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Early signs of stroke: How your body warns you

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Abstract

Stroke, or cerebrovascular accident (CVA), remains one of the leading causes of mortality and long-term neurological disability worldwide. It is generally characterised by the sudden loss of blood flow to the brain and results in irreversible brain damage if not treated promptly. Early recognition of stroke symptoms is paramount, as timely medical intervention can drastically reduce complications and improve recovery outcomes. The widely known F.A.S.T. acronym (Face drooping, Arm weakness, Speech difficulty, and Time to act) aids in identifying common signs, but subtler symptoms like numbness, dizziness, and vision changes may also serve as critical early warnings. This paper explores the various types of strokes—ischemic, hemorrhagic, and transient ischemic attacks (TIA)—and discusses their underlying causes, risk factors, and prevention strategies. Emphasis is placed on the importance of managing risk factors such as hypertension, diabetes, and smoking, alongside lifestyle modifications for stroke prevention. This paper concludes with recommendations emphasising public awareness and encouraging immediate action upon recognising symptoms, underscoring the potential to reduce the global burden of strokes and improve patient outcomes.

Keywords: Stroke; Cerebrovascular Accident (CVA); Ischemic Stroke; Hemorrhagic Stroke; Transient Ischemic Attack (TIA); F.A.S.T

1. Introduction

Stroke or cerebrovascular accident (CVA) is one of the most critical health crises affecting populations globally, ranking among the top causes of death and long-term chronic neurological disability, thus, recognised as a public health issue [1]. Stroke is so called because of the way it strikes people down [2]. According to the World Health Organization (WHO), 15 millions of people suffer strokes each year, and a substantial proportion of them either die or are left with life-altering impairments [2]. Stroke can occur suddenly and with little warning, making early recognition of its symptoms pertinent to improving outcomes. As brain cells begin to die in minutes when deprived of oxygen, even a brief delay in seeking treatment often lead to severe and irreversible damage [3].

The underlying cause of a stroke is typically the disruption of blood flow to the brain, which deprives brain cells of oxygen and essential nutrients. This disruption results from either a blockage (as seen in ischemic strokes) or bleeding (in the case of hemorrhagic strokes) [4]. Regardless of the cause, the effects are often devastating, impacting a person's ability to speak, move, or even think clearly. However, the longer the brain is starved of blood flow, the more extensive the damage. Because the brain controls vital functions, the consequences of delayed treatment can range from physical disabilities to cognitive and emotional challenges [5].

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Given the serious nature of strokes, early detection and prompt action become imperative. Research has shown that individuals who receive treatment within a few hours of the onset of symptoms are more likely to recover with fewer long-term complications [6]. This hammers the importance of public awareness campaigns that teach people how to recognise the warning signs of a stroke and respond appropriately. Many people are unaware that strokes often start with subtle symptoms that, if caught early, can prevent major harm.

The purpose of this article is to raise awareness about the early signs of stroke, encouraging people to be vigilant and proactive about their health. Recognising the body's early warning signals is not just important for the individual experiencing the symptoms; it can also save the lives of loved ones, colleagues, or even strangers. This article delves into the common and less recognised symptoms of stroke, how the body signals the impending condition, and the necessary steps to take to ensure timely medical intervention.

1.1. Historical Account of Stroke

The history of stroke dates back to ancient times, with Hippocrates (460–370 BCE) being one of the first to describe the condition. He noted that occlusion of the 'stout' carotid arteries led to loss of consciousness, and the term 'apoplexy' was used to describe symptoms such as convulsions and paralysis [7-8]. In 1658, Johann Jacob Wepfer expanded upon Hippocrates' observations, identifying that apoplexy could result from obstruction of the carotid or vertebral arteries, or bleeding into the brain [7-9]. Around the same period, Thomas Willis made significant contributions to the understanding of the brain's vascular system, particularly through his study of the anastomotic vessels at the brain's base, which he documented in *Cerebri Anatome* [10].

Between 1682 and 1836, further advancements were made by Giovanni Battista Morgagni, John Cheyne, and others, who began linking clinical presentations of stroke to post-mortem anatomical findings. This era laid the foundation for understanding stroke as a vascular disease affecting the brain [7]. In 1828, John Abercrombie introduced a classification system for apoplexy, dividing it into three categories: primary apoplexy (large intracerebral haemorrhages or infarcts with focal deficits and stupor), probable subarachnoid haemorrhage (accompanied by stupor and headache but no focal deficits), and smaller infarcts or haemorrhages (with focal deficits but without stupor or headache) [7-9].

