

Prevention of Stroke and Post-stroke Dementia: A Public Health Approach

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Abstract

Stroke is a debilitating neurological emergency with high morbidity and mortality causing serious disabilities among survivors. It is a largely preventable condition, primarily with modifications of risk factors. Post-stroke dementia is a clinical entity that includes any form of dementia which occurs following stroke. It comprises of vascular, degenerative or mixed dementia affecting about one-third of stroke survivors. However, no effective therapeutic strategies thus far exist to prevent the development of stroke or post-stroke dementia. The primary means of reducing the burden is through control of vascular risk factors and prevention of recurrent stroke, best achieved through a health promotion intervention which involve actions enabling people to improve and have a control upon their health. In this article, we have reviewed Health Promotion Interventions and their roles in the prevention of stroke and post-stroke dementia, discussed the policies and practices that are currently employed in the prevention of the menace as well as potential barriers to the prevention.

Key Words: stroke; post-stroke dementia; health promotion; stroke prevention; risk factor modification; lifestyle intervention; vascular risk factors; health literacy; public health policy; community-based prevention

Introduction

Stroke is a preventable disease but also a medical emergency that has high morbidity and mortality, causing both physical and mental disability. Globally, it is the second leading cause of death and the third most common cause of disability with a significant burden on health systems, populations, and individuals. The incidence of stroke is estimated to have been increasing over the last 25 years and would probably continue to increase, over the next few decades [1]. As of 2013, about 25.7 million people are living with stroke globally, with 6.5 million deaths, and 113 million people still living with a stroke-related disability with 10.3 million new cases of stroke with the majority of the cases coming from the developing nations [2]. The age distribution of stroke patients is different in the developing and developed countries. In developed nations, more than half of the stroke patients are 70yrs or above, whereas, in developing nations, less than half of the patients are 70yrs or above [1]. Stroke is defined by the World Health Organization (WHO) in 1970 as “rapidly developed clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than of vascular origin” [3]. There are two main classes of stroke: ischemic stroke (80% of cases) and hemorrhagic stroke (15-20% of cases). Ischemic stroke occurs as a result of occlusion of cerebral blood vessels usually caused by either thrombosis or embolism, whereas hemorrhagic stroke occurs due to rupture of cerebral blood vessels or aneurysm [4].

The development of dementia following stroke is not uncommon due to close relationship between dementia and stroke. The prevalence of post-stroke dementia (PSD) is between 7% and 41% at one year and increases at an average rate of 3% per year. Many prevalence studies have reported one to one relationship between stroke and dementia in which one in each ten patients have pre-stroke dementia, one in ten will develop dementia following stroke and one in ten will develop dementia after stroke recurrence [5]. The risk of dementia after stroke was identified to be highest within the first few months following stroke, possibly due to unidentified pre-stroke cognitive decline with cumulative incidence increasing proportionally at a rate of 3% and 1.7% per year in hospital-based and population-based studies, respectively. In one of the longest observational population-based study, the cumulative incidence of post-stroke dementia was found to be 48% at 25 years [6]. Studies have shown that even a minor form of stroke may present with varying forms of cognitive dysfunction ranging from impaired executive function and affection of daily functioning to impaired cognition affecting social participation and quality of life [7]. Post stroke dementia (PSD) can be defined as any form of dementia that occurs after a diagnosis of symptomatic stroke, usually within three months of stroke onset. It overlaps the criteria for vascular dementia, which is dementia in patients who have evidence of cerebrovascular disease, but not necessarily following a symptomatic stroke [7,8].

As with stroke, the development of PSD has been associated with well-known modifiable risk factors such as hypertension, diabetes, dyslipidemia, obesity, low physical activity, unhealthy diet, smoking, or excessive alcohol consumption [9]. Therefore, the most important strategy to prevent stroke as well as cognitive decline after acute stroke is by lifestyle or multiple risk factor modification which can be achieved through health promotion, a process of enabling people to increase control over, and to improve their health through encouraging healthy life styles, creating supportive environments for health, strengthening community action, orienting health services to place primary focus on promoting health and preventing disease, and building healthy public policies [10]. Once these risk factors are identified, targeted, and then controlled via health promotion strategies, then stroke and PSD prevention are ensued. Therefore, the aim of this review was to encourage population-wide preventive strategies for the prevention of both stroke and post-stroke dementia.

