

The Impact of undiagnosed disease and the emergence of Strokes.

March 2023
Efa Onyianta



Goals for today's presentation

Today we're going to be looking to look at data that tells us many things about strokes.

1. What is a stroke
2. What causes a stroke and its comorbidities
3. The cost of living with a stroke, its residuals and what it means for our bottom line
4. And how can we prevent them and make sure current policy holders stay healthy.

Hidden illness plays a large role in the occurrence of strokes as well as comorbid diseases that can accelerate the occurrence of a stroke. We're going to see which illnesses and comorbid disease play a role in the emergence of this debilitating disease.

What is a stroke

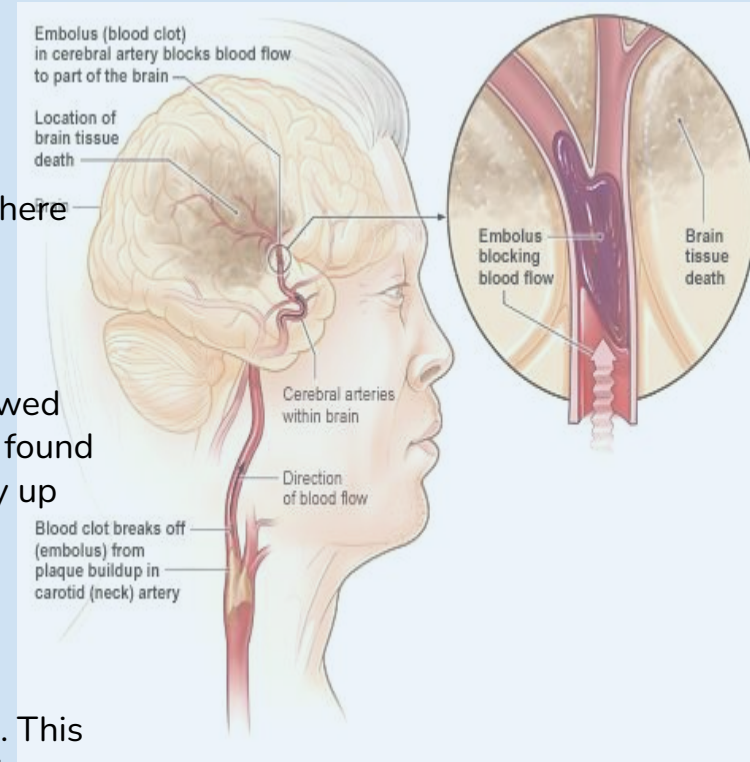
A stroke is the common name for a Cerebral vascular Accident (CVA). There are different types of stroke.

