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Improving the Identification of Women at Increased Risk for Stroke in an Urban Medical Center

1. Overall Aim & Objective:

The main aim of our intervention is to heighten the awareness of stroke risk in women among primary care providers in an urban medical center. Along with education on which women are at increased risk for stroke, we will provide guideline recommended methods to reduce the number of strokes in women at increased risk. Specific objectives include the following:

1. To educate primary care providers on which women are at increased risk for stroke. This effort will focus on analyzing the presence of risk factors such as hypertension and atrial fibrillation (AF) as well as targeting inadequately treated risk factors.

2. To demonstrate improvement in risk factor control from baseline to project completion. Included in this assessment will be percentage of women with adequately controlled blood pressure, percentage of women with Atrial Fibrillation (AF) who are treated with anticoagulants, and percentage of women who engage in regular exercise.

3. To conduct monthly stroke screenings at urban community venues such as medical clinics, health fairs and beauty salons. Included in these screenings will be blood pressure measurements, checking for an irregular pulse suggestive of AF, and distribution of educational materials on stroke risk factors and warning signs.

As described below, we intend to target multiple clinical practice sites under the umbrella of the Wayne State University Physician Group (WSUPG). Targeting multiple sites will have a major impact on the awareness of assessment of stroke risk in women, especially African American women. We believe that the second objective specified above, which aims to demonstrate improvement in risk factor control over an 18 month time frame, will have demonstrable benefits for the patients served by our primary care providers.

2. Current Assessment of Need in Target Area

The Detroit Medical Center, WSUPG and affiliated outpatient clinics serve a greater Detroit population of ~4.3 million residents. Over half (62.4%) of the 910,920 Detroit residents have incomes at or below 25,000 per year. Overall, 81.4% of the Detroit population is African-American (non-Hispanic Black) compared with 8.4% nationally. While most residents are English speaking, an estimated 5% of the Detroit area population is Spanish speaking. In Detroit,

it is estimated that 69.6% of residents have completed high school compared with the national average of 58.6%. By age group, an estimated 20.7% of the Detroit population is 65 years or older (n = ~188,560 residents).

As mentioned in the RFM, women have a higher lifetime risk of stroke and have a higher number of annual stroke deaths than men(1). African American women, in particular, experience a high rate of stroke and one that is not declining as much as other groups(2). Our previous work, along with studies from other groups, has shown a lack of knowledge of stroke risk factors and warning signs in urban patients(3-5). In addition, national studies have demonstrated that many stroke risk factors are not adequately treated. Even with the availability of new oral anticoagulants, for example, only about 40% of AF patients are treated with anticoagulants(6).

Over 80% of the patients in our clinics are African American, 60% are women and 80% are dual eligible (receiving Medicare and Medicaid coverage). There are two audiences for our proposed program. The first target for our intervention is primary care providers (PCPs) within our University Physician Group. The second audience is urban women greater than age 40 years.

Based on previous studies at our institution, using a similar patient population, we expect the following demographics and medical profile:

Condition	Frequency
Hypertension	80%
Diabetes mellitus	40%
Hyperlipidemia	70%
Current or past smoking	40%
Obesity	60%
Atrial fibrillation	7%

Further, we expect that 80-85% of the patients will be African American, with African Americans having a two fold increase in stroke risk compared to Whites.

We shall provide information to primary practitioners on quality measures for stroke prevention and also demonstrate improvements in risk factor control during the study period. For the following quality measures, based on previous studies at our institution, the initial starting point is as follows:

Condition	% of patients achieving target level
Systolic hypertension	30%
Hyperlipidemia	40%
Atrial fibrillation receiving anticoagulants	40%
Regular physical activity (per AHA targets)	20%

We believe that the patient volumes at the four practice sites described below are one of the strengths of our proposal. For example, at the General Medicine Ambulatory Site (GMAP), there were 199 patients with atrial fibrillation seen in the last 24 months.

The figures above demonstrate that a considerable gap exists in achieving optimal stroke prevention practices. By including multiple practice sites and different specialties that are involved with clinical care of women over age 40 years, we will be able to analyze whether certain specialties achieve adherence to quality metrics at a higher rate. Due to the gap that currently exists in adherence to the quality metrics, we believe that this project will be very beneficial to the patients that we serve.

3. Technical approach, Interventional Design and Methods

For the Primary Care Provider (PCP) portion of the intervention, we will include Internal Medicine specialists, Family Medicine (FM), Medicine-Pediatrics specialists ("Med-Peds"), and Geriatrics specialists. The practice sites for Internal Medicine, Med-Peds, and Geriatrics are all located in Detroit, with the patient population being about 90% African American. The FM practice sites are located in two suburbs of Detroit (Southfield, MI and Rochester Hills, MI) and include >50% African American patients. The Wayne State University Department of Medicine's General Medicine Ambulatory Practice (GMAP) trains 88 internal medicine residents, and 12 medical students in ambulatory medicine each year. One of our training sites is a designated Patient Centered Medical Home (PCMH). The patient population of women age ≥ 40 years at the various sites is as follows:

GMAP	Med-Peds	Geriatrics	Family Practice Southfield	Family Practice Rochester Hills
1318	778	1738	824	646

The practitioners at these locations will undergo a baseline assessment of their knowledge of stroke risk factors and treatment in women. In addition each practitioner registering for Performance Improvement CME (PICME) will undergo an evaluation of the percent of their female patients over 40 years old receiving appropriate screening (and prophylaxis if indicated) for stroke risk factors. This will fulfill the requirements for Stage A of PICME.