Population-Wide Prevention Strategies

Scope

The population-wide prevention strategy was one of the most important strategies of preventing chronic diseases. Any small change in the

distribution of risk factors has been shown to have caused major reductions in vascular diseases like stroke and its associated dementia. It was considered by Sir Geoffrey Rose (1985) as the most effective approach to primary prevention of vascular diseases. The emphasis on prevention of stroke and PSD should be shifted from the high-risk approach to a more encompassing and promising approach that includes aggressive control of modifiable risk factors as well as behavioral and lifestyle modification [10]. This approach was prioritized by World Health Organization (WHO) in the prevention of chronic diseases like stroke and dementia through disease surveillance, preventive, and health promotion programs. The most important population-wide prevention strategy is health promotion, defined as the process of enabling people to increase control over, and to improve their health through developing personal skills, creating supportive environments for health, strengthening community action, re-orienting health services to place primary focus on promoting health and preventing disease, and building healthy public policies. These were the five key action areas of health promotion created by WHO during the first International Conference on Health Promotion held in Ottawa, Canada, in 1986. It can be achieved through three health promotion strategies: to enable, to mediate, and to advocate [11]. Figure 1 below summarizes the health promotion action areas and strategies:

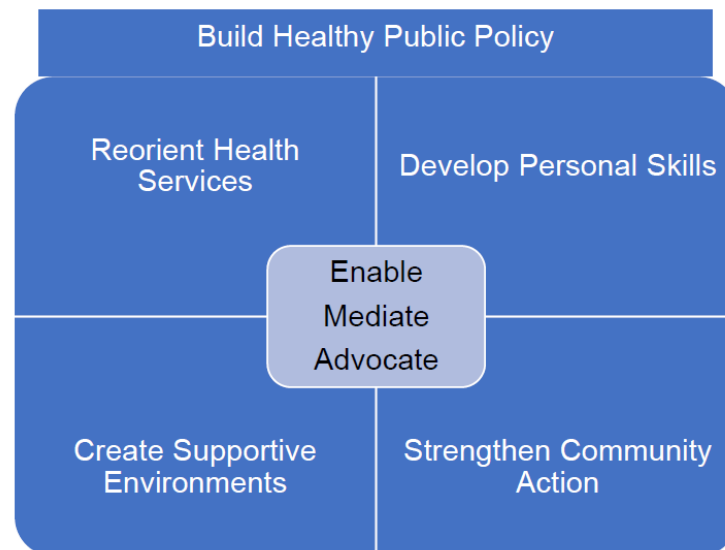


Figure 1: Health Promotion Action Areas and Strategies

Developing Personal Skills

Developing personal skills entails ability of individuals to make healthy decisions. There are many intervention programs for stroke and subsequent PSD prevention that give information and education, which help develop health literacy and understanding of unhealthy behavior and development of personal stroke preventive strategies with consequent attainment of personal life skills. In a Simmons et al. study (2009), ANGELO (Analysis Grid for Elements Linked to Obesity) Framework was used to organize a workshop for many communities in Australia with the aim of enhancing knowledge regarding preventing obesity, which is an important risk factor for both stroke and dementia. After the workshop, the communities were found to have gained considerable skills to promote healthy eating and physical activity [12]. Additionally, due to the high prevalence of stroke in Australia with the high blood pressure as the most significant risk factor, a program termed 'Know Your Numbers' program was instituted to increase community knowledge and awareness regarding their blood pressure and other cardiovascular risk factors for stroke. At the end of the program, improved knowledge and awareness regarding risk factors for hypertension and cardiovascular risk factors were found among the participants [13]. In another study by Ravenell et al. (2015) in

New York, increased stroke literacy was found following stroke education films on changing behavior patterns of calling 911 in a suspected stroke. The films targeted awareness of stroke symptoms and its severity, consequences like dementia, the therapeutic benefits of timely hospital presentation, and calling 911 [14]. Therefore, any intervention, like the ones cited, that will help community or individuals to acquire health-related knowledge regarding the risk factors and symptoms of stroke and its consequent post-stroke dementia, as well as awareness on the importance of the early hospital presentation would contribute to the effective prevention of PSD and modification of its risk factors.