The 20th century marked a revolutionary era in stroke research and treatment. Technological advancements made it possible to visualise vascular lesions antemortem. The development of angiography by Moniz and Seldinger provided critical insights into vascular anatomy [11]. By the 1970s, the invention of the Computerised Tomographic (CT) scan by Hounsfield and Magnetic Resonance Imaging (MRI) by Damadian allowed physicians to accurately locate brain infarctions and haemorrhages [7]. These imaging technologies enabled more precise diagnosis and improved treatment strategies.

More sophisticated techniques such as Positron Emission Tomography (PET) and Single-Photon Emission Computerised Tomography (SPECT) later emerged, enabling the study of cerebral perfusion and metabolism. These advances led to the identification of phenomena like 'misery perfusion syndrome,' diaschisis, and luxury perfusion, significantly enhancing the understanding of stroke pathophysiology [7].

These innovations paved the way for the establishment of specialised stroke units, which now offer effective care for stroke patients, significantly improving outcomes for patients and survivors in the 21st century. Continued advancements in medical imaging and therapeutic strategies have transformed the diagnosis, management, and prevention of stroke, making it one of the most rapidly evolving fields in modern medicine.

1.2. What is a Stroke?

A stroke is a medical emergency that occurs when the brain's blood supply is disrupted, leading to the deprivation of oxygen and nutrients necessary for the survival and functioning of brain cells. Within minutes of this interruption, brain cells begin to die, resulting in the impairment of functions controlled by the affected areas [12-13]. According to the proposed definition by the World Health Organization in 1970, 'stroke is rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer, or leading to death, with no apparent cause other than of vascular origin' [14].

Depending on the part of the brain impacted, a stroke can lead to a variety of severe outcomes, including paralysis, speech difficulties, memory loss, or even death [15]. The rapid onset and severe nature of strokes make immediate medical attention essential to limit brain damage and increase the chances of recovery.

Strokes are classified into three main types based on their underlying cause:

2. Ischemic Stroke

This is the most common type of stroke, accounting for approximately 85% of all cases [12]. Ischemic strokes occur when a blood clot or other obstruction blocks the flow of blood to the brain. The disruption typically takes place in the arteries, which supply oxygen-rich blood to the brain [16]. There are several subtypes of ischemic stroke:

- **Thrombotic Stroke:** This occurs when a clot forms directly in one of the arteries in the brain. It is often the result of atherosclerosis, a condition where fatty deposits (plaques) build up in the blood vessels, leading to narrowing and potential blockage [17].
- **Embolic Stroke:** In this type, a blood clot or other debris forms elsewhere in the body (commonly in the heart) and travels through the bloodstream to the brain. Once lodged in a smaller artery, it obstructs blood flow [18]. A common cause of embolic strokes is atrial fibrillation, an irregular heartbeat that can lead to the formation of blood clots [19].
- **Small vessel blockage (lacunar stroke):** This type of ischemic stroke occurs when smaller blood vessels deep within the brain are blocked, often due to long-term conditions like untreated high blood pressure, high cholesterol, or diabetes [20].
- **Cryptogenic strokes:** Mentioning cryptogenic strokes, or strokes with an unknown origin, is crucial because it acknowledges that not all strokes have an immediately identifiable cause [21].

3. Hemorrhagic Stroke

A hemorrhagic stroke occurs when a weakened blood vessel in the brain bursts, causing bleeding in or around the brain tissue [22]. This type of stroke is less common but tends to be more severe and carries a higher risk of death or disability. There are two types of hemorrhagic stroke:

- **Intracerebral Hemorrhage:** This occurs when an artery within the brain bursts, flooding the surrounding brain tissue with blood. This flood of blood can lead to pressure buildup, which further damages brain cells [23]. High blood pressure is the most common cause, as it weakens the walls of arteries over time [24].
- **Subarachnoid Hemorrhage:** This type of hemorrhage involves bleeding in the space between the brain and the thin tissues that cover it [25]. It is often caused by a ruptured aneurysm—a weakened area in the wall of a blood vessel that balloons out and can burst [25-26]. A sudden, severe headache is typically the hallmark symptom of this type of stroke.

