The Effects of a Failing Network on the Racial Disparity in Stroke Incidence

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Abstract

Ischemic strokes are consistently a leading cause of death in the United States, and non-fatal strokes often lead to severe disability. It has been noted over the past several years that Black Americans suffer from strokes at a much higher rate than non-Hispanic, white Americans. The reasons for this disparity can be discovered through a network analysis of the healthcare system in the United States. This paper uses ANT to define the network and identify the reasons for which it is failing. Specifically, the network builder, which the institution of healthcare, is considered alongside human and non-human actors. The most important actors are patients, healthcare providers, and insurance companies. However, in building this network, healthcare opted to distinguish between patients based only on their insurance status, and it did not consider the many ways that racism affects minorities and that minorities interact differently with the healthcare system. As a result, the healthcare network in the United States is failing, creating a sociological "perfect storm" to substantially increase the risk of stroke in the minority community.

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Introduction

An ischemic stroke is a devastating event that often results in neurological deficits and is one of the leading causes of death in the United States (Donnan et al., 2008; Murphy et al., 2018). Ischemic strokes are caused by a clot that blocks blood flow in the brain and deprives the surrounding area of the oxygen and nutrients that it needs to function normally (Lo et al., 2003). While many older populations are impacted by strokes, Black Americans endure strokes at twice the rate of white Americans (*Stroke Facts | Cdc.Gov*, 2020). A significant amount of research currently focuses on the fact that minorities face worse outcomes following stroke than their white counterparts and aims to understand the reasons for these disparities (Bos et al., 2002; Kapral et al., 2002). However, there are far fewer efforts to elucidate the causes for the gap in the incidence of stroke. Without a clear understanding of the factors that contribute to this disparity, there is no evident avenue for addressing the problem. Thus, this paper uses Actor-Network Theory (ANT) to analyze the network involved in healthcare and the ways in which it is failing. In using this framework, this paper identifies and explores the reasons for which minority groups are at an increased risk for stroke. Specifically, the failure of healthcare to consider the ways in which minority patients differ from non-minority patients has led to poor health and minimal treatment among minority populations, leaving them at a higher risk for stroke.

Research Methods

Why does race impact one’s likelihood to have a stroke? In order to address the many factors involved, documentary research was performed to gather research spanning from biological experiments to historical and sociological studies.

This paper performs a network analysis to understand the ways in which several actors interact with the minority community, leaving them at an elevated risk for stroke. The human actors that are considered are patients and doctors. The nonhuman actors are healthcare and insurance. To inform this analysis, documentary research was used to perform a literature review. Specifically, this paper uses research regarding the impact of insurance on one's likelihood to seek out medical care, in addition to information about uninsured rates in the United States. This paper also utilizes sources that focus on the causes of ischemic stroke and its risk factors to identify the ways in which stressful interactions could lead to an elevated risk of stroke. Lastly, published survey data and historical case studies help to identify the ways in which doctors, healthcare, and minority patients interact and how those interactions differ from those with non-minority patients. The research is synthesized to emphasize the construction of the healthcare network and the ways in which it is failing.

Stroke in the Minority Community

Black Americans have strokes at alarmingly high rates: their risk for stroke is approximately twice as high as white Americans' risk (*Stroke Facts | Cdc.Gov*, 2020). A study of 11,163 adults found that Black adults have a higher prevalence of multiple risk factors for stroke, such as high blood pressure (Bravata et al., 2005). This study indicates that the disparity in incidence may be due to a similar disparity in risk factors. However, there is not currently any research that aims to explain the driving forces behind the disparity in these risk factors.

Instead, most studies focus on the different outcomes between racial groups following stroke. For example, a study of 806 stroke survivors found that Black participants faced more limitations than white participants did in both physical and cognitive activities, such as bathing, dressing, getting in and out of bed, and banking. The disparity in limitations held true even when accounting for comorbidities (Burke et al., 2014). The worse outcomes faced by minority populations further underscore the need for a clear understanding of why race is an indicator of one's likelihood to have their first stroke.

