Methods to Reduce the Risk of Recurrent Stroke

Using Medications and Lifestyle Changes

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Abstract

Strokes are a leading cause of death in the United States each year. Because of this, it is of utmost importance for healthcare professionals to be up-to-date on the latest research and evidence in relation to prevention. Developing an appropriate PICO question and framework are the first steps in determining the strongest level of evidence in related to a specific topic. A small test of change was performed in order to determine the current knowledge level of staff nurses in a neuroscience unit. The information that was obtained was computed and analyzed and used to develop evidence based recommendations related to the education of these staff nurses. As healthcare providers, it is our responsibility to ensure the safety of our patients, and primary and secondary prevention is the best way of doing so.

Methods to Reduce the Risk of Recurrent Stroke

Using Lifestyle Modifications

Cerebral vascular accidents (CVAs), also known as strokes, and transient ischemic attacks (TIAs) prove to be a leading cause of hospitalization and death year after year. A 2011 study by the American Heart Association reveals that stroke is the third leading cause of death in the United States, preceded by heart disease and cancer (Goldstein et al., 2011). Stroke not only has a high incidence of death, but often leads to major functional impairments and rehabilitation. A primary stroke is a horrible misfortune, which places the patient and his or her family under several burdens; because of this it is necessary to take the needed steps to attempt to prevent a recurrent, or secondary stroke. This can be done by making lifestyle changes that have the potential of making drastic changes to the health of an individual.

The PICO question, “In adult patients who have been diagnosed with a CVA or TIA, what methods, including medication administration and lifestyle changes, can be used to decreased the risk of recurrent CVA or TIA?,” was developed to guide article searches and find the best evidence related to the subject. The specific population, or “P” of this PICO question, is those who have been diagnosed with a CVA or TIA. These individuals will make up the group for which the interventions will be implemented. “I,” or interventions, are the medications administered and different lifestyle changes that will be made. These lifestyle changes range from smoking cessation to decreasing amounts of saturated fat consumed daily. The “C” portion of the PICO question is related to comparison. A comparison between specific lifestyle modifications, and their influence on one another, guided the literature search. The final component of the PICO questions, or the “O,” stands for outcome. It is predicted that by administered the correct medication and making the appropriate lifestyle interventions that a second, or possibly third, stroke can be prevented. By developing an appropriate PICO questions, the literature search can be guided to return the information with the highest levels of evidence.

**Framework for Evidence Based Practice**

There are a number of evidence-based frameworks that would be appropriate for guiding the development and implementation of this project. After closely examining and applying multiple frameworks, the IOWA model was chosen. The IOWA model is based on five basic steps: determining a trigger, determining the relevance of the issue (develop PICO question), research the variables, implement chosen interventions, and evaluate the outcomes (Dontje, 2008). The IOWA model is very appropriate for the topic at hand because it serves as a closed loop method of finding a problem, finding the evidence, and improving the practice. Because of this, the IOWA model allows for constant revision of interventions in order to obtain the desired outcome (Dontje, 2008). For example, the trigger in this scenario is the high prevalence of strokes and the number of recurrent strokes that lead to death or debilitation. The PICO question, “In adult patients who have been diagnosed with a CVA or TIA, what methods, lifestyle changes, can be used to decreased the risk of recurrent CVA or TIA?”. Variables such as lifestyle modifications and their influence up one another are researched. Those with the highest levels of evidence and highest success rates are implemented, and finally outcomes may be evaluated. Once outcomes are evaluated, the variables or interventions may be manipulated to achieve the desired outcome.

The IOWA model is also closely related to a process that nurses have studied and relied upon for years, this being ADPIE. The ADPIE acronym that stands for assess, diagnose, plan, implement, and evaluate allows nurses to develop solutions for problems that are encountered on a daily basis. This is a simplified version of the IOWA model and is more often based on knowledge that the nurse has already developed. Both frameworks allow for nurses to continuously monitor the progress of a patient and make changes as necessary to ensure that the patient has the best outcome possible.

APDIE and the IOWA model were both applicable to this project. For instance, as assessment was made that patients are having far too many readmissions related to the reoccurrence of stroke or TIA. Diagnosis in this sense is related to lack of education that patients are receiving prior to discharge. Because of this, a plan, or small test of change, was made to determine where the nurses could use more education. Once this portion of the project was completed, it would be possible for the information obtained and analyzed to implemented on the floor and at this point could be evaluated.

