DISPARITIES AMONG STROKE REHABILITATION

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Are there disparities among stroke patient's recovery due to ethnicity, socioeconomic status, location of residency, age, gender and/or amount, level and type of rehabilitation?

Patients who suffer from a stroke end up losing some mobility in one or both sides of their body which hinders them from performing their daily functions. This makes strokes one of the leading causes of disability as well as the fifth leading cause of death in the United States (Pinel & Barnes, 2018). The lack of blood supply to the brain creates bodily dysfunction because of the decay of various neural tissues in the brain (Pinel & Barnes, 2018). Since strokes are one of the leading causes of disability, it is important and necessary that rehabilitation is aimed at helping those who suffer from strokes regain control over their daily operations. After a stroke has occurred, there are multiple rehabilitation options available, but there is a major discrepancy among whether ethnicity, socioeconomic status and location of residency inhibits one's recovery or not. Some data suggests that there are pretty significant disparities in stroke outcomes in the United States with respect to ethnicity, socioeconomic status, geographical area, age, gender and type of rehabilitation, amount of rehabilitation, level of rehabilitation.

A Background on Strokes

There are multiple types of strokes that can occur in the brain and effect the daily functions of those who are impacted by the stroke's outcome. By definition, a stroke is described as "a sudden-onset cerebrovascular disorder that causes brain damage" or in other words, an

interruption of blood supply to the brain (Pinel & Barnes, 2018). Strokes cause disruptions to the penumbra, an area of dead or dying tissue in the brain, and if not properly healed the symptoms can progress to amnesia, aphasia, paralysis or coma (Pinel & Barnes, 2018). One major type of stroke is a cerebral hemorrhage. During a cerebral hemorrhage, a blood vessel in the brain ruptures and blood percolates into and damages the surrounding neural tissue (Pinel & Barnes, 2018). A cerebral ischemia is the most common type of stroke. It occurs when there is a blockage that restricts blood flow within a blood vessel and causes the brain to slowly deteriorate and lose neurons (Pinel & Barnes, 2018). When people lose neurons, the transfer of motor neurons and sensory neurons is restricted causing the need for rehabilitation.

Rehabilitation for stroke patients is extremely necessary since the amount of people suffering and dying from strokes is significantly increasing. Rehabilitation is “critical to many stroke survivors' regaining the functional skills necessary to return to premorbid levels of independence. Rehabilitation programs are designed to reduce functional disability, thereby improving patient satisfaction and reducing the economic burden associated with long-term stroke-related disability” (Ellis et al., 2015). According to the Centers for Disease Control and Prevention, about 795,000 people suffer from a stroke and 140,000 people die from a stroke every year. There are multiple different options for rehabilitation for stroke patients that are aimed at helping assist with different aspects of their lives. There is acute, post-acute, inpatient and outpatient services found within the rehabilitation system. Acute care refers to the short-term “promotive, preventive, curative, rehabilitative or palliative actions, whether oriented towards individuals or populations, whose primary purpose is to improve health and whose effectiveness largely depends on time-sensitive and, frequently, rapid intervention” (World Health Organization, 2013). Post-acute care refers to the care that is given within rehabilitation centers,

home health, outpatient facilities, inpatient rehabilitation facilities, and skilled nursing facilities (Skolarus, Feng, & Burke, 2017). Physical Therapy, Occupational Therapy and Speech-Language Pathology all fit under the post-acute care category and can either be in an inpatient or outpatient facility. Someone who suffers from a stroke will most likely have to participate in one or more rehabilitation options during their time in the hospital as well as afterwards.

In order to measure stroke patient's recovery trends, researchers have implemented an instrument called the Functional Measure of Independence (FIM) questionnaire, the Barthel Index and the Rivermead Motor Assessment alongside other research techniques. These surveys ask questions regarding, "self-care, sphincter control, transfer capability, locomotion, communication, and social cognition" (Perrin et al., 2010). The Functional Independence Measure is "scored into one of 7 levels of function ranging from complete dependence (level 1) to complete independence (level 7)" (Ottenbacher et al., 2008). While the Barthel Index focuses on activities of daily living, the Rivermead Motor Assessment focuses on physical capabilities such as picking up a ball or performing thumb to finger opposition (Mahoney, Barthel). After giving these surveys to poststroke patients, some inferences can be created on the ethnicity and rehabilitation issue.

