease and stroke together accounted for 36% of mortality in the developed world, with stroke being the second highest cause of death and fourth leading cause of disability among adults (Mathers et al, 2006; Lopez et al, 2006). In the United Kingdom, the incidence is high and stroke is the most common cause of disability in the community-dwelling adult population (Mackay and Mansah, 2004); there are approximately 150,000 cases per year in the UK, including 13,000 cases per year in Scotland (Carroll et al, 2001; Scottish Health Statistics, 2006). Major modifiable risk factors for stroke include hypertension, abnormal blood lipids, tobacco use, obesity, unhealthy diet and physical inactivity. Other significant modifiable risk factors include alcohol use, and psychosocial stress (Mackay and Mansah, 2004).

Stroke recurs in approximately 25% of patients during the first 5 years post-stroke; recurrence may result in death (25% within the first 28 days), increased disability or institutionalisation (Redfern et al, 2006; Hankey et al, 2007). Risk factors for recurrence are the same as for first-ever stroke (Hankey, 2002; Chest Heart Stroke Scotland, 2004). Improvements in the control of hypertension, the use of statins and a reduction in tobacco use have resulted in a decline in the incidence of stroke in many developed countries, including Scotland. *‘However, the absolute number of strokes continues to rise because of the ageing demographic of the global population’* (Mackay and Mansah, 2004; Scottish Government, 2008a). It is important therefore, that effective health promotion strategies and interventions are implemented, including those designed to address the modifiable lifestyle risk factors for

stroke and recurrent stroke i.e. tobacco use, diet, alcohol consumption and physical activity (Sit et al, 2007). This paper summarises government recommendations and contemporary evidence-based guidelines in relation to these four lifestyle risk factors. The intention is to provide an easily accessible information resource, which nurses and allied health professionals can use to inform their practice as it relates to lifestyle risk factors for recurrent stroke. This paper also presents a summary of the findings from a systematic review of the stroke secondary prevention literature, which aimed to determine the effectiveness of behavioural interventions (Lawrence et al, 2009a). These evidence-synthesis activities were undertaken as part of the evidence-building phase of a programme of research (Medical Research Council 2008) which is concerned with the development and evaluation of a behavioural intervention designed to address these four lifestyle risk factors for recurrent stroke. Other issues relevant to the programme of research are also reported here and include the health promotion role of stroke nurses and family-centred approaches to stroke rehabilitation.

## METHOD

Reviews of the literature relating to epidemiology, causation and evidence-based guidelines were conducted for the four lifestyle risk factors, tobacco use, diet, alcohol consumption and physical activity. Key word searches were conducted in a range of electronic databases including MEDLINE, CINAHL, Cambridge Scientific Abstracts, and repositories of evidence-based guidelines such as the Department of Health, National Institute for Health and Clinical Excellence (NICE) and the Scottish Intercollegiate Guidelines Network (SIGN). The peer-reviewed protocol for the systematic review has been published on the Joanna Briggs Institute website (Lawrence et al, 2009a).

## GUIDANCE SUMMARIES

### *Tobacco use/Smoking as a risk factor*

Epidemiological studies have demonstrated that cigarette smoking is a major independent risk factor for stroke (Goldstein et al, 2006; Campbell et al, 2008, Sacco et al, 2006). The risk associated with smoking is present at all ages, in both sexes and among different racial/ethnic groups (Sacco et al, 2006). The 2-4 fold increase in risk is associated with the promotion of vasomotor and platelet dysfunction, vascular stenosis and thrombosis (Goldstein et al, 2006; Galimanis et al, 2009). Smoking has also been found to negatively influence the lipid profile (Campbell et al, 2008; Galimanis et al, 2009). In addition, there is growing evidence that exposure to environmental tobacco smoke increases the risk of stroke (Lee and Forey, 2006; Heuschmann et al, 2007).

In light of the above, smoking cessation and the avoidance of second-hand tobacco smoke are important strategies in the prevention of stroke and stroke recurrence. The risk of stroke decreases after stopping smoking, with the elevated risk disappearing after five years (Sacco et al, 2006). While the prevalence of smoking is reducing, 22% of the UK population and 27% of the Scottish population continue to smoke (NHS Health Scotland, 2007). The prevalence of smoking is known to be linked to socio-economic status; for example, levels of smoking are as high as 35-40% in Scotland's more deprived areas (NHS Health Scotland, 2007).