4. Transient Ischemic Attack (TIA)

Commonly referred to as a 'mini-stroke,' a transient ischemic attack (TIA) is a temporary episode of reduced blood flow to the brain [27]. The symptoms of a TIA mimic those of a full stroke but typically last only a few minutes to hours and do not cause permanent damage. However, a TIA is a critical warning sign of a future stroke. It indicates that there is an underlying issue with blood flow to the brain, and without proper medical attention, a full stroke may follow [27-28]. In fact, one-third of people who experience a TIA will have a major stroke within a year if left untreated.

4.1. Early Signs of Stroke

Recognising the early signs of a stroke can be the difference between life and death, or between a full recovery and permanent disability. When a stroke occurs, the brain is deprived of oxygen, and every minute counts. Prompt recognition and immediate medical attention can reduce the severity of a stroke's long-term effects. One of the most effective ways to identify stroke symptoms is by using the acronym **FAST**, which stands for Face, Arm, Speech, and Time to act [29]. These symptoms are the most common and straightforward indicators of a stroke:

4.1.1. FAST: The Warning Signs

- **Face Drooping:** One of the hallmark signs of a stroke is facial weakness. This typically affects only one side of the face, which may begin to droop or feel numb [29-30]. A simple test involves asking the person to smile; if one side of their face appears uneven or droops, it may indicate a stroke. Additionally, they may report feeling a sudden loss of sensation or heaviness on one side of their face, making everyday facial expressions difficult to control [30].
- **Arm Weakness:** A stroke can cause sudden weakness or numbness in one arm, often affecting just one side of the body. If you suspect someone is having a stroke, ask them to raise both arms. A person experiencing a stroke will often find it difficult to lift one arm, or the arm may drift downwards involuntarily. This weakness is usually

a clear sign of neurological impairment, often signalling damage to the part of the brain that controls muscle movements [29-31].

- **Speech Difficulty:** Difficulty speaking or slurred speech is another early symptom of a stroke. A person experiencing a stroke may struggle to form coherent sentences, or their speech may sound slurred or garbled [29-32]. Asking the person to repeat a simple phrase, such as 'The sky is blue,' can help you assess whether their speech is normal. If the person cannot repeat the phrase accurately or if their speech seems jumbled, this is a red flag for stroke.
- **Time to Act:** Time is of the essence when dealing with a stroke. If any of the signs mentioned above—face drooping, arm weakness, or speech difficulty—are present, it is important to seek emergency medical help immediately. Quick intervention is essential because treatments for stroke, such as clot-busting drugs, are most effective within a narrow time window. Thus, early medical attention can minimise brain damage and improve the likelihood of recovery.

4.1.2. Other Early Signs of Stroke

While the **FAST** acronym covers the most common symptoms, strokes can present with other early warning signs that should not be ignored. These signs can vary in intensity and may come on suddenly, making it important to remain vigilant:

- **Sudden Numbness or Weakness**: In addition to the face and arms, stroke-related numbness or weakness may also occur in the legs, often affecting just one side of the body. A person may find it difficult to walk or stand without losing balance [15]. This sudden loss of sensation or strength can happen without warning, leaving the affected individual disoriented and unable to perform basic movements.
- **Confusion and Difficulty Understanding Speech**: Some stroke victims may experience sudden confusion, making it difficult to process information or respond to simple questions. They may have trouble comprehending spoken words or instructions, even if their hearing remains intact [33]. This mental fog can make it seem as though the person is disconnected from their surroundings.
- **Vision Changes**: A stroke can affect vision in one or both eyes, leading to blurred or double vision, or even sudden loss of sight in one eye. These visual disturbances often occur alongside other stroke symptoms [34], but they can be easily overlooked or mistaken for fatigue or eye strain. Any sudden changes in vision, especially when combined with other symptoms, should be taken seriously.
- **Dizziness and Loss of Balance**: Stroke can also cause sudden dizziness or vertigo, making it difficult for the affected individual to maintain balance or coordination. This may result in unsteady walking or even falls [35]. If a person suddenly becomes clumsy, loses their sense of direction, or struggles to coordinate their movements, it could be an early sign of a stroke.
- **Severe Headache**: A sudden, severe headache—often described as the 'worst headache of one's life'—is a common symptom of a hemorrhagic stroke [36]. This type of stroke occurs when a blood vessel in the brain bursts, causing blood to leak into surrounding tissue. The pressure from the blood can lead to intense pain, often accompanied by nausea or vomiting [22]. Unlike typical headaches, this pain comes on suddenly and without any clear cause, signalling an urgent medical emergency.