**Review of Literature**

Reviewing and synthesizing literature is a method to ensure that the best evidence is being used. By doing so it is possible to determine the best approaches for the project at hand, and in turn ensure the best patient outcomes. Searches were mostly limited to the Auburn database, primarily through CINAHL, MEDLINE, EBSCO and PubMed. Phrases used to search were a bit more difficult to limit. It seemed that the more specific of a search that was attempted, the more difficult it was to find an appropriate article. The phrases that turned up the most results were, “recurrent stroke,” “prevention,” “medications,” and “lifestyle changes,” in combination with each other. Although there are numerous articles related to stroke and the reduction of a secondary risk, an attempt was made to only include articles that were peer reviewed and either systematic review, clinical practice guideline, or randomized controlled trials.

A 2011 systematic review published in the European Journal of Preventative Cardiology provides information related to the best evidence to attempt to prevent a first stroke and secondary disease processes (Lennon, Galvin, Smith, Doody, & Blake, 2013). Because the majority of research related to prevention of secondary stroke is focused on medication administration and the combination of regimens, this study is aimed at the impact of lifestyle interventions on secondary prevention of stroke or TIA. The modifiable risk factors examined in this article were blood pressure, total cholesterol, physical activity and fitness, smoking and diet. The most interesting fact related to these risk factors is that they all have an influence on one another, with smoking cessation and diet modifications being the two with the most influence. With the current changes in healthcare trending toward primary prevention, advanced practice nurses must take this into consideration. Not only do these methods of primary prevention help prevent stroke, but it also has a strong influence on other disease processes as well.

The American Heart Association developed clinical guidelines for the primary prevention of stroke in 2011 (Goldstein, et al.). This article involves a team of researchers that was developed and with the goal of determining methods of preventing stroke based upon categories such as nonmodifable risk factors, well-documented and modifiable risk factors, assessment of the risk of first stroke, and primary prevention in the emergency department (Goldstein et al., 2011). Nonmodifable risk factors that were examined include age, low birth weight, race/ethnicity, genetic factors, and sex. These risk factors are those that cannot typically be changed, but have an influence on modifiable risk factors. Well-documented and modifiable risk factors are those that we typically have more influence over. For this guideline based upon an evidence based study, hypertension, diabetes, dyslipidemia, atrial fibrillation, other cardiac disorders, oral contraception, and obesity and body fat distribution, were included. The research showed that modifiable risk factors are those which when managed and monitored can have the best chance of reducing the risk of stroke. As advanced practice nurses we have the knowledge base and capability to assist patients in making the changes necessary to improve their health. This article provides valuable information related to the different changes that the nurse practitioner may influence, particularly modifiable risk factors.

The American Heart Association also developed a Clinical Practice Guideline for stroke from the aspect of prevention of stroke in those who have previously had a CVA or TIA (Sacco et al., 2006). As healthcare providers it is important to strive to prevent any form of CVA or TIA, but it is especially important to prevent a second or third event. Of the 700,000 strokes that occur in the United States each year, approximately 200,000 of these are recurrent strokes (Sacco et al., 2006). Risk factor control is of primary concern for all patients who have previously had a stroke. These risk factors include hypertension, diabetes, cigarette smoking, lipids, alcohol consumption, obesity, and physical activity. The article also examines disease processes that may affect overall health of those who have had a stroke, but the advance practice nurse has the most influence over the risk factors mentioned above. The evidence related to the appropriate modifications of these risk factors and how it appropriately decreases the risk of a recurrent stroke is very promising. Providing adequate education and information, such as appropriate changes to exercise pattern and eating habits, is the responsibility of the healthcare provider and needs to be discussed each opportunity that is available.

In relation to education, a randomizing control trial was conducted by Kim, Lee, & Kim (2013) who studied the effects of a web-based method of providing education related to modifiable risk factors in order to reduce the risk of recurrent stroke. The study targeted individuals who had been diagnosed with a stroke within the previous twelve months. Education was provided via the Internet ensuring the participants understood stroke and on risk factors such as exercise, nutrition, smoking and drinking, blood pressure and diabetes. For those who had adequate access to the Internet, this method of education was highly received. The largest problem was related to those who did not have adequate access to the Internet, and therefore were unable to receive the education that was necessary to prevent a recurrent stroke. Another issue that was discovered is that just because the education was being provided does not mean that appropriate changes were made. This study found that even though education was provided on smoking cessation and the importance of decreasing alcohol consumption, none of the participants made those changes. With a world that is quickly becoming centered around technology, this is an option for advanced practice nurses to consider when providing patient education. Appropriate follow-up interaction must be maintained and the patient should be help accountable for making the necessary changes in order to reduce the risk of recurrent stroke.

After reviewing this combination of articles it is obvious that there are specific lifestyle modifications that evidence has shown reduces the risk of a recurrent stroke. Providing proper education related to these lifestyle modifications is the primary responsibility of the healthcare provider, or the nurse practitioner. Several of these modifications will influence one another, and hopefully have a positive influence on the overall well-being of the patient.