Smoking Cessation Guidelines highlight the important role that nurses should play in raising the issue of smoking/smoking cessation (NICE, 2006, 2008a; NHS Health Scotland/ASH Scotland, 2004, 2007). Brief interventions are recommended, which involve the provision of opportunistic advice, discussion and encouragement (NICE, 2008a). Brief interventions

typically take between 5 and 10 minutes and can be delivered in a variety of health care settings. People who wish to stop smoking should then be referred to an intensive support service (e.g. NHS Stop Smoking Service). It is recommended that both behavioural and pharmacological support be provided as together these interventions quadruple a person's chances of being able to stop smoking successfully (NHS Health Scotland/ASH Scotland 2004). Pharmacological support can take the form of nicotine replacement therapy, varenicline (Champix) or bupropion (Zyban) (NICE, 2008a; NHS Health Scotland/ASH Scotland 2004; 2007).

#### *Obesity and unhealthy diet as a risk factor*

Obesity (Body Mass Index (BMI)  $\geq 30$ ) kg/m<sup>2</sup> has long been recognised as a risk factor for stroke, largely because of the associated increase in dyslipidaemia and hypertension. However, BMI has also recently been found to predict occurrence of cerebrovascular disease even after adjusting for traditional risk factors, including hyperlipidaemia and hypertension (Wilson et al, 2008). The prevalence of obesity in Scotland in 2003 was estimated to be 22% in men and 26% in women, while 65% of men and 60% of women were either overweight (BMI 25-29.9 kg/m<sup>2</sup>) or obese (BMI  $\geq 30$  kg/m<sup>2</sup>) (Scottish Executive, 2005). Similar figures have been reported for England where, 24% of both men and women were obese, while 65% of men and 56% of women were overweight or obese (NHS Information Centre (NHS IC), 2008).

Various other dietary factors also affect risk of stroke, including intakes of saturated fat, fruit and vegetables, fibre, oily fish, sodium, potassium and B vitamins (reviewed by Galimanis et al (2009), Ding and Mozaffarian (2006) and Spence (2006)). These dietary factors are likely to act by influencing the development of atherosclerosis and hypertension.

Scottish Intercollegiate Guidelines Network (SIGN) Guideline 97 and the Royal College of Physicians (RCP) Intercollegiate Stroke Working Party (ISWP) recommend that, in order to prevent stroke, the diet should be low in saturated fat, include two portions of fish per week (of which one should be oily) and incorporate at least five portions of fruit and/or vegetables per day (SIGN, 2007; ISWP, 2008; NICE, 2008b). It is also recommended that the amount of salt in the diet should be reduced (ISWP, 2008) and intakes should not exceed not more than 6g salt per day (SIGN, 2007). Essentially the dietary advice to prevent recurrence of stroke is consistent with the healthy eating advice illustrated in the 'eatwell plate' promoted by the Food Standards Agency (FSA) (FSA, 2007). In addition, the RCP guidelines point out that there is no evidence that oral vitamin supplementation will reduce risk of stroke (ISWP, 2008).

The current Scottish diet is far from close to achieving these recommendations. Only one in five people eats five or more portions of fruit and vegetables per day (Scottish Executive, 2005), sugar-sweetened soft drink consumption is increasing, average salt intakes are 13.2g for men and 8.2g for women, while oily fish consumption is low and has not improved since 1996 (Lang et al, 2006).

As well as incorporating these 'healthy eating' recommendations when giving dietary advice on secondary prevention of stroke, undernutrition is common amongst survivors of a stroke and poor nutritional status may predict poor long term outcomes (FOOD Trial Collaboration, 2003). In the rehabilitation phase, nutritional adequacy should be ensured, especially if the person who has had a stroke experiences neurological deficits that may affect chewing and swallowing (ISWP, 2008).