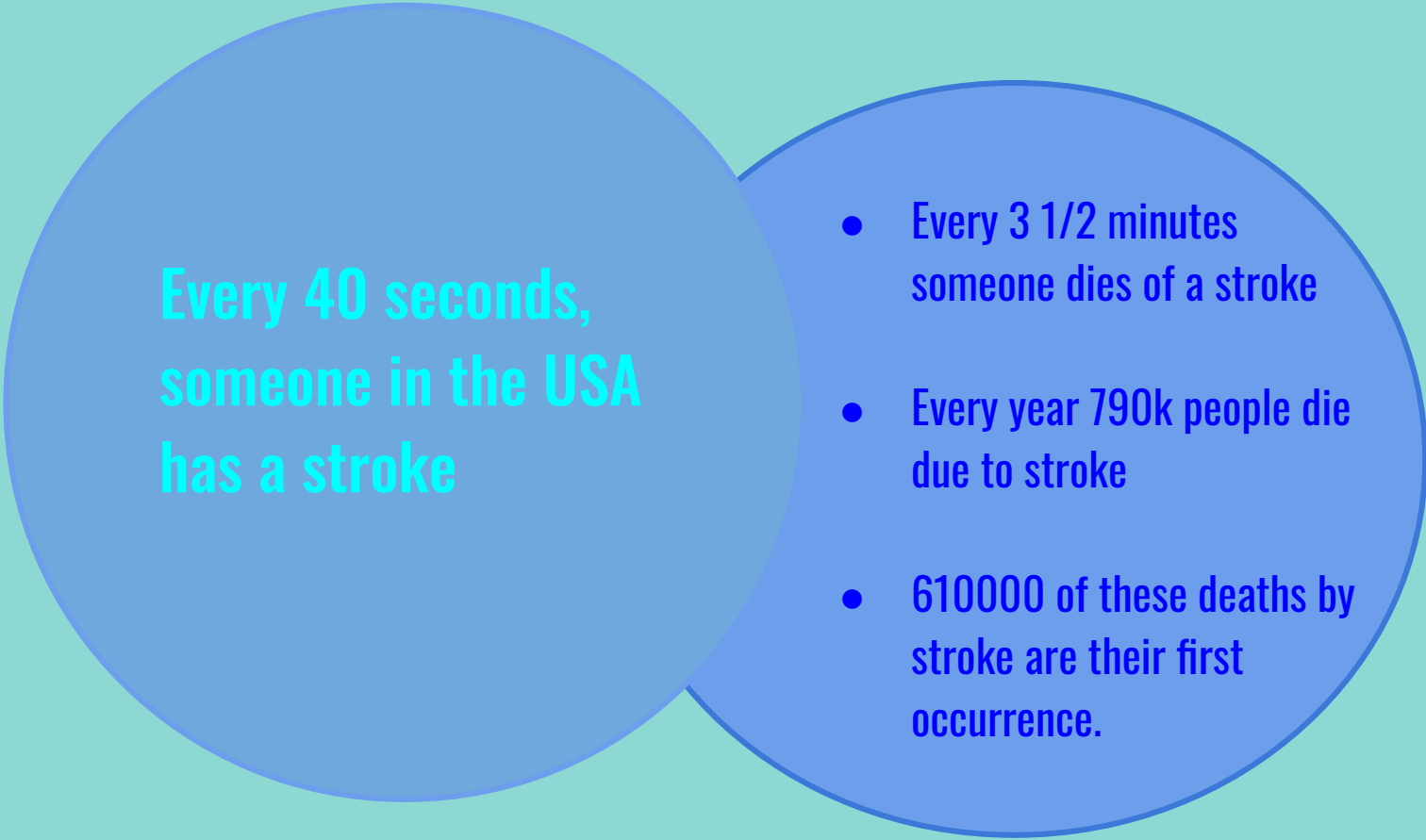
Ischemic:

The most common kind of stroke. Occurs when blood vessels are narrowed or blocked in the brain (usually due to plaque build up and other debris found in the blood). Sometimes a blood clot from the heart also makes its way up and causes a block. The blockage disrupts blood flow and can cause extensive damage to the brain.

Hemorrhagic:

This stroke is caused when a blood vessel in the brain leaks or ruptures. This can be caused by an aneurism, trauma to the head in an accident or and ischemic stroke that lead to a hemorrhage due to the severity of the blockage.





**Every 40 seconds,
someone in the USA
has a stroke**

- Every 3 1/2 minutes someone dies of a stroke
- Every year 790k people die due to stroke
- 610000 of these deaths by stroke are their first occurrence.

Covering the cost of stroke

Strokes cause long term and sometimes permanent disabilities in its sufferers. The lifetime cost of a stroke is around 200k (before insurance) and can range from 80k-140 k post. That is 60-120 k cost of coverage per patient. This is not including complications since most people who suffer strokes had other conditions that were not detected causing the stroke and making its recovery more difficult.

Having a stroke puts you at a SIGNIFICANT risk of having another one. 23 % of stroke victims have a second one and it's usually within 3 years of the first one.

What can we do to get ahead of this preventable and costly disease?