Disparities in Healthcare and Rehabilitation

Within rehabilitation centers, there are disparities among stroke patient's recovery abilities. Some research suggests this could be due to ethnicity, socioeconomic standing, age, gender and location of residency alongside of the availability the patient has to certain amounts, levels and types of rehabilitation. Depending on the circumstances, it is possible that one could not be treated equally due to the restrictions or unchangeable characteristics they possess. Even

outside of health care, there are inequities relating to one's race and ethnicity. Discrimination in healthcare has been well documented thus far including the disparate outcomes it has on health. One's socioeconomic standing within their race can impact the care that they are given after they have a stroke because they might not be able to afford it various types of necessary rehab (Arrichi et. al, 2008). The confounding variables that also impact one's ability to recover fully are gender, age, living situation, type of care, intensity of care, and type of rehabilitation offered. These variables, alongside ethnicity, can foster a change in rehabilitation efforts.

Some studies have found that after controlling confounding variables such as age, gender, type of stroke, marital status and number of comorbidities, there was a significant difference among ethnicity and rehabilitation. The disadvantaged populations, as they say, are more likely to have problems with their stroke rehabilitation and less functional independence according to the Functional Measure of Independence survey. "Differences may be related to the appropriateness or effectiveness of an intervention or patient preferences. Our investigation suggests the presence of disparities in poststroke outcomes for persons from minority populations" (Ottenbacher et al., 2008). In order to measure the impact that ethnicity has on stroke rehabilitation, it is necessary for the researchers to utilize the Functional Independence Measure (FIM) for various ethnic stroke patients. After having a stroke, the results from the FIM determined that Latino/Puerto-Rican individuals had an overall lower quality of life with more dependence than the quality of life for Black and White individuals (Perrin et al., 2010). In one study, "Not only did non-Hispanic white patients enter medical rehabilitation with higher FIM instrument ratings, but they also made larger gains after adjusting for covariates" (Ottenbacher et al., 2008). This statement means that White stroke patients not only began rehabilitation with a

high level of independence, but also made improvements in their independence and overall quality of life.

Research has shown that there is also a significant disparity among the caregivers of stroke patients of various ethnicities which eventually impacts the patients care. According to Perrin and colleagues (2010), "African American and Latino individuals, who experience more strokes and recover more slowly from stroke than White individuals". A study reported that "African Americans who sustained a stroke were twice as likely as White individuals to sustain a second stroke, whereas Latinos were 2.6 times as likely" (Perrin et al., 2010). It is inferred that these statistics could be due to different informal care experiences embedded within a caregiver's family structure, cultural norms, and living situation (Perrin et al., 2010). African American and Latino caregiver's socio-cultural norms within the stroke rehabilitation system have significant differences causing distinctive types of care to be given. While Latino's value a more collectivist culture, Whites are more focused on the self-reliance of an individualist culture, and African American culture is somewhere in between (Perrin et al., 2010). The way in which caregivers approach the care they are giving to these stroke patients can impact their recovery rate. For example, a person who is more immersed in a collectivist culture would center their rehabilitation around helping the well-being of a group rather than an individualist culture which focuses on independence and self-reliance (Perrin et al., 2010). Depending on the type of care, intensity of care and amount of care given, it would most likely be more beneficial to a patient to receive individual care so they are the main focus for rehabilitation and their symptoms can improve at a steady rate.

The mental health of these caregivers in these cultures really can take a toll on the patients they are providing the care to. One study concluded that "Depression in White

caregivers may elicit depression in individuals with stroke or vice versa, slowing rehabilitation" (Perrin et al., 2010). If caregivers to stroke patients are struggling with their own mental health, then it is impossible for them to give the quality care needed to their patients therefore slowing down the recovery rate for stroke patients. The same goes for the patient. If the patient is suffering from mental instability, housing insecurity, or are struggling with living conditions at home, then their ability to fully recover could be obstructed since they are not solely focused on improving their own health (Perrin et al., 2010).

The racial disparities among stroke rehabilitation resources and recovery time is prominent within most studies conducted surrounding this issue. One study compared the poststroke outcomes between blacks and whites. They found that "Three key findings emerged from the study: (1) blacks experienced higher levels of impairment at stroke onset than did whites, (2) blacks reported lower levels of functional independence at 1 year poststroke onset, and (3) blacks reported lower levels of functional independence and driving independence despite a lack of racial differences in rehabilitation utilization" (Ellis et al., 2015). The independence referred to in this study is toileting, walking, transportation, laundry, telephone usage and driving (Ellis et al., 2015). In this study, 48 percent of blacks reported experiencing difficulties in their most valued life activities compared to only 26 percent of whites (Ellis et al., 2015). It is surprising that even despite the fact that there was no evidence of racial discrimination within rehabilitation, there were still differences among the patients who received care there. This could be due to the fact that the discrimination does not lie within the rehabilitation systems, but rather within the consistent inequities found among various races in general (Ellis et al., 2015).