4.1.3. Importance of Recognising Early Signs

Recognising these early warning signs can make a dramatic difference in the outcome of a stroke. Acting quickly, especially by calling emergency services, can ensure that the affected person receives life-saving treatment before irreversible damage occurs. Many people delay seeking help because they do not realise the gravity of the situation, or they hope the symptoms will pass. However, early medical intervention, such as clot-busting drugs or other treatments, is most effective within a narrow window of time. The faster the response, the higher the chances of recovery with minimal long-term effects.

4.2. How Your Body Warns You

In many cases, the body may provide subtle warning signs before a major stroke occurs. These early indicators may not always be dramatic, which is why they are often overlooked. However, paying attention to these small changes could be life-saving. Strokes can develop gradually, with transient episodes that seem to resolve on their own, but these should never be dismissed as insignificant. Recognising these early, subtle signs allows for timely medical intervention, which can prevent a minor event from turning into a full-blown stroke.

4.2.1. Subtle Warning Signs

- **Mild Weakness or Tingling**: Intermittent weakness or tingling in one limb may be easy to brush off, but it can be a early sign of a stroke or a transient ischemic attack (TIA) [37]. A TIA, often referred to as a 'mini-stroke,' occurs when there is a temporary disruption in blood flow to the brain [27]. Unlike a full stroke, a TIA's symptoms may resolve within minutes or hours, which may cause the person to ignore them. However, a TIA is a serious warning sign that a more severe stroke could follow [27-28].
- **Dizziness and Loss of Balance**: A sudden onset of dizziness, vertigo, or loss of balance can also be an early warning sign of a stroke. This can be accompanied by feelings of disorientation or difficulty walking in a straight line [23, 38]. Stroke-related dizziness can differ from typical lightheadedness because it often comes on suddenly and may not have an apparent cause, such as dehydration or standing up too quickly [38]. Ignoring such symptoms can delay necessary medical treatment.
- **Frequent Headaches**: While headaches are common and not always a sign of a stroke, the sudden appearance of severe or unusual headaches can be a red flag, particularly if they are accompanied by other symptoms like vision problems or confusion [23]. Hemorrhagic strokes, which involve bleeding in the brain, often present with intense, 'thunderclap' headaches [39]. These can occur intermittently in the days or hours leading up to a major event. Even mild, recurring headaches that seem out of the ordinary should not be dismissed, as they may indicate vascular issues in the brain.
- **Fatigue and Disorientation**: Feeling abnormally tired or mentally foggy without a clear reason could also be an early stroke warning. This fatigue may be more profound than what is typically experienced during a busy day and can be accompanied by brief periods of confusion or difficulty concentrating. These episodes may last only a few minutes, which is why they are often overlooked. However, they should not be ignored, particularly if they occur alongside other stroke-related symptoms.
- **Brief Episodes of Confusion or Memory Lapses**: If you find yourself or someone else suddenly struggling to recall simple facts, names, or recent events, this could be a sign of disrupted brain function. Memory lapses or confusion that seems unusual for the individual should prompt immediate concern. Even if the episodes are brief, they could indicate a temporary blockage in the brain's blood supply, which can escalate into a full stroke if left unchecked [23].

4.2.2. Importance of Listening to Your Body

The body is often good at sending signals when something is wrong, but recognising and acting on these signals requires awareness and vigilance. Minor symptoms, such as a sudden change in vision, slight numbness, or temporary confusion, are easy to dismiss as stress-related or fatigue-induced. However, these symptoms may be early warnings that a more serious event is imminent.

Early detection of a stroke or TIA can lead to preventive measures that significantly reduce the likelihood of a more catastrophic stroke. It is essential to err on the side of caution and seek medical evaluation even if the symptoms are brief or appear to resolve on their own. Acting quickly upon noticing subtle changes can prevent severe brain damage and, in some cases, save lives.

4.3. Risk Factors and Prevention

While anyone can suffer from a stroke, certain risk factors increase the likelihood of experiencing one. Many of these factors are related to lifestyle choices and underlying health conditions, and addressing them can substantially reduce the risk of stroke.