**Appraisal of the Evidence**

The 2013 article by Lennon that examines the impact of lifestyle interventions on secondary prevention of stroke or TIA is a systematic review that provides Level I evidence related to the population at hand. Because this information was obtained from a large sample group, it is valid and pertinent for the purposes of my research. The largest limitation in this article was related to a primary focus blood pressure reduction as a means to reduce the risk of recurrent stroke. Although the article discussed other lifestyle modifications, the majority of the information was related blood pressure. Overall the information was very valuable.

A clinical practice guideline developed by the American Heart Association that compiled evidence related to risk factors for reducing the risk of a first stroke provided Level I evidence to (Goldstein et al., 2011). The information covered a wide variety of modifiable risk factors that are closely related to the developed PICO question. The limitation related to this article is that is directed toward the prevention of a first stroke, where the PICO question is aimed at the prevention of recurrent strokes. With this being the case, the information can still be applied as a method of reducing recurrent strokes, but the statistics reported in this article were not applicable. The information reiterated that the risk factors to be modified were consistent in the majority of studies.

A second clinical guideline from the American Heart Association provided Level I evidence that is directed at prevention of stroke in individuals who have already suffered from a TIA or CVA (Sacco et al., 2006). The material in this article is much more relevant to the PICO question that has been asked. A population sample size of over 15,000 individuals who had suffered from a stroke were involved in a study where lifestyle modifications served as the interventions to reduce the risk of a second stroke. Though the outcomes were closely related to the reduction in blood pressure, this reduction was made possible by implementing the appropriate lifestyle modifications. The information provided by this article was very relevant to the PICO question that had been asked.

A fourth and final study that provided Level II evidence is a randomized controlled trial that studied the use of a web-based program to educated individuals on lifestyle modifications (Kim, J., Lee, Kim, J., 2013). The risk factors discussed in this article reinforced those that had previously been studied and that evidence had shown to have the greatest influence on reducing the risk of a recurrent stroke. The bias related to this article is that fifty percent of those involved in the study did not have continuous access to the internet, which made it difficult to accurately determine whether or not this method education was appropriate. This article did provide information relevant to the PICO question from the aspect of methods to implement and educate individuals who have previously had a stroke.

These four articles provide strong evidence related to lifestyle modifications to reduce the risk of recurrent stroke. Though there is bias and information that is not relevant to the PICO question, the vast majority of this information is pertinent. Please refer to the evidence review grid in the appendix for more information.

Recommendations

Recommendations have been derived from the information in the articles that were previously discussed and are as follows with their grade equivalent. The grades for each recommendation came from the guideline where it originated.

1. A target blood pressure should be based on each individual patient, but normal levels should be less than or equal to 120/80. (Grade: B)
2. Regular screenings, including that of blood pressure, should be evaluated on a regular basis. (Grade: A)
3. Patients who smoke should be advised to quit smoking and to avoid environmental tobacco smoke. (Grade: C)
4. The healthcare provider can aid in smoking cessation by offering different methods of tobacco replacement. (Level B)
5. Patients who have previously had a CVA or TIA should completely cease all alcohol consumption. (Grade: A)
6. Those who are able to engage in physical activity should engage in at least 30 minutes per day. (Grade: C)
7. Oral contraceptives can increase the risk of stroke or TIA in patients with additional risk factors, therefore their use is strongly cautioned. (Grade: C)
8. Weight reduction is recommended in those who are clinically overweight or obese as a method to reduce blood pressure. (Grade: B)
9. An anticoagulant or antiplatelet should be prescribed to each patient suffering from an ischemic stroke at discharge. (Grade: A)
10. A drug from the statin class should be prescribed prior to discharge for all stroke patients. (Grade: B)
11. Nurses benefit from having a standardized method of providing education to patients prior to discharge.
12. Providing a typed outline of discharge instructions to patient reduces the risk of information overload.

**Clinical Setting Assessment**

The completion of this project will be contingent on the basis of the participation of multiple individuals. The primary contact, who will be involved in obtaining data, coordinating an in-service for staff nurses, and approaching individuals to participate in the project, will be the clinical educator for the Neuroscience department at Baptist Medical Center South in Montgomery, AL, which is where the project will take place. A second contact person is the assistant manager of the unit. Together they work together to educate staff, obtain data and statistic relevant to the unit, and have recently obtained stroke certification by The Joint Commission. After discussing the proposed project and what is needed to make the project a reality, it is agreed that it is important information, especially for her staff nurses. Approximately twenty patients a month are admitted to this neuroscience department with a diagnosis of CVA or TIA. Because of these numbers, it is ever so important that the nurses are educated on best practice in order to provide adequate patient care. Currently the unit implements The Joint Commission issued Core Measures for patients who have been diagnosed with a CVA or TIA. These have been put into place to improve patient care and outcomes, and to ensure that physicians receive reimbursement.