### *Alcohol consumption as a risk factor*

Alcohol has been identified as a risk factor and, paradoxically, a protective factor for stroke, having a net detrimental effect for haemorrhagic stroke, and a net beneficial effect for ischaemic stroke (Rehm, 2006). The association between alcohol consumption and risk of haemorrhagic stroke appears to be an almost linear dose-response relationship, with greater levels of consumption being associated with higher risks of stroke. In relation to ischaemic stroke, low levels of alcohol consumption are associated with reduced levels of risk, suggesting a protective effect for consumption up to three standard units of alcohol per day (Reynolds et al, 2003). However, consumption of seven or more units a day is associated with an increased risk of ischaemic stroke (Sacco et al, 1999). The risks for individuals, who in the past were heavy drinkers, may reduce if they lower their consumption to a moderate level. However, definitive levels of risk for recurrent stroke in such individuals are not known.

Sensible drinking guidelines from the Health Departments of the UK are defined in terms of daily benchmarks, which are currently no more than 3-4 units per day for men and no more than 2-3 units per day for women. Drinking within these limits is unlikely to incur significant risks to health (Scottish Government, 2008b; Department of Health, 2009). In the UK, according to the Office for National Statistics (2009), on at least one occasion in a typical week 38% of men drink more than 4 units in one day and 25% of women exceed 3 units., with 21% of men and 10% of women regularly consuming more than twice the recommended limits for low-risk drinking.

The use of screening tools is recommended to ensure that a person's level of alcohol consumption is determined as accurately as possible. AUDIT (Babor et al, 2001) and FAST (Fast Alcohol Screening Test) (Hodgson et al, 2001) are two validated instruments that can

be quickly and easily used by nurses. People who are drinking above the 'sensible' drinking limits (females: a total of 15-35 units/week; males: a total of 22-50 units/week) should be encouraged to reduce their alcohol consumption through the delivery of a brief intervention. This should be delivered in an empathic and motivational style (Miller and Rollnick, 2002). People who are drinking more heavily (females: a total of 35+ units/week; males: a total of 50+ units/week) should be referred to local specialist alcohol services for support.

#### *Physical inactivity as a risk factor*

Physical inactivity is known to be associated with an increased risk of stroke (Goldstein et al, 2006). There is substantial evidence to support the beneficial effect of regular participation in physical activity on the numerous atherosclerotic risk factors for stroke including hypertension, insulin resistance and glucose intolerance, low-density lipoprotein cholesterol concentrations and obesity (Sacco et al, 2006). Levels of physical activity influence the risk of both ischaemic and haemorrhagic stroke (Lee et al, 2003; Wendel-Vos et al, 2004). Lee et al (2003) concluded that highly active individuals had a 27% lower risk of stroke incidence or mortality than low active individuals, while those who were moderately active had a 20% lower risk of stroke incidence or mortality compared with those with lower activity levels. These conclusions were supported by Wendel-Vos et al (2004), who reported that being moderately or highly active at work was linked to a 43% and 36% stroke risk reduction respectively, while high and moderate leisure time activity levels were linked to a stroke risk reduction of 20-25% and 15%.

Although there is now evidence that physical activity is an important modifiable risk factor for stroke, Bassett et al (2008), reported that 30% of the Scottish adult population are sedentary and only 42% meet the current physical activity recommendations. In England,

60% of men and 82% of women failed to meet the recommended levels of activity (NHS IC, 2009). Those people over 55 years of age and living in more deprived circumstances were most likely to adopt a sedentary lifestyle and least likely to meet the activity recommendations (Bassett et al, 2008).

The most recent guidelines for older adults (aged > 65 years) and those who have significant chronic health conditions (Nelson et al, 2007) are similar in many respects to the updated guidelines for healthy younger adults (18-65 years) (Haskell et al, 2007). Both recommend that for health maintenance, individuals should engage in moderate intensity aerobic activity for a minimum of 30 minutes on 5 days per week or for those who are already fit, 20 minutes of vigorous intensity activity 3 days per week. In addition, resistance exercises to maintain or improve strength of the major muscle groups should be undertaken at least twice per week. These amounts of activity should be additional to routine activities. It is further recommended that older adults should perform exercises to maintain or improve flexibility and balance regularly each week (Nelson et al, 2007). Activity and exercise participation by stroke survivors is endorsed by the Scottish Intercollegiate Guidelines Network (SIGN, 2008) Clinical Guideline 108, and the RCP Intercollegiate Stroke Working Party (ISWP) (2008), both of which advocate that unless there are specific contraindications, all stroke patients should engage in lifelong regular exercise.