5. High Blood Pressure

High blood pressure, or hypertension, is the leading cause of stroke [40]. It exerts excessive pressure on the walls of blood vessels, causing them to weaken over time. As a result, these vessels become more vulnerable to ruptures or blockages, which can lead to either hemorrhagic or ischemic strokes [40-41]. Regular monitoring and management of blood pressure, through lifestyle changes such as reducing salt intake, maintaining a healthy weight, and exercising regularly, can lower stroke risk. For those with hypertension, medications may also be necessary to keep blood pressure in a safe range.

5.1. Diabetes

People with diabetes face an increased risk of stroke due to the damaging effects of high blood sugar on blood vessels. Over time, elevated glucose levels can cause the blood vessels to become narrow or blocked, increasing the likelihood of clot formation [42]. Additionally, many individuals with diabetes also have other risk factors for stroke, such as high

blood pressure, high cholesterol, and obesity [42-44]. Controlling blood sugar levels through diet, exercise, and medication is vital for reducing stroke risk in individuals with diabetes.

5.2. Smoking

Smoking is a major contributor to stroke, as it accelerates the build-up of plaque in the arteries (atherosclerosis), which can obstruct blood flow to the brain [45]. Moreover, the chemicals in cigarette smoke damage the lining of blood vessels, making it easier for clots to form [46]. Smoking also raises blood pressure, further increasing stroke risk [45]. Quitting smoking is one of the most effective steps a person can take to lower their stroke risk [47]. Within a few years of quitting, the risk of stroke can significantly decline to that of a non-smoker.

5.3. High Cholesterol

High levels of cholesterol, especially low-density lipoprotein (LDL) cholesterol, contribute to the formation of fatty deposits in the arteries, which can reduce or block blood flow to the brain [48]. Atherosclerosis, or the hardening of arteries due to these deposits, is a risk factor for ischemic stroke [49]. Managing cholesterol levels through a balanced diet, regular exercise, and, if necessary, medications can help reduce this risk.

5.4. Family History

Genetics can also play a role in stroke risk [3]. If you have a family history of stroke or cardiovascular disease, one may be at higher risk of experiencing a stroke. While family history cannot be changed, individuals with a genetic predisposition to stroke can take proactive steps to mitigate other risk factors through healthy living and regular check-ups.

5.4.1. Prevention Strategies

Preventing strokes involves actively managing the risk factors mentioned above. Preventive strategies include:

- **Regular Physical Activity**: Engaging in physical activity for at least 30 minutes most days of the week can help reduce blood pressure, improve circulation, and maintain a healthy weight [50].
- **Healthy Diet**: A diet rich in fruits, vegetables, whole grains, and lean proteins, while low in salt, saturated fats, and sugars, can help prevent high cholesterol and diabetes [51]. Foods like leafy greens, fish rich in omega-3 fatty acids, and nuts are particularly beneficial for heart health [51-52].
- **Quit Smoking**: If you smoke, quitting will drastically reduce your risk of stroke [45]. There are numerous resources, including counseling and medications, to help with smoking cessation.
- **Manage Blood Pressure and Diabetes**: For those with high blood pressure or diabetes, following your doctor's advice on medication, diet, and lifestyle changes is essential in preventing stroke.
- **Medication**: For individuals at high risk of stroke, such as those with atrial fibrillation (a heart condition that can cause blood clots), or those who have had a TIA, doctors may prescribe medications like blood thinners or cholesterol-lowering drugs to reduce the risk of clot formation.

Incorporating these lifestyle changes can help mitigate the risks of stroke, even for those with a family history or pre-existing health conditions. Stroke prevention is largely within our control, and taking proactive steps to manage risk factors is essential for maintaining brain and cardiovascular health.

5.5. What to Do If You Experience Early Signs of Stroke

When it comes to stroke, time is of the essence. Prompt action can mean the difference between life and death or, at the very least, between full recovery and long-term disability. If you or someone around you exhibits any early signs of a stroke, the F.A.S.T. approach is crucial for ensuring timely intervention. Here is how to respond effectively:

6. Call Emergency Services Immediately

The most important step is to dial your local emergency number as soon as you notice any stroke symptoms. Stroke treatment is extremely time-sensitive, and immediate medical attention is essential to reduce the risk of permanent brain damage [53]. Emergency responders are trained to assess stroke symptoms quickly and transport patients to a hospital equipped to handle stroke emergencies.