Actor Network Theory

In order to use the wide range of available research and information to explain the disparity in stroke incidence, Actor-Network Theory (ANT) will be implemented. ANT looks to identify all of the actors involved in a technology and track their interactions with each other and additional technologies (Cressman, 2009). Notably, this theory includes both human and non-human actors, which allows researchers to consider a wide variety of actors, such as technology, policies, and groups of people (Rodger et al., 2009). ANT begins its search for actors with those who seem to have built the network of interest and, from there, expands to include a wide range of actors. This framework evaluates power dynamics between the actors, as well as any instability in the network. Criticisms of ANT include its seemingly infinite nature and the level of subjectivity for which it allows (Cressman, 2009). The key actors that appear to be involved in the healthcare network and influence the disparity in stroke incidence include patients, the healthcare system, healthcare providers, and insurance companies. ANT is employed to characterize the interactions between these groups and the failures of the network to establish how they might impact the health and risk of stroke among minority groups.

The United States Healthcare Network

The factors that impact one's health are extensive and exist in many forms. Thus, in order to understand even a fraction of the reasons for which minority communities have strokes at higher rates, it is critical to consider the many actors involved. First, this paper will offer an overview of the relevant network.

A minority individual spends their life subjected to overt and implicit racism. The constant onslaught of bias induces stress, which can lead to high blood pressure and other health issues (Jl, 1991). However, this individual is reluctant to schedule an annual physical with their primary care provider. Throughout their life, their family and community conditioned them to be wary of healthcare providers and healthcare as a whole, due to its history of racism and mistreatment of minorities (Scharff et al., 2010). Thus, they avoid interaction with doctors when possible. To add on to their limited trust in healthcare, this individual is likely to have insurance with a high deductible and limited coverage, so a trip to the doctor when they feel perfectly healthy appears to be an unnecessary expenditure (Ayanian et al., 2000). All of these factors lead the hypothetical patient to wait until they feel severely unwell to seek out healthcare. They unknowingly live with treatable risk factors for stroke for many years, until one day, a clot forms, fully occluding a miniscule blood vessel in their brain, and causing an ischemic stroke with potentially devastating effects.

To understand the ways in which this healthcare network has allowed for minorities to experience strokes at such high rates, this paper will first detail the construction of the network of interest. Then, an exploration of the oversights of the network builder will demonstrate how the network has been permitted to fail and, subsequently, to put minority patients at an increased risk for stroke.

The Network Construction

In this case, the builder of the healthcare network is the institution of healthcare itself. Healthcare, in this case referring to the fields of medicine and medical research, sits at the center of the network and is responsible for recruiting the other actors: patients (both minority and non-minority patients), healthcare providers, and insurance companies. In this network, insurance has the majority of the power. It is able to control the cost of care, which influences whether or not the patients access care and what care the healthcare system and providers are able to offer.

Of note, the treatment of patients by the healthcare system and by healthcare providers depends on insurance. In 2018, of the 91.5 percent of people in the United States that had health insurance, 55.1 percent were covered under an employment-based private plan. In comparison, only 10.8 percent of insured people were covered under a direct-purchase private plan, and 17.9 percent of insured people were covered under Medicaid (Berchick et al., 2019). Medicaid is a public insurance plan offered by the government to low-income adults and children and to people with disabilities (*Medicaid* | *Medicaid*, n.d.).

Further, both low income and education levels are associated with higher uninsured rates; a higher percentage of people who did not work for at least one week in a year or who worked less than full-time are uninsured, compared to those who work full-time (Berchick et al., 2019). Thus, the network that healthcare has constructed is a job-based care system, as insurance appears to rely heavily on employment, with highly educated and high-income individuals having the lowest uninsured rates. As the network stands currently, this is the only difference that it seems to acknowledge among patients, categorizing them exclusively by their insurance status. This insurance-based grouping threatens the network, but other factors not considered by the network builder exacerbate the instability of the network and are leading to failure.