**Implementation Plan**

Evidence from multiple clinical practice guidelines has guided the selection of these interventions and their implementation. Due to the selected intervention being a combination of medication administration and education related to lifestyle changes, the patients who meet the project criteria and have had the proposed medication changes implemented, will be selected for the project. The primary focus will be education related to lifestyle modification and if those changes occurred, but data will be gathered related to the medication aspect of the project.

As patients who fit the targeted population are determined, their charts will be audited in order to gather data related to the medications that are prescribed and the education that has been provided by staff nurses. At this point in time there is not a uniformed method of educating these patients, it is hoped that the information related to this evidence based practice project will assist in this process. These patients will be approached regarding participation in the project at this point. Information will be thoroughly explained, and it will be emphasized that participation is strictly voluntary and the data obtained will only be used for the purposes of this project. Once the patient has been discharged, the chart will undergo further auditing to determine medications prescribed at discharge and the progress the patient has made related to lifestyle changes and modifications. Once patients are discharged, they will receive a survey with five specific questions at two weeks, one month, three months, and six months after discharge. The survey that is being sent to patients is one derived from information related to the evidence that was found throughout the articles. This will be the final phase of data collection.

Because a relationship has been established with Baptist Medical Center South and the Neuroscience department, potential barriers are most closely related to the lack of patient participation and not to the ability to obtain initial data. Permission will be obtained from patients and guide this project. It does not appear that there will be any financial or personnel barriers that will appear.

**Evaluation Plan**

The project is proposed to take six months to complete in order to obtain and process all information. Due to the time constraints related to this course, the data will be compiled over a three month period. After the initial surveys are returned and data can be compiled, it is predicted that in patients who are compliant with drug therapies and lifestyle modifications will not have a recurrent stroke.

The particular tool used to follow-up with patients is very basic, to where it will be easily understood by participants. By using only yes or no questions, the time requirements are kept to a minimum. The following five questions will be presented to each participant each time a survey is given:

1. Have you had a second (or recurrent) stroke or TIA (mini-stroke) since your discharge date? (If so, please include date)
2. What medications do you take related to your stroke or TIA?
3. When is the last time you had an appointment with your PCP?
4. Have you made any changes in your lifestyle, such as eating or exercise habits?
5. If applicable, have you stopped smoking?

As each survey is returned, the information will be compiled from answers of each question, but also related to age, sex, and the medication or education related to lifestyle changes that were given. As time progresses, the information can then be compared, and a final grid with all data that has been obtained can be designed to determine whether or not the conclusion of the project is closely related to the predicted outcomes, or the overall reduction in the number of recurrent strokes.

**Small Test of Change**

The small test of change took place in a neuroscience unit, among nurses who had various years of experience. This test of change was intended to determine a baseline education level of the nurses who participated, provide education directly related to the population of patient for which they care, and provide a post test to determine whether the educational intervention was significant. Because of the way the small test of change was presented, there were no financial burdens presented to any members.

Nurses were approached regarding participation in this test of change. Each nurses was explained the process, purpose and requirements needed to participate, and at that point were allowed to choose whether or not he or she would like to continue with participation. The primary outcomes that were being measured were related to the overall effectiveness of nurse education and how it could potentially influence patient care. The data was also reflective of the different age, gender, and experience levels of each nurse.

Each nurse who chose to participate was given a test prior to and after a teaching intervention was completed. The intervention presented to the nurses consisted of a short in-service related to specific points that literature recommends to decrease the risk of recurrent strokes in patients. Two separate groups of nurses were provided with the pre-test, intervention, and post-test. The first group was comprised of eight nurses, while the second was comprised of six. The pre-test and post-test, Appendix B, were both comprised of the same ten questions, giving the nurses an opportunity to answer differently from the previous questionnaire. Once the pre-test and post-tests were anonymously completed, they were collected and data was complied and computed in SPSS.

The actual in-service was completed in one day. Because of the busy schedule of nurses, an attempt was made to not take any more time than necessary to completed the pre-test, in-service, and post test. Data compilation was a bit more tedious process. This took place over a matter of one week. It was sorted based upon groups, entered into Microsoft Excel, and exported to SPSS for data to be analyzed.