Were going to look at some data of stroke sufferers over the years. This data includes

- Age
- BMI
- Residence type
- Employment type
- Smoking status
- Average glucose level
- If they have heart disease
- If they have hypertension

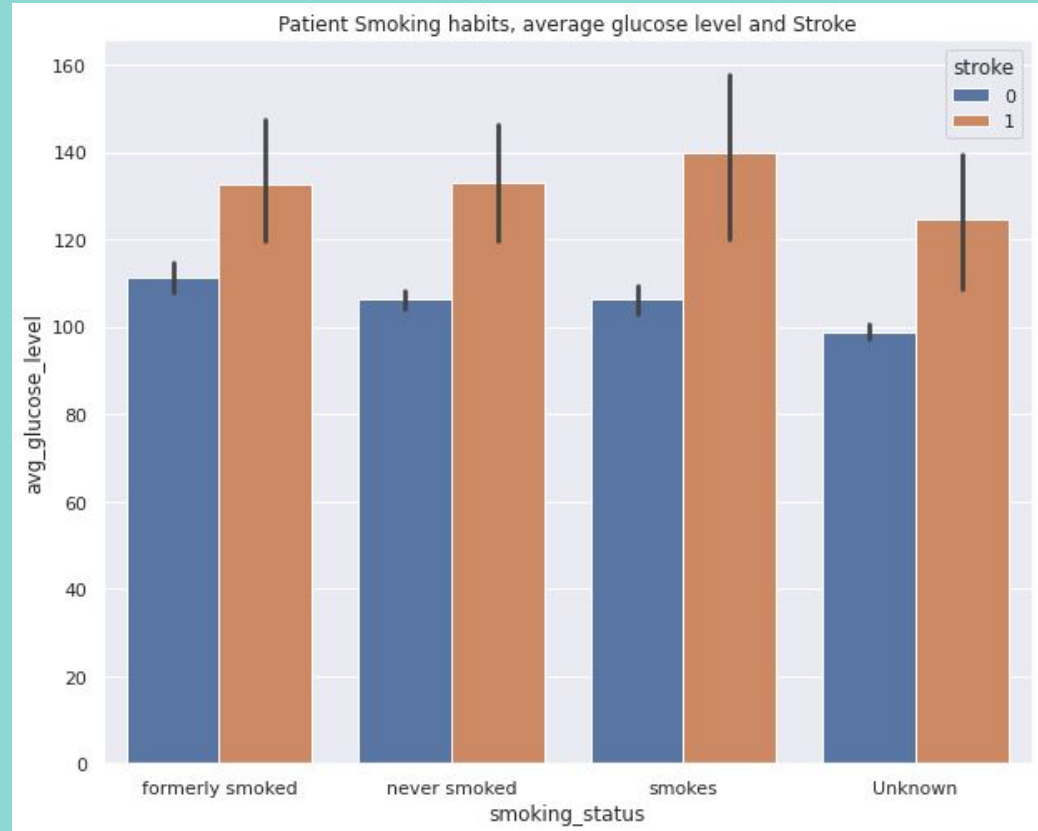
Most stroke victims had comorbid health conditions that put them at a higher risk of having a stroke. Those conditions include

- Diabetes mellitus type 2
- Hypertension
- Heart disease (ischemic and vascular)



A few features that seemed to have a correlation with the occurrence of strokes were a person's glucose level as well as smoking status.

- This elevated average glucose level (impaired glucose) seems to indicate that the patient is either diabetic or their diabetes isn't being treated properly. Both these things can lead to a complication including stroke
- Smoking was also a factor and even a past history of smoking. The only people who didn't suffer from a stroke were also people who smoked but had normal glucose. But everyone in this graph who had impaired glucose had a stroke and the smoking seems to have added to the occurrence as well.