A Failing Network

In building the network, healthcare recruited patients as an actor and opted to treat them differently based only on insurance. In so doing, they missed three key considerations that have caused the network to fail: the ways in which the categorization by insurance would disproportionately harm minorities; the impacts of racism on minorities; and that minority groups interact differently with healthcare than non-minority groups do. The failure of this network has led to the increased incidence of ischemic stroke among minorities that has been observed in the United States.

Insurance

The healthcare network was constructed to treat patients differently based on their insurance; specifically, this manifests as a job-based healthcare system. It is established that different patients have access to different levels and qualities of insurance, primarily based on their education, income, and employment status; many privately insured people access insurance through a plan offered by their employer (Berchick et al., 2019). However, this system disproportionately harms minority patients, as minority populations have less access to health insurance. In 2007, 19.5 percent of Black Americans were uninsured, while only 10.4 percent of non-Hispanic white Americans were uninsured (Denavas-Walt et al., 2008). Recent expansions of healthcare in the United States have not improved this disparity notably. By 2015, the expansion of Medicaid under the Affordable Care Act resulted in only a one percent reduction in the insurance disparity between Hispanic and non-Hispanic white Americans; the effect on the disparity between Black and white Americans was similar (Wehby & Lyu, 2018). Data from the United States Census Bureau show that, in 2018, 9.7 percent of Black Americans lacked insurance, a 0.4 percent increase from 2017, while 5.4 percent of non-Hispanic white Americans were uninsured. Additionally, 17.8 percent of Hispanic[1] Americans did not have insurance coverage in 2018 (Berchick et al., 2019). This disparity in insurance is likely the result of the job-based healthcare network. Black and Hispanic Americans' median annual income is approximately $11,000 lower than that of white Americans, from which it can be inferred that

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[1] The United States Census Bureau defines Hispanic as referring "to a person of Cuban. Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin" (Bureau, n.d.).

they are likely to work jobs that either do not offer insurance or offer lower quality insurance than higher paying jobs might (*Indicator 30: Earnings and Employment*, n.d.). Further, in 2015, the US Department of Commerce reported that 36.2 percent of non-Hispanic white adults had at least a Bachelor's degree, compared to only 22.5 percent of Black Americans and only 15.5 percent of Hispanic Americans (C. L. Ryan & Bauman, 2016). Thus, minority Americans less frequently obtain degrees that may allow them to access high paying jobs, thereby accessing quality, private insurance.

The disparity in insurance, and the subsequent difference in how patients are treated in the network, negatively impacts outcomes for minority patients. Insured Americans have been found to be significantly more likely to seek any recommended care. Uninsured people also report that they frequently are unable to access care due to cost. Further, long-term uninsured populations are less likely than other groups to schedule and attend regular wellness visits with a primary care provider (Ayanian et al., 2000). The lack of care of uninsured adults can have significant health impacts.

A study of 10,998 adults in the United States found that uninsured adults were significantly less likely to be aware of their high blood pressure than insured adults, despite the fact that both populations suffered high blood pressure at similar rates (Ayanian et al., 2003). Without awareness of their condition, a person will be unable to make the lifestyle changes or receive the drug treatment necessary to address the issue. Thus, a person without insurance is less likely to be treated for maladies that could be risk factors for stroke. Clearly, health insurance is critical for reducing one's risk for morbidity and insurance's power in the network through determining the treatment of patients is causing the network to fail minority patients.