Outcomes related to the small test of change were comprised after the completion of the project and data analysis. Group one, or the group of eight nurses, had a median years of experience of five, while the second group of six nurses, had a median years of experience of four. The median age comparison was 29.5 years to 27.0 years from group one to two, respectively. The results related to the standard deviation of the answers from these nurses was as to be expected. In group one the standard deviation was 1.885 in the total of answers, as compared to a standard deviation of only 0.816 in group two. Group one, which was comprised of pre-test scores, had a median score of 9.000, where as group two had a median score of 9.50. There is a significance of 0.023 that was calculated from the independent t-test, which shows that the intervention is significant. The following graph shows a comparison of the pre-test scores to the post-test scores.

Figure 1. *Pre-test group scores comparison to post-test group scores.* These scores were calculated on a ten point testing scale.

**Application to Overall Project**

The information that was obtained throughout the small test of change has the potential to have great implications on the education that patients receive prior to discharge. It was found that the nurses do not have a standardized method of providing education, therefore it is unknown whether or not patients receive complete discharge instructions. After the completion of the small test of change it was easier to see where the nurses differed in information that they had previously been providing to patients. At this point, the unit assistant manager and clinical nurse education will prepare a template, or outline, of information that the nurses can use to ensure that patients are properly educated prior to discharge. The template is not intended to be the only information that the patients receive, but it can be changed and manipulated based on specific patients diagnosis, medication and comorbidities. Nurses will have the ability to not only adjust the information, but actually give patient a copy of the discharge instructions as reference after discharge. In turn, it is hoped that by providing thorough education, the risk of a recurrent stroke or TIA can be decreased. Once the patients were properly educated, it would be possible to continue with the main idea of the project. Patients would then be followed and fill out the questionnaires that were previously discussed in order to determine the effectiveness of the education.

**Conclusion**

As strokes continue to be a leading cause of death in the United States, healthcare professionals must continue to promote prevention. Though the initial stroke often occurs before risk factors are identified, modifying risk factors that led to the primary stroke can often prevent a recurrent stroke. By developing a PICO question and choosing a research framework to guide searches, it is possible to determine the best evidence in relation to reducing the risk of a recurrent stroke. This evidence guides our clinical practice as advance practice nurses, therefore it is necessary to develop recommendations based upon the strongest evidence available. The future of healthcare will greatly rely on prevention, this being so, it is more important than ever to ensure that patients receive proper education and information related to diagnosis, in this case stroke of TIA. Advance practice nurses are responsible for providing much of this education. Knowing how patients react to and use the information that they are provided with gives insight into what can be done to reduce the risks of reoccurrence and readmission.