Even if the symptoms seem to resolve on their own, it is vital to seek medical help without delay. In many cases, symptoms that come and go could be an indication of a transient ischemic attack (TIA), which is often a precursor to a

more severe stroke [54]. Getting to the hospital quickly can improve treatment outcomes, as clot-busting drugs or other interventions are most effective within a few hours of the stroke's onset.

7. Stay Calm and Take Note of the Time

In the panic of a medical emergency, it is easy to forget important details. However, if possible, take note of the time when the stroke symptoms first appeared. This information is important for healthcare professionals, as certain treatments, such as thrombolytics (clot-busting drugs), are most effective when administered within a specific time frame after stroke symptoms begin. For ischemic strokes, these drugs can be life-saving, but they must be given within 3 to 4.5 hours from the onset of symptoms [55-57]. The sooner the treatment is given, the better the outcome.

Remaining calm while waiting for help is also essential. If you are with the person experiencing stroke symptoms, keep them comfortable and reassure them that help is on the way. Avoid giving the person food, drink, or medication, as this could complicate their treatment.

8. Seek Medical Attention Even if Symptoms Resolve

A stroke or TIA can sometimes present with symptoms that seem to disappear after a few minutes. While it may be tempting to ignore the situation if the symptoms subside, doing so can be dangerous. It is essential to treat a TIA as seriously as a stroke, and immediate medical evaluation is necessary to assess stroke risk and implement preventive measures [54].

After calling emergency services and arriving at the hospital, medical professionals will likely perform a series of tests, such as brain imaging (CT scan or MRI) and blood tests, to diagnose the type of stroke or determine if a TIA occurred. Based on the findings, they will recommend appropriate treatments, including blood-thinning medications, surgery, or lifestyle modifications, to reduce the risk of another stroke.

9. Conclusion

Recognising the early signs of a stroke is important in saving lives and preventing permanent disability. Stroke symptoms such as face drooping, arm weakness, and speech difficulties are among the most recognisable indicators of an impending stroke, and acting F.A.S.T. is a proven method to ensure timely intervention. Beyond these common signs, subtle warning symptoms like sudden numbness, dizziness, or vision changes can provide important early clues, giving individuals the opportunity to seek help before more severe damage occurs. Early medical intervention significantly improves outcomes, highlighting the importance of vigilance and immediate action.

The findings of this research reveals that several studies indicate that prompt medical attention can drastically reduce the risk of long-term damage from a stroke. This research has shown that patients who receive thrombolytic treatment within three hours of an ischemic stroke have a much higher chance of recovery. However, one of the biggest challenges remains the delay in recognising and responding to stroke symptoms. According to a survey by the World Stroke Organization, less than half of the general population could correctly identify all symptoms associated with stroke, particularly among those living in low-resource settings.

Additionally, this research finds that many individuals mistake transient ischemic attacks (TIA) for minor health issues and fail to seek timely medical intervention. This lack of awareness can lead to full-blown strokes in the future, making it vital to educate the public on the seriousness of even brief stroke-like episodes. Premised on this, the following recommendations are made:

- **Public Awareness Campaigns**: Governments and health organisations should implement comprehensive stroke awareness campaigns aimed at educating the public on recognising both major and subtle signs of stroke. Information dissemination should focus on underserved communities where access to healthcare and information may be limited.
- **Community Screening Programs**: Regular community-based screenings for stroke risk factors such as high blood pressure, diabetes, and cholesterol levels can help identify individuals at high risk and encourage early preventive action. These programs should be accessible and affordable to improve reach and effectiveness.
- **Improved Access to Medical Care**: Governments should prioritise improving access to medical facilities equipped to handle stroke emergencies. This may involve strengthening ambulance services, especially in rural

areas, and ensuring that hospitals are equipped with the necessary diagnostic tools like CT scans and MRIs to diagnose strokes rapidly.

- **Prevention Programs**: Emphasising lifestyle changes through community health initiatives can reduce the prevalence of risk factors like hypertension, smoking, and poor diet. Encouraging regular exercise, proper diet, and routine medical check-ups can lower stroke incidence rates over time.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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