Creating Supportive Environment for Health

Environmental risk factors have long been linked with the development of chronic diseases like stroke and dementia. Living and working conditions should promote health, and environments (work, home and leisure) that would support healthy living such as healthy food choices, smoke free work sites, and healthy social norms should be created. Thus, creating a supportive environment would immensely impact on the prevention of stroke and PSD [15]. Interventions that would transform the physical, social, communication, and economic environments from unhealthy to healthy should be employed in the prevention of stroke risk

factors. These interventions should support and provide opportunities for people to develop healthier behaviors and alter individual behaviors to healthy lifestyle like reduced tobacco consumption, or even alter unhealthy social norms. Some of the environmental policies that are used in the prevention of chronic diseases like stroke and dementia include clean indoor air and access to healthy food policies for the physical environment; high tobacco cost and affordable fruits and vegetables for the economic environment; awareness-raising and defacing unhealthy behaviors for communication environment [16].

Strengthening Community Action

Health promotion aims to enable and empower communities, provide them with resources so that they actively participate in health decisions which lead to better health outcomes. They can apply those skills acquired to other situations to determine what their needs are and how best they can achieve them. Therefore, any intervention program can only become successful if the community is encouraged to fully involve in the planning, evaluation, and execution of the program [11]. Many health promotion interventions are currently in use for the prevention of stroke and its subsequent PSD, which involves enabling the community to take care of their health. For example, self-measured blood pressure was employed in the monitoring of blood pressure to enable people to participate and take care of their health condition. The US formulated guidelines for self-measured blood pressure, which aim for the diagnosis and management of hypertension, the most significant risk factors for stroke [17]. Giachello and colleagues conducted a study in Chicago of United States, which actively involved the community in a program aimed at mitigation of diabetes-related morbidity and mortality. This involvement of the community was shown to have enhanced the community's understanding of the intricacies of diabetes and its associated morbidities like stroke and PSD, pertinent social causes, and potential solutions. Along with preparing them for social action, this participatory process also resulted in voluntary involvement of many stakeholders within the community, with efforts to identify and address the existing sociopolitical problems [18]. These demonstrated the importance of strengthening community action for their health which could immensely modify risk factors and prevent chronic diseases like stroke and dementia.

Re-orienting Health Services

For effective stroke and PSD prevention, health services must be designed in a way that will result in increasing the pursuit of health and also address the general needs of a person, and not only his disease conditions. The intervention programs must take into cognizance the cultural and societal norms of the community to help them achieve a healthy lifestyle [11]. In the United States, Worksite Health Program laws were already enacted, which mandated employers to incorporate health promotion programs in their workplaces. This can be either onsite programs or insurance programs. The former involves the creation of programs directly into the worksite like provision of fitness sites, work schedules allowing exercise during working hours, and provision of healthy diets in the worksite cafeterias whereas, insurance program entails the provision of insurance

by employers to their employees like coverage for gym memberships or any preventive health care services [19]. All these services are essential preventive measures that involve health services reorientations, which would significantly reduce or eliminate cardiovascular risk and other risk factors for stroke and PSD.