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The McNaughton and colleague study discuss how independence, death, dependence on others, and the patients living situation can vary according to ethnicity 6 months after a stroke has occurred. A study was conducted that evaluated the recovery functionality of stroke patients from various geological areas. It was found that "Non-Hispanic white participants were less likely to be discharged home despite their better functional status at discharge" meaning that even though the white participants were prepared to go home, they were not released until after different ethnicities (McNaughton et al., 2011). Another study conducted by Ellis and colleagues found similar research pertaining to the idea of white dominance. It was discovered that "white subjects received more minutes a day of OT and more nontherapy ancillary care regardless of severity than did black patients" causing black patients to report having less independence upon release from recovery (Ellis et al., 2015). Once again, there is a disparity among stroke patients based off of their ethnicity instead of how much care they need to make a full recovery.

Alongside ethnicity, the socioeconomic status (SES) of stroke patients can possibly influence their recovery time. It was found that within investigations of this discrepancy, "patients with lower SES do not receive the same diagnostics than patients with a higher SES" (Arrich et al., 2008). People with good economic standing tend to have sufficient funds in which they are able to pay for quality care for themselves. For example, people of a higher socioeconomic status have more access to treatment and technology such as echocardiographies, occupational therapy, physical therapy and speech language pathology (Arrich et al., 2008). Arrich and colleagues (2008) reported that people with a higher socioeconomic status were more likely to be examined by a neurologist, receive a Computerized Tomography (CT) or Magnetic Resonance Imaging (MRI). Other researcher, Kapral and colleagues, found that "patients in the lowest income quintiles were less likely than those in the highest income quintile to receive

physiotherapy (58% versus 61%, *P*<0.001), occupational therapy (36% versus 47%, *P*=0.001), and speech language therapy (21% versus 28%, *P*=0.001)" (Arrich et al., 2008). Those stroke patients who do not have enough money to afford the important rehabilitation necessary for a full recovery are most likely not going to get all the care they need and therefore have a difficult time regaining all their functioning back. Without occupational therapy to help the patient regain control of their daily activities, physical therapy to help them remobilize their muscles and speech language pathology to help them reclaim their speech, a patient's ability to recover is inhibited and therefore slowed down.

A lot of studies that have to do with socioeconomic status tend to also relate to the education level of the patient. Those of a higher socioeconomic standing are associated with higher levels of education which is said to impact one's ability to recover. It is said that "During the inpatient rehabilitation period, a higher educational level was significantly associated with better motor and functional recovery" (Putman et al., 2007). This could be due to the educated individual's ability to answer the questions on the Barthel Index (BI) and Rivermead Motor Assessment (RMA) (Putman et al., 2007). Communication among those of lower SES is said to be restricted and therefore what they are feeling cannot be expressed as easily causing them to require more rehabilitation. The results indicated that "Patients with a low educational level were less likely to improve on the BI (OR 0.53; 95% CI 0.32 to 0.87) and the RMA arm during inpatient stay (OR 0.54; 95% CI 0.31 to 0.94)" (Putman et al., 2007). This means that those who have a lower education level were less likely to improve their performance surrounding activities of daily living.

One's location of rehabilitation as well as their ethnicity impacts their stroke rehabilitation. The ethnicity and location of stroke patients in one study impacted whether they

received inpatient rehabilitation care after they suffered from a stroke or not. Blacks in an urban part of Maryland were more likely to obtain access to an inpatient rehabilitation facility (IRF) which highlights the significance of geographic location of the rehabilitation centers in proximity to the patients (Gregory et al., 2006). The study stated that "The majority of acute inpatient rehabilitation facilities in the state of Maryland are located in Baltimore. Thus, patients who reside in the urban areas are more likely to gain access. In this study, blacks are twice as likely to live in urban settings in comparison with whites, so urban-dwelling blacks would be more likely to have access to IRF" (Gregory et al., 2006). The disparity described here is focused on the residential area that the patient is found in and how that impacts where they go to receive care and eventually what rehabilitation options are available to them. The research showed that "Ten percent (1197) of all patients were discharged to IRF after acute hospitalization. Of these, 34% were black and 66% were white. Black patients were more likely to be discharged to IRF and a nursing home. Black patients were less likely to be discharged home or to rehabilitation in a SNF and nursing home" (Gregory et al., 2006). This statistic shows that more White stroke patients were discharged to inpatient rehabilitation facilities or nursing homes than Black patients who did not have as many care options available. Even though this study is from some time ago, racial disparities still exist, and this is most likely still a reoccurring issue among urban communities.