References

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Appendix A

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| **Evidence Grid:** | | | | |
| **Article citation in APA format**  **(10 points)**  **Level of evidence** | **Purpose of study/research questions**  **(15 points)** | **Research elements:**  **- Design**  **- Sampling method**  **- sample size**  **- Brief description of interventions (if any)**  **- Outcomes measured**  **(30 points)** | **Major findings relevant to project**  **(20 points)** | **Critique of validity, bias and significance for your project**  **(25 points)** |
| Lennon, O., Galvin, R., Smith, K., Doody, C., & Blake, C. (2013). Lifestyle interventions for secondary disease prevention in stroke and transient ischaemic attack: a systematic review. *European Journal Of Preventive Cardiology*.  LOE: Level I | The purpose of this study is to examine the impact of lifestyle interventions on secondary prevention in stroke or TIA. | **- Design:** Systematic Review  **- Sampling method:** RCT examined the effectiveness of interventions that included education and promotion of lifestyle changes. A systematic literature review was performed.  **- Sample Size:** 2478  **- Interventions:** Lifestyle changes that are intended to decrease patient blood pressure and in turn reduce the risk of stroke.  **- Outcomes:** Though there were favorable results related to blood pressure, there was insufficient high quality research to support lifestyle changes as interventions post-stroke to decrease the chances of mortality. | Lifestyle modifications were noted to have a positive effect on the blood pressure on the patients involved in the study. This reinforces the point that I am attempting to make in my research. Also, the fact that cholesterol levels were studied are also a strong indicator for the patients decreased risk of stroke. | Strengths:  The study had a very large sample size, which can be representative of a very large group of individuals, such as the population of stroke victims. The study also includes various methods of blood pressure reduction.  Weaknesses:  The article focused on blood pressure reduction as the primary method of stroke reduction, although lifestyle interventions are what directed the reduction in blood pressure. It would have been must more helpful for my research if the study addressed lifestyle changes in a different manner. |
| Considine, J., & McGillivray, B. (2010). An evidence-based practice approach to improving nursing care of acute stroke in an Australian emergency department. *Journal Of Clinical Nursing, 19*(1-2), 138-144. doi:10.1111/j.1365-2702.2009.02970.x  LOE: Level II | The purpose of this study was to improve the emergency nursing care of acute stroke by enhancing the use of evidence regarding prevention of early complications. | **- Design:** Clinical Practice Guideline  **- Sampling method:** The sampling method was related to the patients who were relevant to the changes implemented by the guideline. These patients were those with a discharge diagnosis of stroke.  **- Sample size:** Pretest data included 64 participants. Once the guideline was implemented an additional 41 participants were included.  **- Brief description of interventions (if any):** The clinical guideline served as the single intervention.  **- Outcomes measured:** the following outcomes were measured before and after the implementation: triage category, waiting time, ED length of stay, time to specialist assessment, assessment and monitoring of vital signs, temperature and blood glucose and VTE and pressure injury risk assessment and intervention. | The guideline proved to improve emergency nursing care of acute stroke and optimized patient outcomes. | Strengths:  The study reinforces the beliefs in the increased number of physiological assessments. This made nurses more likely to “catch” acute changes. Temperature monitoring was also a focus of this guideline. The evidence shows that decreasing the risk of early hyperthermia decreases the risk of a poor outcome.  Weaknesses:  One of the major weaknesses of this article is that it only includes a total of 105 individuals. The data collected was also reliant on the documentation of nurses, where it is well known that care may be delivered, but not documented. There changing of the staff (though it was not major), also is a weakness of the study. It would have been better if there had a been a continuum of those providing care. |
| Goldstein, L., Bushnell, C., Adams, R., Appel, L., Braun, L., Chaturvedi, S., & ... Pearson, T. (2011). Guidelines for the primary prevention of stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke (00392499), 42*(2), 517-584. doi:10.1161/STR.0b013e3181fcb238  LOE: Level I | This guideline provides an overview of the evidence on established and emerging risk factors for stroke to provide evidence-based recommendations for the reduction of risk of a first stroke. | **-Design:** Clinical Practice Guideline  **- Sampling method:** Group members who were approved by the AHA based upon previous experience with the subject at hand. The group members then used systematic literature published guidelines, personal files, and expert opinions to summarize existing evidence.  **- Sample Size:** No sample size. Information is based off previous research and the clinical knowledge of those involved in the research.  **- Interventions:** Patients were assessed to determine their overall stroke risk. Once this was determined, the patients were evaluated for modifiable risk factors, such as HTN, exposure to cigarette smoke, DM, A Fib, and other cardiac conditions, poor diet, activity, obesity and body fat.  **- Outcomes:** Evidence shows that specific factors do in fact increase the risk of a first stroke and strategies such as addressing these risk factors may reduce this risk. | The article covered modifiable risk factors from diet, hypertension, tobacco and alcohol use, but it also included information related to hypercoagulability and even the use of oral contraceptives and their effects on stroke prevention. This is information that is not always studied and provided.  Also, the article related the recommendations that were made to a level of evidence review grid. This was very helpful in determining which recommendations were the most important to reducing the risk of stroke for each patient. | Strengths:  This article includes information input from several individuals who are highly experienced in this subject matter. Discussion is based upon both modifiable and nonmodifable risk factors. After reviewing each modifiable risk factor, the article provides specific recommendations related to improvement of these risk factors.  Weaknesses:  The article provides an extreme amount of information. There is information that is not at all relevant to my topic and made the article a bit more difficult to sort through and extract the relevant information. |
| Sacco, R., Adams, R., Albers, G., Alberts, M., Benavente, O., Furie, K., & … Tomsick, T. (2006) Primary prevention of ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council: cosponsored by the Atherosclerotic Peripheral Vascular Disease Interdisciplinary Working Group; Cardiovascular Nursing Council; Clinical Cardiology Council; Nutrition, Physical Activity, and Metabolism Council; and the Quality of Care and Outcomes Research Interdisciplinary Working Group: the American Academy of Neurology affirms the value of this guideline. *Stroke 37*(6):1583-1633.  LOE: Level I | The aim of this new statement is to provide comprehensive and timely evidence-based recommendations on the prevention of ischemic stroke among survivors of ischemic stroke or transient ischemic attack. | **- Design:** Clinical Practice Guideline  **- Sampling method:** A systematic review based upon patients with ischemic stroke, TIA and ICH randomized from 3 weeks to 14 months after the initial attack and followed up for 2 to 5 years.  **- Sample Size:** 15,527  **- Interventions:** Interventions included systolic BP reduction related to weight loss, the consumption of a diet rich fruits, vegetables, and low-fat dairy products; regular physical activity and limited alcohol consumption.  **- Outcomes:**  The degree of risk reduction was directly related to the amount of decrease in patient blood pressure. | The medications that were used to attempt to reduce the blood pressure of the individuals that had been previously studied did not seem to cause an effect as great as the use of modifiable risk factors to reduce the risk of stroke. Antihypertensive treatment is recommended for these patients and even the addition of a diuretic as a method to reduce blood pressure. | Strengths:  The article provides extensive information related to hypertension and its overall effects on stroke risk reduction. This article provides strong evidence on recommendations related to reducing these risks and making changes to modifiable risk factors.  Weaknesses:  Again, like the other articles from the American Heart Association that I have reviewed, the information is extensive in nature and much of it is not relevant to what I am attempting to research. |