Racism

When the institution of healthcare built this network, it failed to consider that minority patients might face different health risks as a result of specific stressors in their lives. Minority communities are likely to confront racism and discrimination throughout their lives. A 2016 survey of 3,716 Americans found that 63 percent of minorities[2] reported that they had experienced some level of discrimination, compared to only 30 percent of white people reporting experiences of discrimination (Lee et al., 2019). It is possible that these numbers may even underrepresent the prevalence of racism among minorities, as studies have found that minorities are less likely to report that they personally have experienced racism than to report that another member of their community has experienced it (Caughy et al., 2004). Encounters with discrimination and racism vary from slurs and violence to subtle forms of exclusion. Notably, subtle forms of racism have been found to be viewed differently between groups; white populations tend not to view behaviors such as feeling uncomfortable or nervous around a Black individual as racist. However, minority populations often perceive these behaviors as racist (Carter & Murphy, 2015). These varying views of racism indicate that the network builder, a likely predominantly white institution, did not understand the prevalence of racism when building the network.

These biased interactions between minority and non-minority groups are thought by many experts to impact health problems in minority groups. Specifically, studies have found that experiences of racism can lead to elevated blood pressure. A study of 680 African American and Latino adults living in New Hampshire found a positive correlation between self-reported discrimination and blood pressure (A. M. Ryan et al., 2006). An additional study found that video clips depicting racism against Black individuals resulted in elevated blood pressure among

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[2] Lee et al. define minorities as Black, Hispanic, and Asian populations (Lee et al., 2019).

Black viewers compared to those who watched other clips that were anger-provoking but included no racist content (Armstead et al., 1989). Researchers believe that this observed elevation in blood pressure is due to the chronic stress caused by experiences of discrimination and racism (Peters, 2004). Thus, the interactions between minority and non-minority groups, specifically those interactions with racist under or overtones, are likely to account for some of the disparity in stroke risk factors between minority and non-minority groups (Bravata et al., 2005). Minorities are a patient population with different experiences and risks than non-minority patients. By not considering the differences in these patient populations, the network has failed to address the unique obstacles faced by minority patients.

Interactions with Healthcare

Historical Context. Minority patients interact differently with healthcare than non-minority patients do; the discrepancies in these interactions are rooted in widespread distrust in healthcare among minorities. Distrust of medicine stems from its history, in addition to recent examples of its mistreatment of minorities. Nearly all of the early, significant advances in medicine in the United States occurred while blatant racism and discrimination were woven throughout the fabric of society in the form of slavery and legally mandated discrimination. According to the US Department of Health, Education, and Welfare, the first United States medical school was founded in 1765 at what is now the University of Pennsylvania (1976). Thus, medicine and medical training in the United States officially began at a time when slaves made up between 34 and 38 percent of the southern population (*Statistics on Slavery*, n.d.).

While there are many examples of the ways in which early medical research embodied the racism present in society, the work of J. Marion Sims and the Tuskegee Syphilis Study are among the most well-known and egregious case studies. J. Marion Sims, a doctor in Alabama, was one of the earliest major contributors to medical advancement in the United States, and is credited as the "father of gynecology" (Ojanuga, 1993). While his title implies scientific heroism, the reality of his work is far grimmer. Sims's initial trials of his most notable, cutting-edge surgery were performed in the mid-1800s. Without the need for approval to experiment, he attempted his procedure on enslaved African American women and did not ask for their consent. He housed the women in a small hospital that was behind his house and operated on them repeatedly (Wall, 2006).

The Tuskegee Syphilis study again made use of rampant racism to advance medical knowledge in 1932. The study was performed by the U.S. Public Health Service in Alabama and was intended to study the progression of syphilis in Black men. However, in the 1950s, when penicillin became available as a treatment, the syphilitic men were not provided with the treatment. Rather, some were actively prevented from receiving penicillin (Brandt, 1978).

As the stories of these atrocities have been passed down through generations, minority communities have developed a distrust in medicine. Surveys indicate that minorities feel as though the field of healthcare exposes them to unnecessary risks. They also are more likely than white patients to believe that the medical field aims to use them as test subjects without their consent (Corbie-Smith et al., 2002).