Build a Healthy Public Policy

The WHO has taken many steps in developing government-driven health policies in many regions and countries all over the globe for the prevention and management of chronic diseases like stroke and dementia. At the 9th Global conference on health promotion, WHO urges the governments to formulate policies that will reduce unhealthy living such as taxing the companies that produce sugar-sweetened beverages to reduce their significant contribution to obesity and diabetes which contribute to stroke and PSD [20]. In Australia, the government health policies include increasing taxation on tobacco and alcohol products with price monitoring of healthy food products. Healthy eating and physical activity were introduced into the community, schools, and workplaces to modify risk factors aimed at preventing stroke and its consequences like PSD. Additionally, in May 2010, the Men's Health Policy was introduced and the Women's Health Policy of 1989 was updated, and they both stress on the prevention of cardiovascular disease and stroke risk factors [21]. Similarly, in the year 2000, the Healthy People 2010 goal was formulated by the United States (US) government which prioritize heart disease and stroke prevention with the main objective "to improve cardiovascular health and quality of life through the prevention, detection, treatment, and control of risk factors; early identification and treatment of heart attacks and strokes; and prevention of recurrent cardiovascular events" [22]. Also, the US government makes many policies and environmental changes that affect its population through 'The Public Health Action Plan to Prevent Heart Disease and Stroke' (2003) and the 2010 'Affordable Care Act' (US Healthcare Reform Legislation), both aimed at lifestyle modification changes with the main goal of preventing cardiovascular diseases and stroke [23]. Generally, healthy public policy for stroke and PSD prevention aimed at replacing unhealthy lifestyles among the population with alternative healthy ones. There are currently many healthy public policies that focus on reducing stroke risk factors or eliminating them, and these include US Dietary Guidelines, Physical Activity Guidelines for Americans, and financial policies that increase the cost of smoking among others [23].

Potential Barriers

Health promotion interventions such as stroke literacy and awareness, control of hypertension and lifestyle modifications like physical activity, smoking cessation, moderation in alcohol consumption, healthy diet, healthy weight and living stress-free life significantly reduce and eliminate stroke risk factors and thus prevent the development of stroke and PSD. However, many factors can potentially prevent targeted community from accessing and adopting these interventions. These barriers can be at an individual level, community level, or a healthcare provider level [24]. Figure 2 below shows the various levels of health promotion barriers for stroke prevention:

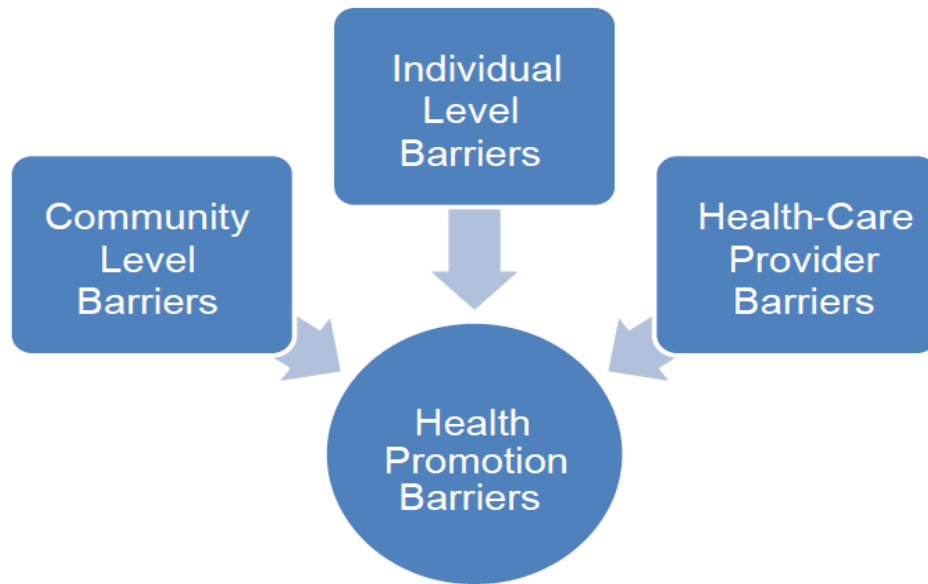


Figure 2: Levels of Health Promotion Barriers

The Individual Level Barriers

Individual level barriers entail a lack of psychological orientation of an individual in which a person might have difficulty perceiving the relative importance of these health promotion interventions and complying with the proscribed actions as compared to the services that give an immediate effect like pain relief. Additionally, many people have knowledge barriers as they are unaware of their risk factors and thus unable and undetermined to undergo healthy lifestyle modifications. In some instances, people underutilized stroke preventive services due to fear (social insecurity), lack of insurance (financial insecurity), and sometimes denial [25]. Furthermore, the socioeconomic status of an individual serves as a barrier to attaining a healthy lifestyle. For example, in a study by Yeah and colleagues, it was found out that some of the US'S population do not take the recommended amount of fruits and vegetables and this was shown to be partly related to the high cost and low socioeconomic status of the study population despite awareness of the health benefits of fruits and vegetable consumption [26]. In another study by Williams and colleagues regarding the perceptions of primary care physicians in Indonesia concerning barriers to screening and patient education to reduce stroke risks, the physicians believe that among the common barriers were patient misconceptions with regards to their stroke risk factors as well as patient unwillingness to adopt behavioral modifications for healthy lifestyle coupled with their low level of education [27].

The Community Level Barriers

Community level barriers include factors like cultural and societal disharmony. Many stroke prevention interventions do not succeed due to potential disharmony between the interventions and the societal values, norms or perceptions. Therefore, to prevent these barriers, the interventions should not be in such a way that the community might

perceive it as parallel to their culture and norms. Furthermore, stroke prevention intervention might lack community support as in lack of participation by the community stakeholders and individuals, especially when they were not involved right from the point of decision making to the planning and implementation [24]. Many studies have demonstrated the association between the incorporation of culture in health promotion interventions and the attainment of healthier lifestyles. In African-American communities, for example, communication programs that incorporated their cultural norms and values have yielded more impact on stroke prevention than the conventional approaches. Therefore, for a stroke and PSD prevention programs to be effective, it should consider and address the cultural characteristics of the target community [28].

The Healthcare Provider Barriers

Healthcare provider barriers simply mean the reluctance of the health care providers to assume responsibility for stroke and PSD prevention services. Many health care providers assumed that, it was the individual patient's responsibility to promote his health condition, modify his stroke and PSD risks, and prevent the development of stroke and PSD. Healthcare provider barrier is more so with regard to specialists like neurologists who do not perceived stroke and PSD preventive services as their role, but the primary care physicians' responsibilities. Additionally, many health care providers lack the knowledge and expertise in the identifications of stroke risk factors, symptoms, and symptoms severity and, therefore, are unable to provide proper stroke literacy information to individual patients or communities. Similarly, the health care provider may underestimate the perceived stroke or PSD risks in an individual or community and thus become unwilling to offer a health promotion intervention program for the prevention of stroke occurrence and its consequent PSD [25]. Table 2 below shows examples of some barriers at various levels:

Level of Barriers against Health Promotion for Stroke Prevention	Barriers	Implications
A. Individual Level Barriers	1. Psychological disorientation/mental disability	Poor health-promoting behavior
	2. Illiteracy	Lack of awareness of stroke risk factors
	3. Social insecurity	Fear to attain health promotion services
	4. Financial insecurity	Inability to afford health promoting services like healthy diets
	5. Misconceptions and superstition	Unwillingness to adopt behavioral modifications for healthy lifestyle
B. The Community Level Barriers	Cultural or religious disharmony	Lack of community support and stakeholder's involvement
C. The Health-care Provider Barriers	1. Misplacement of responsibilities	Reluctance in providing health promotion services
	2. Laziness	Lack of motivation
	3. Poor expertise	Missing important stroke risk factors
	4. Underestimation of stroke risk factors	Inability to motivate patient for health promoting services

Table 1: Showing some examples of barriers at various levels

Conclusions

Stroke and post-stroke dementia are serious neurological diseases with devastating consequences that affect many communities causing high burden on the health care system and high economic cost. It has high mortality with many years of disability among survivors. However, they are highly preventable through early detection, screening, and modification of risk factors. Health promotion intervention programs should be adopted as strategies for primary prevention of PSD through healthy public policies, strengthening community participation in any intervention program, creating a supportive environment for stroke and PSD prevention interventions, helping individuals and communities develop skills for preventive measures, and then reorienting unhealthy health services. However, potential barriers at individual, community or healthcare provider level could have deterred successful achievement of these intervention programs and should always be considered in the design and conduction of preventive services.

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