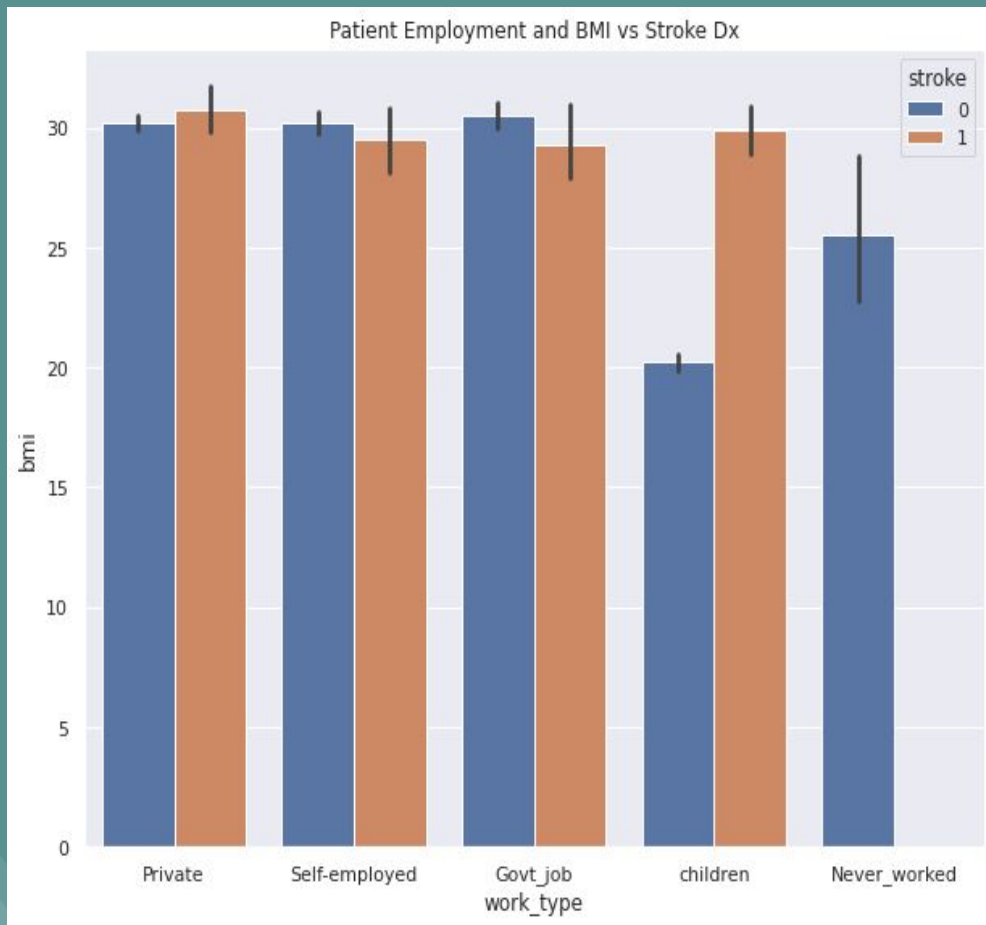


In this next graph we have patient BMI, job type and the occurrence of stroke.

This graph shows an alarming trend. All the BMI's besides the 'never worked' column are all in the overweight category when it comes to their BMI (25 and above). It seems the possible sedentary component of these jobs as well as the stress is causing these patients to hold on to more weight and cause them to be put at risk of stroke.

Plan:

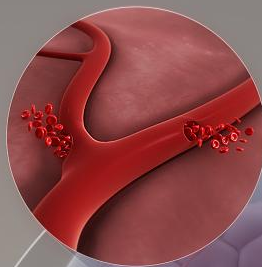
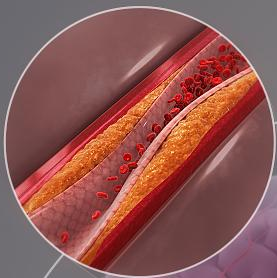
Make sure patients have their vitals taken at every visit and if we notice the BMI is increasing a flag should go up for their provider to talk to them about weight management. Also offer employers premium discounts if employees participate in get up challenges to battle desk work weight gain.



****FULL DISCLOSURE****

Like with all medical data a false negative is a very dangerous thing to deal with. A false negative can lead to life or death. My model initially had a very good accuracy of 95% however the model was VERY biased and could only predict the healthy.

My tuned model has a lower accuracy of 75% however its able to register the positives and also I feel can be tuned to increase its accuracy since class imbalance was handled in its creation. Im confident that with more tuning this model will be able to make the predictions needed to flag at risk patients so they can get the care they deserve.



With proper evaluation and watching of patient vitals and current diagnosed ailments, we can hopefully get ahead of the curve and prevent further decline in health of our patients due to CVA (strokes)