Continued Racism in Medicine. Skepticism of medicine is continuously validated, even today. Though there are not new horror stories of studies that emulate the oppression seen in Tuskegee, the minority community continues to receive worse treatment than their white counterparts. According to data collected by the CDC, there are 41.7 pregnancy related deaths per 100,000 live births among non-Hispanic Black women, compared to 13.4 deaths per 100,000 live births among non-Hispanic white women (*Pregnancy Mortality Surveillance System* |

Maternal and Infant Health | CDC, 2020). As of April 2021, the CDC also reported that Black Americans and Hispanic persons face a COVID-19 mortality rate that is 1.9 times and 2.3 times as high as that of white persons, respectively (CDC, 2021). These disparities extend into access to medicine as well. Across the country, there exist "pharmacy deserts" or areas with a proportionately lower density of pharmacies compared to their surroundings. A 2014 study of this phenomenon in Chicago found such pharmacy deserts to be localized in predominantly minority communities rather than in predominantly white communities (Qato et al., 2014). Even when care is available to minorities, the medical field continues to fail them. Studies have found that, even when minorities are able to afford and access care, they are less likely than white patients to receive proper care (Kennedy et al., 2007). A United States Department of Health and Human Services study found that racial minority patients receive lower quality care than white patients for 30 to 40 percent of the quality metrics evaluated; there has been very little improvement in this quality disparity since 2000 (Chaves et al., 2020).

The prevalence of distrust in medicine among minority communities demonstrates that they are conscious of the unethical behaviors of the medical field both currently and throughout history. However, in building this network, the institution of healthcare failed to identify its own wrongdoings by distinguishing between patients based only on their insurance. Ultimately, in not acknowledging the doubt that minorities harbor about healthcare, this network failed to account for the ways that these patients interact differently with it.

Impacts of Distrust on Care. Minorities' distrust of medicine has a direct impact on their actions as patients. Among adults on Medicare, who are all equally insured, racial minorities have been found to access care less often. Further, patients who perceive racism within healthcare are 3.92 times more likely to delay care or forego it entirely (Rhee et al., 2019).

The interaction between minorities and healthcare is dictated heavily by the past and present inequitable actions of the medical field in the United States, both in the perception of healthcare by minorities and in the treatment of minorities by the healthcare system. This complex interaction results in minority populations not seeking out care that could easily identify risk factors for stroke, such as high blood pressure. However, when a minority individual does choose to receive healthcare, they are less likely to receive appropriate care, which could result in key health issues going unnoticed, untreated, or even improperly treated.

To worsen the issue, the impact of this distrust extends beyond a patient's interaction with the institution of medicine, influencing the ways in which they interact with individual healthcare providers. Patient-physician relationships are largely dictated by the perception of the doctor by the patient, and this is especially true of minority patients' interactions with white doctors. Studies have found that when a patient feels they are experiencing racism from their doctor, there is over three times as much of a chance for poor patient-physician communication compared to when there is no perceived racism (Rhee et al., 2019). Furthermore, Black adults are significantly less likely than white adults to believe that they can freely ask their physician questions, which can reduce the quality and efficacy of patient-physician communication. Black adults are also significantly more likely to believe that prescribed medication is a method for physicians to experiment on patients without their consent (Corbie-Smith et al., 2002). In other words, even when offered care, minority patients' distrust of medicine is so deeply rooted that they are hesitant to accept the care. These studies demonstrate an overall distrust of physicians among the minority population, which can impact the health of the population. Specifically, it has been found that if a patient does not trust their doctor, they are significantly less likely to seek out medical care (Jacobs et al., 2006). Additionally, survey data indicate that patients rate care from a physician of the same race or ethnic groups higher than that from a physician of a different race or ethnic group (Kennedy et al., 2007). Thus, the distrust and subsequent poor communication between minority patients and white healthcare providers cause these patients to opt against seeking out care or to receive care that they feel is insufficient. In this case, it is possible for underlying health conditions that may serve as risk factors for stroke, such as high blood pressure, to go unnoticed and, consequently, untreated.

