

## **Stroke: Identifying Symptoms and Acting Fast to Save Lives and Prevent Permanent Disabilities**

**Mary E. Helander, Bernard Appiah, and Miriam Mutambudzi**

In 2019, stroke was the 5th leading cause of death in the United States<sup>1</sup> and the 2nd in the world,<sup>2</sup> with some groups such as Black and Hispanic women having higher rates of stroke and suffering worse outcomes than other groups. Stroke occurs in the U.S. every 40 seconds, with someone dying from it every 2 minutes.<sup>1</sup> Over 795,000 people in the U.S. have a stroke each year, and for approximately 610,000 people, it is their first stroke.<sup>1</sup> Those who develop a transient ischemic attack (TIA) (mini-stroke) have about a 17% likelihood of experiencing a full stroke within 90 days.<sup>3</sup>

These numbers suggest we need to know more about this often-silent enemy and understand strategies to recognize and quickly address stroke.

But what is stroke?

### **Stroke: Prevention and When to Act**

A stroke, also called a cerebrovascular accident (CVA), is a disruption of blood to the brain due to a hemorrhage or blood clot. TIA is a mini stroke, with symptoms being temporary and generally lasting 1-2 hours. Symptoms of stroke include one side paralysis, facial drooping, slurred or gargled speech, vision issues, loss of balance or coordination, and unexplained headache.<sup>4</sup> Some of these symptoms occur with other conditions and diseases. Sudden onset of one or more of these symptoms is what distinguishes a stroke/TIA from other medical events. Any of these symptoms may result in permanent disability for people who experience nonfatal stroke events.

Activities that can help prevent stroke are consistent with activities that reduce your chances of other health problems, such as high blood pressure, obesity, or diabetes.<sup>5</sup> Prevention includes watching what you eat (for example, avoiding high-calorie foods), exercising daily (for example either 30 minutes a day or 10-15 minute sessions a few times daily), quitting smoking, and reducing alcohol consumption.

Permanent disabilities resulting from stroke can be avoided or reversed if the stroke patient receives treatment within a critical time window. The time window is defined by the onset of stroke symptoms to the time of treatment received in a hospital emergency department.

