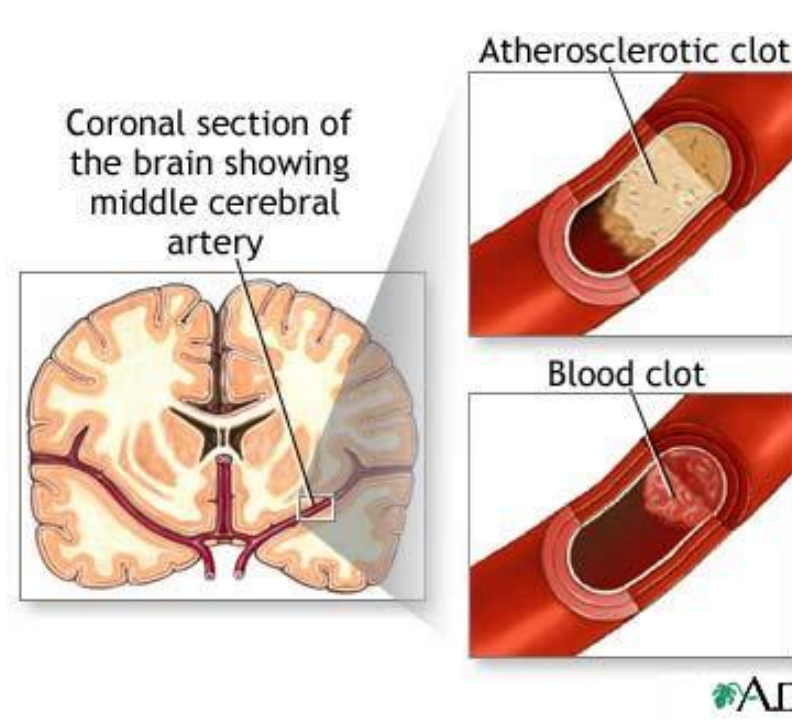




# Brain Attacks and Age, a Retrospective Study of Clinical and Ambulatory Run Data



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## Background

Strokes are the third leading cause of death and disability in the US. “Brain Attacks” refer to the general symptoms exhibited by ischemic strokes, brain bleeds, and other stroke mimics, including transient ischemic attacks (TIAs). Ischemic strokes occur when blood flow to a region of the brain is blocked and results in the brain tissue necrosis. Hemorrhagic strokes are caused by ruptured blood vessels in the brain parenchyma which damage the brain directly by pressure and indirectly through the toxic effects of hemorrhage. TIAs are caused by a temporary instance of blood flow occlusion.

The common expectation is that brain attacks will increase linearly with age and there would be a single correlation peak. However, two recent studies of ambulance run data at our hospital demonstrated a bimodal peak for brain attacks versus age.

## Hypothesis

1. Brain attacks will increase linearly with age.
2. The bimodal peak in Aggarwal et al is caused by a divergence between stroke types with mimics being linear relative to age.
3. African Americans will have a significant increase in brain attack prevalence compared to any other racial demographic.
4. Patients presenting to the UH ED without insurance will have a greater prevalence for brain attacks compared to those with insurance when differences in population are taken into account

## Objectives

1. To break down brain attacks by type of stroke.
2. To determine risk factor correlates between types of brain attacks.
3. To increase knowledge of stroke risk factors to allow EMS personnel, nurses, and physicians to better decide on treatment protocols