However, many people who have had a stroke are reluctant or less able to exercise because of their residual disabilities, leading potentially to a cycle of sedentarism, deconditioning and increased risk of stroke recurrence. It is recognised, therefore, that these patients should have an individualised activity plan, developed in consultation with a health professional such as a physiotherapist, which meets their physical fitness needs in a safe and progressive manner

while taking activity limitations into account (Nelson et al, 2007; Gordon et al, 2004; ISWP, 2008). People who have had a stroke should be screened to ensure their suitability for exercise and a physiotherapist should assess components of physical fitness to ensure that the optimal exercise dosage is prescribed for each individual (Gordon et al, 2004). Activity plans should comprise aerobic, strength, flexibility and balance components with the variables of intensity, duration and frequency manipulated to provide an achievable and effective training response (Gordon et al, 2004). However, it is recognised that the evidence that informs the exercise recommendations relates more to primary than to secondary prevention of stroke, and that further research is required (ISWP, 2008).

#### *The role of stroke nurses*

Health promotion is an important aspect of nursing practice (Nursing and Midwifery Council, 2004), and stroke guidelines describe the nurse's role in providing information and education regarding healthy lifestyle behaviours (NHS Education for Scotland (NES), 2006; SIGN Guideline 108, 2008; ISWP, 2008). The provision of information, education and interventions designed to instigate and support lifestyle change, has the potential to save lives and reduce the extension of disability, and consequently the associated economic costs to health and social care services, as well as the personal cost to individuals and their families. Current guidelines recommend that all stroke patients should be given lifestyle information and advice and that healthcare practitioners working in primary care should follow up any interventions instigated whilst in hospital (Scottish Executive, 2002; NES, 2006; ISWP, 2008). A recent UK survey reported that almost half of stroke patients received no information about dietary change and one third reported having received no information about physical exercise (Stroke Association, 2006); another UK-wide survey found that the majority of stroke patients (54%) had received no lifestyle information at all (Healthcare

Commission, 2005). And whilst health promotion has been described as an essential element of stroke nursing (Burton and Gibbon, 2005), stroke rehabilitation nurses have been found to focus on meeting the physical needs of patients rather than on wider, more long-term needs such as changes in lifestyle behaviours (Burton, 2000).

### *Systematic review of behavioural interventions*

Focus groups held with Scottish stroke nurses identified a gap in the evidence-base regarding effective health promotion interventions for people who have had a stroke (Rowat et al, 2009). This finding was confirmed by the systematic review reported here, which identified only four studies that had tested the effectiveness of secondary prevention, lifestyle interventions, following stroke.

In America, Ovbiagele et al (2004) evaluated an in-hospital, secondary prevention programme, Stroke PROTECT, which was delivered to 112 patients, admitted following transient ischaemic attack or ischaemic stroke. Eight medication/behavioural secondary prevention measures were initiated, including counselling regarding smoking cessation, exercise and diet; personal risk factors were addressed by means of an educational component. Participants in this cohort study were followed up over the course of 90 days post-discharge. The programme was found to improve adherence to medication regimes, however it was less successful with regard to lifestyle behaviours. Joubert et al (2009) reported the results of a randomised controlled trial (RCT) of a model of integrated care, involving collaboration between a specialist stroke service and General Practitioners. The Integrated Care for the Reduction of Secondary Stroke (ICARUSS)'s primary aim was to promote the management of vascular risk factors through ongoing patient contact and education. Stroke patients (n=186) were randomised to either ICARUSS or usual care and

were followed up over 12 months. ICARUSS was found to significantly reduce systolic blood pressure and BMI and participants had significantly increased physical activity relative to controls, sustained over 12 months.