Stroke is said to have a greater effect on women than men partially due to biology or varying functional outcomes. "Age-specific stroke incidence and mortality rates are higher in men than in women, stroke affects a greater number of women because of their increased longevity and the fact that stroke event rates increase substantially in the oldest age groups. Moreover, stroke-related outcomes, including disability and quality of life (QOL), are

consistently poorer in women than in men…Women have more physical impairments and limitations in activities of daily living (ADL), as measured by the Barthel index" (Reeves et al., 2008). Rehabilitation is important for all whether they are male or female. "At least two studies have shown that women have worse prestroke disability than men. Women are also more likely to be living alone or to be in an assisted living arrangement or a nursing home before their stroke event" (Reeves et al., 2008). It is shown that women suffer strokes at an older age than men and have a history of atrial fibrillation and hypertension while men have a higher history of heart disease, alcoholism and myocardial infarction (Reeves et al., 2008). It was also found in some studies that women arrived at the hospital at a slower rate than men after suffering a stroke which could affect the care they are given and the ability for them to have a successful recovery (Reeves et al., 2008). Since females are more likely to suffer from a stroke in their lifetime, they should be given the same attention that men receive.

A patient's age at the time of their stroke can have a big impact on the type of care they receive, length of rehabilitation, and intensity of care. It is said that a patient's age is "the best direct predictor of length of stay. Functional recovery of older stroke patients is recognized as being slower. Slower gains in functional recovery could postpone the discharge date and increase length of stay" (Bagg et al., 2002). Some elderly patients are also said to have less physical endurance to participating in intense rehabilitation programs, whether it is physical movements like physiotherapy or more sensory like occupational therapy, fostering a longer stay (Bagg et al., 2002). Patients of an older age are more susceptible to strokes. It takes them longer to be able to achieve their activities of daily living they had prior to their ischemia because their bodies have more limitations due to older age.

Possible Reasons for Discrimination in Healthcare

As shown in some studies, ethnicity, socioeconomic standing, location, rehabilitation, age and gender all have an impact on recovery of stroke patients whether it is prominent or more subtle. Even though not all studies exhibit statistical significance, most of the disparities exposed in previous research still exist. Statistical significance does not matter as much when it causes so many people trouble, not only within their healthcare but also throughout their everyday experiences. Through the research presented, there are some disparities that stand out more than others. In the Ellis and colleagues 2015 study, it was proven through the use of the poststroke outcomes that 48 percent of African American stroke recoverees had difficulties with their most cherished activities of daily living, while only 26 percent of whites reported having trouble. African American stroke patients had almost double the percentage of white stroke patients. This difference should not exist since every inhabitant of the United States is said to be created equal.

Although there are some signs of ethnic disparities within healthcare, it is possible that the disparities within healthcare are part of our larger discriminatory culture. One study conducted by Perrin and colleagues 2010 study, the researchers pointed out that the differences in healthcare could be due to the caregiver's bias, personal experiences or personal hardships they are facing. So rather than discrimination in the healthcare system, there could be discrimination among the providers that are caring for their patients. Sometimes the underlying discrimination is not recognized by people causing them to forget that it is an issue and should be eliminated. Discrimination among one's socioeconomic status should also be taken into consideration when providing care. Everyone who suffers from a stroke should be given the care they need to make a full recovery without being turned away because of their social standing, economic background and/or educational level. No matter what, patients should be given equal

opportunities to receive advantageous technological care such as MRI's, CT scans, various kinds of therapy as well as access to neurologists (Arrich et al., 2008). If the goal of every person going through rehabilitation is to achieve the same activities of daily living and quality of life, then why should there be inconsistencies in how these stroke patients accomplish their goals? They should have equal opportunities to recovery programs and specialists.

With the elimination of discrimination in general, discrimination embedded within the healthcare system would diminish. If people were to recognize that a stroke patient's ethnicity, socioeconomic status, gender, age, location of residency, and rehabilitation needs are not deciding factors in how well the patient recovers, then rehabilitation would be more beneficial to all. The disparities found not only within healthcare, but also other aspects of life, influence some aspect of rehabilitation and generate inconsistencies. Whether it is noticeable or minor, these disparities do hinder one's ability to recover fully from a stroke and restrict complete care within the various facets of rehabilitation.

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