Ultimately, by ignoring the critical ways that patients vary across different races, healthcare failed to build a network that could equitably care for all patients. Minority patients have been left with little access to affordable care, more risk factors for stroke, and extreme hesitation in seeking out healthcare.

Limitations and Future Work

This paper is subject to multiple limitations. There are unquestionably additional actors involved in the network analyzed in this paper. In order to feasibly perform a network analysis, a finite number of actors must be selected. However, despite the exclusion of other potential actors, the actors chosen in this paper are those that are likely to have the largest impact on the network. It is possible, though, that there are additional actors who play influential roles in the network. Further research, as well as in-depth interviews of the already identified actors, would serve as a future step in identifying additional actors and analyzing their roles in the network.

Furthermore, this study relies heavily on previous research correlating experiences of racism to negative health outcomes. However, these studies cannot be perfectly controlled and are therefore only able to identify correlations, not causal relationships. As more research continues to be done in this field, a clear mechanism by which experiences of racism impacts health may eventually be identified and will further support the claims made in this paper.

Future work on this topic will likely require employing additional research strategies. This paper relies on a limited number of case studies and documentary research. Analyzing additional case studies, as well as using surveys to further inform the network analysis, could provide new information that would be useful in continuing the study of the disparity of stroke incidence by race. The arguments in this paper provide a framework for the network involved in this disparity and background as to how the network came to be, which should be used to inform future research.

Conclusion

Considering the disastrous outcomes of stroke, especially among the minority community, it is critical to understand the reasons for which minorities have strokes at a higher rate than non-minority populations. The institution of healthcare constructed a network that was destined to fail, especially for minority patients. The network treats patients differently based on their insurance, essentially ensuring a job-based healthcare network, which negatively impacts minorities who are less likely to have access to jobs that feature superior benefits. The network also fails to consider that minority patients face additional stressors in their lives that can add to their health risks. Most importantly, though, the network failed to consider that minorities interact with healthcare in an entirely different manner than non-minorities do. Healthcare has a long history of abusing minority patients through biomedical research, as was the case with J. Marion Sims' gynecologic research and the Tuskegee Syphilis Study, and it continues to offer them lower quality treatment than their white counterparts. As a result, minority patients lack trust in medicine and, therefore, are less likely to seek out care or to speak freely with a provider. Without accessing care, patients can have underlying conditions that go unnoticed, leading to catastrophic results, as is the case with high blood pressure eventually leading to stroke.

The arguments presented in this paper serve to support the conclusion that a variety of social factors in this network result in minority Americans facing a greater risk for stroke. This paper also provides a guide for analyzing disparities in the incidences of other pathologies and can be used as a framework for exploring similar circumstances. Perhaps the most impactful aspect of the conclusions drawn in this research is that they offer a clear understanding of the problem at hand and provide the necessary starting point for beginning to develop solutions. By describing three clear failures on the part of healthcare in building the network, the healthcare network can begin to be reconstructed to correct these oversights. Diversifying the healthcare field will help offer patients care providers that they may feel able to trust and may help minority patients feel less reticent to interact with healthcare. Providing cultural competency training to care providers will also emphasize the importance of considering the entirety of each patient, including the ways that their life experiences might influence their health. Such changes to the network will help to stabilize it by treating minority patients as a separate actor from non-minority patients and will allow the network to treat them in a more ethical and effective manner. Ultimately, altering the network to address its failures will contribute significantly to bettering the health of minority communities in America.

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Figure 18. Percentage of all active physicians by race/ethnicity, 2018. (n.d.). AAMC. Retrieved March 1, 2021, from https://www.aamc.org/data-reports/workforce/interactive-data/figure-18-percentage-all-active-physicians-race/ethnicity-2018

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