The literature review also identified a Scottish RCT that had tested a secondary prevention, lifestyle intervention delivered in an outpatient clinic (Ellis et al, 2005). In the intervention group (n=100), this nurse-led intervention demonstrated increased levels of satisfaction with regard to the receipt of lifestyle information but had no demonstrable positive impact on lifestyle risk factor modification at three month follow-up.

In Hong Kong, Sit et al (2007) used a quasi-experimental method to investigate the effects of a nurse-led, community-based intervention designed to address four lifestyle risk factors for recurrent stroke i.e. tobacco use, diet, alcohol consumption and physical activity. The educational intervention was delivered to 147 patients; outcomes were measured after three months. Significant positive effects of the intervention were demonstrated in terms of stroke knowledge and the instigation of improvements to diet; no changes were demonstrated in relation to smoking and alcohol consumption. However, this study was remarkable due to the healthy pre-stroke lifestyles of the participants, 95% of who were 'not smokers or drinkers' and 75% of whom 'walked for exercise' prior to stroke.

#### *Relevance/efficacy of a family-centred approach to stroke care*

As described above, stroke affects the whole family (Smith et al, 2004; Visser-Meily et al, 2006; NICE, 2008c), and Wade (2001) has described family life as influencing lifestyle behavioural patterns. The effectiveness of involving family members in an educational lifestyle intervention for cardiac patients has been demonstrated (Worcester et al, 2003) and

yet, as evidenced by the systematic review described above, there is a lack of research, nationally and internationally, which has adopted a family-centred approach to supporting lifestyle change post-stroke.

## CONCLUSION

Stroke is a major event, which has a devastating impact on individuals and families as well as on government exchequers (Mackay and Mansah, 2004). Modifiable lifestyle risk factors have been identified (Mackay and Mansah, 2004) and the secondary prevention of stroke is an important health promotion issue, with regard to which stroke nurses are ideally placed to play an important role (NHS NES, 2006; ISWP, 2008; SIGN, 2008). Lifestyle behaviours are believed to be influenced by family life (Wade, 2001), and yet, no lifestyle interventions that had adopted a family-centred approach to the secondary prevention of stroke were identified by the systematic review of the literature.

The guidance summaries and the systematic review of the literature reported here were undertaken as evidence-building elements of a programme of health promotion research. Other aspects of this programmatic research include a questionnaire survey of Scottish stroke nurses (Lawrence et al, 2009b) and a Scotland-wide focus group study which explored the perceptions of patients and family members, regarding the receipt and utility of secondary prevention lifestyle information (Lawrence et al, 2008). The results and findings from these studies will contribute to the secondary prevention evidence-base, resulting in a more substantial body of evidence upon which to found the development of a family-centred behavioural intervention that will address the lifestyle risk actors for recurrent stroke and which is cost-effective and acceptable to service users.

## RECOMMENDATIONS

### Recommendations for education

- Nurses and allied health professionals need to have appropriate knowledge and skills (and attitudes) to be able to deliver a brief intervention.
- Health promotion skills should be addressed in undergraduate and postgraduate courses.
- Nurses and allied health professionals should be encourage to undertake specific training in the delivery of brief interventions and motivational enhancement, where it exists (e.g. tobacco, alcohol).

### Recommendations for practice

- Health promotion following stroke should be regarded as a multidisciplinary issue.
- Available resources should be used, including validated screening tools, delivering brief interventions and referring to specialist services, as appropriate.
- Nurses and allied health professionals should ensure that they provide current, evidence-based information regarding lifestyle risk factors for recurrent stroke to patients and their families.
- Lifestyle advice should be personalised (individualised) and based on a thorough lifestyle assessment; achievable, practical goals should be negotiated with patients and/or their families.
- Secondary prevention interventions instigated whilst in hospital should be followed up and supported in the community, over the long-term.

### Recommendations for future research

- Further research regarding the effectiveness of adopting a family-centred approach to



the secondary prevention of stroke is required.

- To date there is limited evidence available regarding the effectiveness, acceptability, feasibility and cost-effectiveness of secondary prevention lifestyle interventions. Therefore, there is a need for further investigation of aspects, which include the theoretical approach (including the factors that facilitate or hinder the initiation and maintenance of behaviour change), location, format and content of interventions.

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