| Kim, J., Lee, S., & Kim, J. (2013). Effects of a web-based stroke education program on recurrence prevention behaviors among stroke patients: a pilot study*. Health Education Research, 28*(3), 488-501. doi:10.1093/her/cyt044  LOE: Level II | The aims of this study were to assess the effects of such interventions among stroke patients and their primary caregivers and to evaluate the feasibility of a web-based stroke education pro- gram. | **- Design:** RCT  **- Sampling method:** Patients who had a clinical diagnosis of ischemic stroke within 12 months post-stroke and their primary caregivers. The participants were randomly assigned to either an experimental or control group.  **- Sample Size:** 36  **- Interventions:** Web- based program for education on methods to reduce the risk of recurrent stroke. The interventions were tested by performing initial blood tests, and comparing them to chemistry throughout the study.  **- Outcomes:**  50% of participants reported positive changes in exercise, shifting from irregular to regular. No statistical data was found related to smoking or alcohol usage. | The use of the internet as a method of education is a feasible way of doing so. Though there were mentioned challenges, these are ones that can be overcome. A program such as this has the potential to increase patient quality of life. | Strengths:  The study and article provides a look at information that I have not seen in much previous research. This being so, it opens up the possibilities of using technology in order to provide direct information to patients so that they may decrease the risk of recurrent stroke.  Weaknesses:  The study included a very small sample size; therefore the findings may not accurately depict a larger group of those who are effected by strokes. |
| Toledano-Zarhi, A., Tanne, D., Carmeli, E., & Katz-Leurer, M. (2011). Feasibility, safety and efficacy of an early aerobic rehabilitation program for patients after minor ischemic stroke: A pilot randomized controlled trial. *Neurorehabilitation, 28*(2), 85-90. doi:10.3233/NRE-2011-0636  LOE: Level II | The purpose of this study is to examine the feasibility, safety and effectiveness of an early rehabilitation program from patients after a minor ischemic stroke. | **- Design:** RCT  **- Sampling method:** 28 patients, 1-3 weeks post minor ischemic stroke, were randomly assigned to intervention or control groups. Measures were taken at weeks 1 and 6.  **- Sample size:** 28  **- Brief description of interventions (if any):** The intervention group participants performed a supervised exercise training program twice a week for 6 weeks.  **- Outcomes measured:** Exercise capacity was measured by the 6-minute walk distance test, and the modified Bruce treadmill test. | An early supervised aerobic training after minor ischemic stroke is feasible and well tolerated and, in a per-protocol analysis, was associated with walking endurance. | Strengths:  The study used well known and often used tests in order to determine if exercise capacity was increased. This study is important because post ischemic stroke, we encourage increased levels of exercise, but it is often difficult to determine how much is too much exercise.  Weaknesses:  The sample size proves to be far too small. Also, if the study was conducted over a longer period of time, such as 6 months to a year, it would be helpful to have this information. |
| Feng, W., Hendry, R., & Adams, R. (2010). Risk of recurrent stroke, myocardial infarction, or death in hospitalized stroke patients. *Neurology, 74*(7), 588-593. doi:10.1212/WNL.0b013e3181cff776  LOE: Level VI | This study examines the risk of recurrent stroke, myocardial infarction (MI), vascular death, or all-cause death after hospitalized stroke in South Carolina. | **Design:** Observational, descriptive study  - **Sample method:** A database of all South Carolina hospitalscontaining stroke hospitalizations from 2002 and any hospitalizations incurred by those patients after their index was provided by the Office of Research and Statistics  - **Sample size:** 10,399  - **Description of interventions**: No interventions were part of this study. The study was aimed at determining likelihood of death and the cause of death in specific time frames post stroke.  - **Outcomes measured:** The outcomes showed the risk of recurrent stroke, MI, vascular death or all cause death. These results were shown in intervals of 1 month, 6 months, 1 year, 2 years, 3 years and 4 years. | In this population, the likelihood of death post stroke increases with each interval of time. For example, 1-month post stroke, the study showed that 14.6% risk of death, but at 4 years the risk increased to 41.3%. Also, the risk of recurrent stroke or death increases at a more rapid rate for Caucasians that for African Americans. | Strengths: Because the Office of Research and Statistics provided the list of participants for this study, the basis for information is very reliable.  Weaknesses: Bias for this study is related to the fact that it only involved participants from South Carolina.  The study provided strong evidence of increased risk for recurrent stroke and all cause death post initial stroke, but did not discuss any interventions made after the initial stroke. |
| Lawrence, M., Fraser, H., Woods, C., & McCall, J. (2011). Secondary prevention of stroke and transient ischemic attack. *Nursing Standard, 26*(9), 41-46  LOE: Level V | The purpose is to provide a review summary for application to practice to determine if certain behavioral changes can assist in prevention of stroke or TIA. | **- Design:** Integrative review  **- Sampling method:** This article reviews evidence related to lifestyle changes and their influence on reducing secondary stroke. There was not a sample group for this article.  **- Sample size:** This article reviews evidence related to lifestyle changes and their influence on reducing secondary stroke. There was not a sample group for this article.  **- Brief description of interventions (if any):** The article reviewed lifestyle changes including diet, obesity, alcohol usage, physical activity, stress and smoking.  **- Outcomes measured:** There is an agreeance that the above lifestyle changes negatively affect overall health, but the degree for which it effects health is not known. | Review of relevant findings are related to each specific lifestyle change.  - Tobacco use: Smoking doubles the risk of ischemic stroke. The risk of stroke is related proportionally to the number of cigarettes the individual smokes daily. Five years after smoking cessation, the risk of stroke returns to that of a nonsmoker.  - Diet: The overall risk of stroke is closely related to the amount of fat a person consumes. Reducing salt intake can also decrease the risk of a stroke.  - Obesity: Although there are no specific research studies to show that obesity is a risk factor for stroke, obesity is a risk factor for hypertension, diabetes and dyslipidemia, which are risk factors for stroke.  - Alcohol: Evidence supports the fact that excessive alcohol intake is a risk factor for stroke.  - Physical activity: Adequate levels of physical activity have a positive influence on blood pressure and weight, causing an overall decreased risk of stroke.  - Stress: This is an area that has not been highly researched. The majority of individuals who had a stroke reported feeling stressed in the weeks prior to stroke. | Strengths:  The information for this article was gathered by individuals who were highly educated in research and strokes. There did not appear to be any bias in the article. There are several different lifestyle changes and modifications that when made can decrease the risk of a second stroke. The article provides specific information related to each lifestyle changes and how it influences stroke risk.  Weaknesses:  The fact that this article was an integrated review was a weakness in relation to my needs. Though it compiled very important information, it would have been much more relevant if it included information directly from the studies at hand. |