### **KEY TAKEAWAYS**

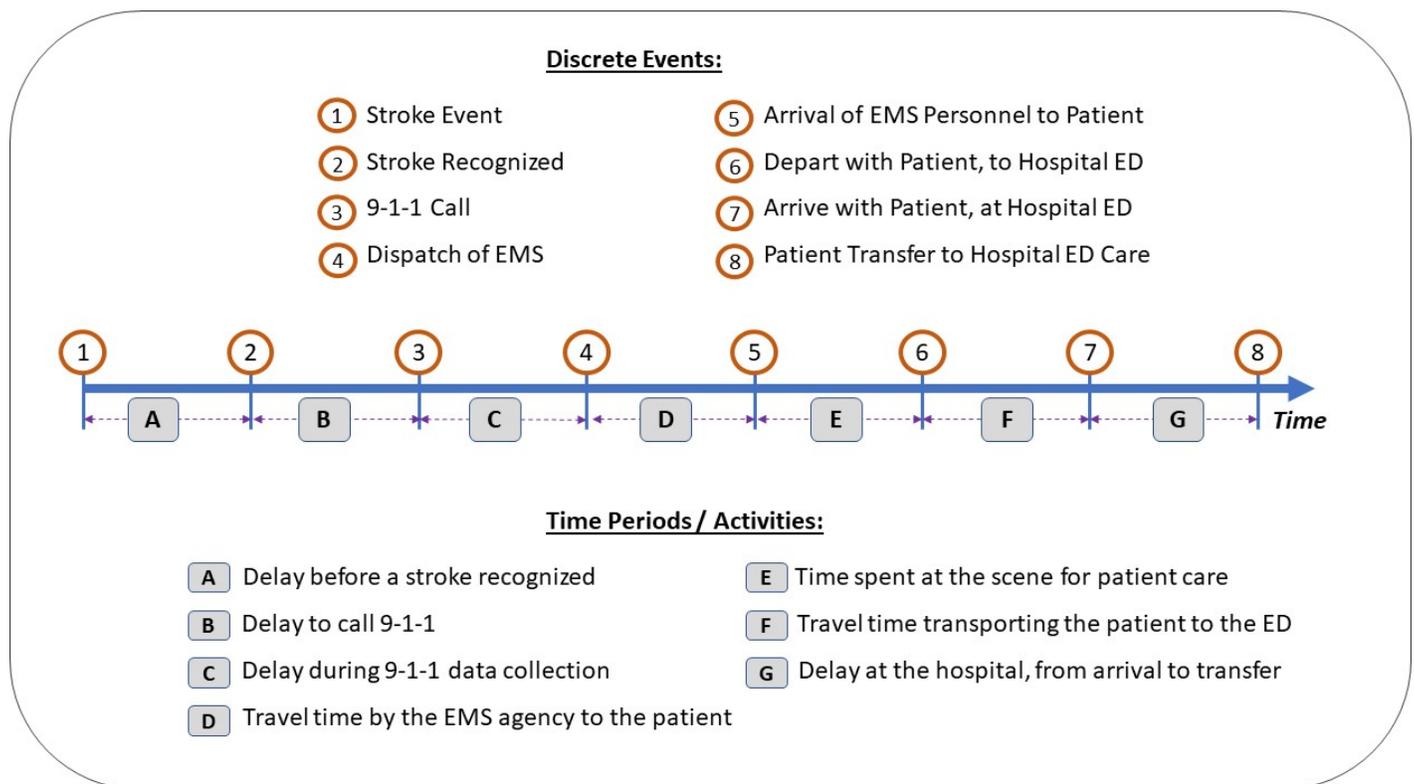
- Recognize a stroke: **sudden** paralysis, facial drooping, slurred or gargled speech, vision issues, loss of balance or coordination, and unexplained headache.
- Healthy lifestyle helps prevent stroke: eat a healthy diet, exercise, avoid smoking, and reduce alcohol consumption.
- Time is of essence: It is important to seek medical treatment immediately.
- Strokes and their long-term effects are preventable. Family members and bystanders can save lives and prevent long-term disabilities by acting quickly and minimizing unnecessary delays in time-to-treatment.

## Time is of the Essence

If a stroke occurs, it is important to get treatment as soon as possible for two reasons. First, as the blood clot occurs in the brain, it results in a short supply of oxygen-rich blood. The longer this oxygen deprivation occurs, the greater the likelihood of long-term disability or death. Second, the time it takes for patients to get to the hospital or get emergency care can influence whether and how much medication (called tissue plasminogen activator, or TPA) can help. TPA dissolves the blood clot in the brain to return blood flow. However, it must be given within 3-4.5 hours of when the stroke symptoms started.<sup>6,7</sup> Thus, the earlier one seeks care, the better. A recent study found that among 58,353 patients with a median age of 72 years who were treated with TPA, the median **onset-to-treatment** (OTT) time was 144 minutes (2 hours and 24 mins.). Faster OTT was linked to a reduction in deaths, reduced acute bleeding inside one's skull or brain, and increased rate of hospital discharge to home.<sup>8</sup>

## Visualizing the Stroke Timeline and Understanding What You Should Do

Figure 1 describes the sequence of events following a stroke, when a call to 9-1-1 results in dispatch of an ambulance and emergency transport to the hospital. Earlier time periods between events following a stroke or TIA, especially "A" and "B", are the critical time periods that any of us can minimize by recognizing and promptly reacting to the symptoms of a stroke/TIA and by dialing 9-1-1 immediately.