## Methodology

| Variable                               | Description   |
|--|---|
| • Age                                  | <ul style="list-style-type: none"><li>• Stroke incidence increases exponentially after age 30</li><li>• Two-thirds of all strokes occur in those age 65 or older</li></ul>  |
| • Gender                               | <ul style="list-style-type: none"><li>• Men are 25% more likely to suffer strokes than women</li><li>• Women live longer than men; some risk factors for strokes apply only to women</li></ul>  |
| • Race/ Ethnicity                      | <ul style="list-style-type: none"><li>• Incidence rate of strokes for African-Americans is nearly twice that of Caucasians.</li><li>• Asian Americans, Native Americans, and Hispanics have similar rates to Caucasians</li></ul>   |
| • Insurance Status                     | <ul style="list-style-type: none"><li>• Those without insurance are less likely to seek preventative care and thus are at a higher risk for uncontrolled hypertension, heart disease, and diabetes</li></ul>  |
| • Family History of Stroke             | <ul style="list-style-type: none"><li>• Inherited genetic predispositions for stroke risk factors, such as hypertension and diabetes, increase stroke incidence among family members</li><li>• Common family lifestyles (high fat and high salt diet and cigarette smoking) may contribute to familial stroke risk</li></ul>                          |
| • Hypertension                         | <ul style="list-style-type: none"><li>• A person with hypertension is four to six times more likely to have a stroke than the general population</li><li>• Approximately 50 million Americans have hypertension</li></ul>   |
| • Diabetes                             | <ul style="list-style-type: none"><li>• A person with diabetes is two to three times more likely to have a stroke than someone without diabetes</li><li>• The prevalence of hypertension is nearly 40% higher in diabetics compared to the general population</li></ul>   |
| • Sickle Cell                          | <ul style="list-style-type: none"><li>• Children with sickle cell disease are 250 times more likely to have a stroke than the general population</li></ul>  |
| • Heart Disease                        | <ul style="list-style-type: none"><li>• Heart disease, especially atrial fibrillation and the need for a mechanical heart valve, is a powerful risk factor</li><li>• Atrial fibrillation increases an individual's risk of stroke by 4 – 6% and approximately 15% of stroke patients report having atrial fibrillations before their stroke</li></ul> |
| • Past Stroke                          | <ul style="list-style-type: none"><li>• A previous stroke increases the risk of another stroke within 5 years by 25 – 40%</li></ul>   |
| • Past TIA (Transient Ischemic Attack) | <ul style="list-style-type: none"><li>• Past TIAs have shown an increased chance of recurring strokes due to the atherosclerosis increase causing a TIA</li><li>• After a TIA, the chance of having a stroke within the next 90 days is 10-15%</li></ul>  |
| • Cocaine                              | <ul style="list-style-type: none"><li>• Cocaine has not been directly connected with triggering strokes, but the effects of cocaine are risk factors in causing strokes</li><li>• Factors include vasospasm, cerebral vasculitis, and enhanced platelet aggregation</li></ul>   |
| • Marijuana                            | <ul style="list-style-type: none"><li>• Marijuana has not been directly connected with strokes, however marijuana is known to cause hypotension</li></ul>   |
| • Amphetamine                          | <ul style="list-style-type: none"><li>• Amphetamines have not been directly connected with triggering strokes but are responsible for increasing the risk factors of strokes including elevated blood pressure, vasculitis, and cerebral vasospasm</li></ul>  |
| • Tobacco                              | <ul style="list-style-type: none"><li>• Smoking tobacco can increase patient's stroke risk 2-4 fold</li><li>• Passive smoking or second hand smoke has also been shown to increase stroke risk</li></ul>  |

## Methodology

This study is an observational, retrospective chart review of previously collected data of patients who came to UH by ambulance with symptoms suggestive of “Brain Attacks.” The study population was compiled from dispatch reports of patients brought to the Emergency Department with brain attack symptoms. Run data was coupled with medical record numbers (MRNs) by matching date with approximate time of complaint, age, gender and chief complaint on the day of arrival from the transfer center database to the electronic “White Board” Database.

The second database (the electronic “White Board” database) records the chief complaint, date and time of arrival, and MRN for each patient. This system allowed the researchers to identify more than 500 potential Brain Attacks. Medical record numbers of pertaining cases were taken to the medical records department where the medical charts were obtained, over 100 of which have had data extracted and analyzed.

The RA workforce of the Emergency Medical Research Division consists of 30 CITI certified individuals who have volunteered their time to assist in data abstraction and analysis. The data will be analyzed using accessible statistical software including SPSS and Microsoft Excel. Both a database manager and a statistician assisted in this research.