Appendix B

**Reducing the Risk of Recurrent Stroke**

**Small Test of Change**

**Pre Test**

How many years have you been a nurse? If less than 1 year, please include months: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What modifiable risk factors are related to reducing the risk of a recurrent stroke?
   1. Cigarette smoking
   2. Family history of stroke
   3. Atrial fibrillation
2. What disease process are related to stroke?
   1. Atrial fibrillation
   2. Hypertension
   3. Diabetes
   4. All of the above
3. Patients should receive with of the following medications at or by discharge?
   1. Antithromolytic
   2. Anticoagulant for Aflutter
   3. Statin drug
   4. All of the above
4. What is the most common “fall-out” related to BMCS Stroke Core Measures?
   1. Antithromolytic prescribed at discharge
   2. Documentation of use of SCDs only at DVT prophylaxis in patients with hemorrhagic stroke
   3. Lack of teaching documentation at discharge
   4. No MD signature on core measure
5. What resources does BMCS offer for post-discharge rehabilitation?
   1. Health South rehabilitation
   2. Nursing home care
   3. Home health care
   4. All of the above
6. Before a patient with residual effects from a stroke is discharged, he or she should be evaluated by:
   1. Wound and Ostomy care
   2. PT/OT
   3. Case manager
   4. Both B & C
7. If okay by the physician, physical activity should be:
   1. 10 minutes per day 5 days a week
   2. 30 minutes a day for 4 days a week
   3. 2 hours per day 1 day a week
8. To ensure that a proper diet is prescribed at discharge, the nurse is responsible for:
   1. Reviewing speech therapy notes
   2. Asking the patient what he or she prefers
   3. Considering the patients comorbidities
   4. A & C
9. Reasons that the patient should return to the hospital immediately include:
   1. Sudden numbness/weakness in hand, arm or leg
   2. Can not feel one side of the face or body
   3. Cannot understand what someone is saying
   4. Suddenly cannot see out of one eye
   5. All of the above
10. At discharge patients should be taught that their target blood pressure should be:
    1. <110/60
    2. <140/90
    3. <130/80 in those with DM and HTN
    4. Both B & C

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