**Figure 1: Sequence of events and time periods between events (with potential for unnecessary delay) following a Stroke (CVA) or Transient Ischemic Attack (TIA).** Derived from elements of NEMSIS Data Dictionary, NHTSA v3.5.0, Build 191130, Critical Patch 1, EMS Data Standard, National Elements Only, Version Date: November 30, 2019, <https://nemsis.org/technical-resources/version-3/version-3-data-dictionaries/>. A similar timeline is described in [11].

As family members or bystanders, we can help to minimize the delay of "C" by knowing what happens when you call 9-1-1. You will be asked a set of questions, following a globally recognized standard protocol for emergency call-taking - an approach designed to minimize subjective interpretation of high-pressure calls and to provide timely and critical response.<sup>9,10</sup> The call-taker will always ask, first and foremost, the address of the emergency and the callback number,

followed by asking the caller to tell them exactly what happened. The caller should clearly describe the symptoms that have occurred, answer all questions, and follow the direction of the dispatcher, which likely follows a simple stroke diagnostic that the caller is asked to perform. The diagnostic involves asking the patient to smile, raise their arms, and repeat a given phrase. The 9-1-1 call-taker will also ask for the **exact time that the stroke symptoms first occurred** - this is an extremely important piece of information.

Knowing and expecting this interaction, being clear and concise in answers, and following directions of the dispatcher, can help reduce unnecessary time delay for “C”. Using the word “stroke” is important to avoid the potential delay of a lower priority dispatch, helping to minimize “D.” Time periods “D” and “E” can be minimized by small things such as making sure the front porch lights are on and the door is unlocked, so that the emergency medical services personnel can find and access the patient without unnecessary delay.

### **Known Disparities in Stroke**

There are racial/ethnic and sex disparities in stroke prevalence. Stroke occurs more in men than women, but this varies by age.<sup>12</sup> Stroke prevalence is higher, and outcomes are worse among Hispanics and Blacks than among Whites.<sup>13</sup> This may be partially explained by the fact that Hispanics and Blacks have higher prevalence of diabetes and hypertension, which in turn increase likelihood of having a stroke. However, there are also racial disparities in access to treatment that influence the risk of poor outcomes from stroke. For example, distance to providers, lack of transportation, and racial bias within the health care system are all factors that contribute to Whites accessing treatment for stroke more quickly than people of color. Addressing stroke disparities calls for more action within and outside the health care sector, including addressing social factors that make racial/ethnic minority groups more vulnerable to having a stroke and suffering worse stroke outcomes.

### **Know the Symptoms, Act Quickly, Save Lives**

We can all save lives and help prevent permanent physical and mental disabilities for ourselves, our family, friends, and others through stroke prevention and by helping to reduce time to treatment. Healthy lifestyle choices, such as a healthy diet, exercise, quitting smoking, and reducing alcohol consumption are individual strategies we can also use help to prevent stroke. If a stroke occurs, then unnecessary delay can be avoided by simple practices that anyone can follow:

1. Know the common symptoms of stroke. If stroke symptoms are present, call 9-1-1 immediately (do not delay!).
2. When you call 9-1-1, be prepared to give the physical address of the emergency, the call back number, and description of symptoms. Use the word “stroke” if you think the patient might be having a stroke and provide the time of first onset. Knowing and expecting this interaction, being clear and concise in answers, and following directions of the dispatcher, can help reduce unnecessary time delays.
3. Make sure porch lights are on and the door is unlocked so that when responders arrive, bystanders and family members can help them focus on getting to the patient and providing care without delay. It is also a good idea to gate pets and make sure there is a clear path for first responders to get to the stroke patient. Do not interfere with patient care at the scene or create any unnecessary delays for responders.

Strokes and their long-term effects are preventable. As family members or bystanders, we can help to minimize the unnecessary delays in time-to-treatment. Remember that stroke symptoms are sudden, time is of essence, and that the time-of-onset is important information to relay to health care providers.

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