## Figures

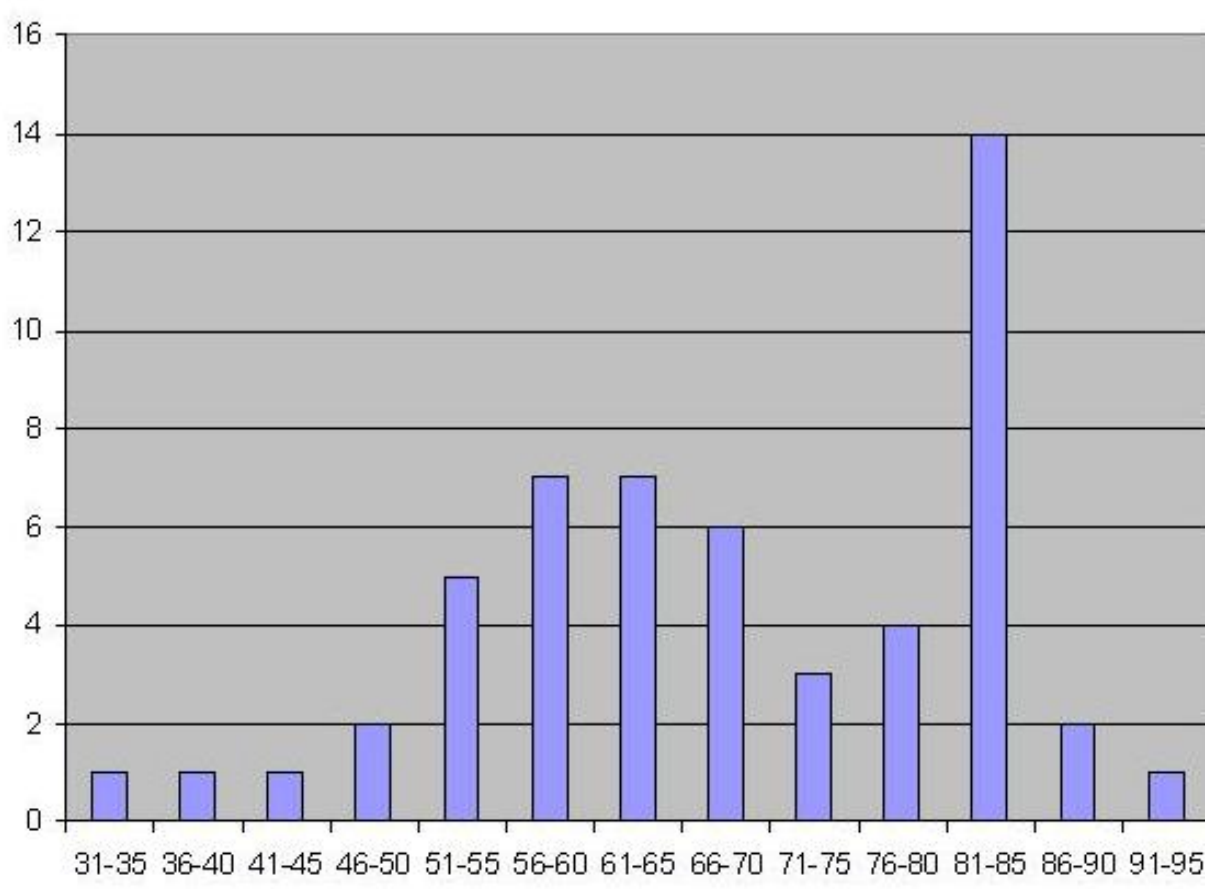


Figure 1: Age vs. frequency of stroke. There appear to be 2 peaks of strokes: 56-65 and 81-85. However, there is no statistically significant correlation behind this, which may be due to the small sample size

## Preliminary Results

- No Statistically Significant Correlation
  - Age and ischemic stroke
  - Age and hemorrhagic strokes
  - Diabetes and ischemic strokes
  - Diabetes and hemorrhagic strokes
  - Private insurance and ischemic strokes
  - Private insurance and hemorrhagic strokes
  - Medicaid and ischemic strokes
  - Medicaid and hemorrhagic strokes
  - No insurance and ischemic strokes
  - No insurance and hemorrhagic strokes
  - Insurance vs. no insurance for strokes overall
  - Sickle Cell Disease and ischemic strokes
  - Sickle Cell Disease and hemorrhagic strokes
- Statistically significant correlations
  - Patients on Medicare have a 25.7% higher chance of having an ischemic stroke
  - Patients who smoke have a 41% lower chance of having an ischemic stroke
  - Patients with a family history of strokes have an 18% higher chance of having a hemorrhagic stroke

## Conclusions

The data does not show many significant statistical correlations based on the analyzed data.

Patients on medicare may have a higher chance of having an ischemic stroke due to having a number of other conditions and being in worse overall health than those who have other forms of insurance.

Patients who smoked were expected to have a significantly higher chance of ischemic and hemorrhagic stroke. The cause for this is unknown.

Certain stroke factors have a genetic basis, which could explain the correlation between hemorrhagic strokes and family history of strokes.

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