After the baseline assessment, they will have monthly educational presentations on different facets of primary and secondary stroke prevention. Presentation topics over the 18 month intervention period will include:

1. Current guidelines for hypertension evaluation and treatment
2. Causes of secondary hypertension
3. Treatment of resistant hypertension and hypertension in the elderly
4. Current guidelines for hyperlipidemia evaluation and treatment
5. Current guidelines for diabetes screening and treatment
6. Lifestyle factor control and impact on diabetes

7. The importance of atrial fibrillation (AF) as a cause of stroke in middle-aged and older women
8. Warfarin and novel anticoagulants for stroke prevention in patients with AF
9. Stroke risk stratification tools that can be used in primary care settings (such as the CHADS-VASC tool for AF)
10. Heart failure and subsequent risk for stroke
11. Asymptomatic carotid stenosis as a risk factor for stroke
12. Obesity and physical inactivity as risk factors for vascular disease
13. Dietary approaches to improving vascular health
14. Postmenopausal hormones and relationship to vascular disease
15. Oral contraceptives and risk factors for stroke
16. Stroke as a cause of vascular cognitive impairment
17. Antiplatelet agents for primary prevention of stroke in women
18. When prevention fails: Acute stroke therapy options

The primary care audiences that we will target utilize an electronic medical record (EMR). Along with the health information technology staff from our University Physician Group, we will set up "electronic alerts" for certain conditions such as inadequately controlled systolic blood pressure or presence of AF. We aim to demonstrate that these electronic alerts will improve the responsiveness of practitioners to inadequately controlled risk factors.

The PCP portion of our intervention will occur for an 18 month period. After nine and 18 months, the PCPs will retake the stroke assessment test to determine whether their knowledge and willingness to treat stroke risk factors has changed.

We shall also assess the percentage of women who meet certain quality metrics at baseline and study completion. These will include the following (partial listing):

Condition	**Quality metric to be assessed**
Systolic blood pressure (nondiabetics)	< 140 mm Hg
Systolic blood pressure (diabetics and chronic renal failure)	< 130 mm Hg
Hyperlipidemia	LDL < 100 mg/dl
Hyperlipidemia (high risk patient per AHA criteria)	LDL < 70 mg/dl
Hyperlipidemia	HDL > 50 mg/dl
Atrial fibrillation (CHADS score ≥1 or CHADS-VASC >2)	Receiving anticoagulant
Atrial fibrillation	Documented risk stratification measure in chart (such as CHADS or CHADS-VASC score)
Diabetes mellitus	Hemoglobin A1C < 7
Exercise	Five days per week or > 150 minutes per week

Postmenopausal estrogen	Avoidance of postmenopausal hormone therapy
Oral contraceptives	Avoidance of oral contraceptives in women > 40 years with hypertension

These measures were selected since they are "well established" risk factors for stroke, according to the American Stroke Association primary prevention guidelines(7).

The monthly presentations and EMR alerts will constitute Stage B of PICME and the final assessment and reflection will fulfill the requirements for Stage C of PICME for a total of 20 credits of CME.

In addition to the PCP portion of our intervention, we will also recruit "patient navigators" who will assist with education of middle-aged and older women in our community. The patient navigators will represent a variety of health care professionals trained in the program goals and objectives. These include residents from the various training programs (Internal Medicine, FM, Med-Peds), pharmacists, and clinic nurses or nurse practitioners. They will interact with patients seen by PCPs and provide education on measures to improve vascular health (e.g., restricting excessive salt and fast food, regular exercise) and reminders on subjects such as the importance of compliance with prescribed medications. There are approximately 88 Internal Medicine residents, 39 Med-Peds residents, and 18 FM residents. These training programs include community service as a required element (e.g., 12 hours per year for Internal Medicine residents). Providing educational presentations on vascular disease prevention to patients from the clinic will help the residents achieve a portion of their community service requirement. Participating in quality improvement projects is also strongly encouraged by the Accreditation Council for Graduate Medical Education and the new Next Accreditation System.

A target group of 50 women from each practice site will undergo a brief assessment of their knowledge of stroke risk factors and warning signs at baseline and then at project completion (18 months later). Women age 40 years and above with at least one major stroke risk factor (hypertension, diabetes, AF, smoking) will be approached by clinic staff at each of the practice sites until a group of 50 is reached at each site.

4. Evaluation Design

Whether the proposed interventions affected the practice gap will be addressed as follows: The main outcomes of interest will be improvement in PCP and patient knowledge and demonstration of improved stroke risk factor treatment. The PCP and patient knowledge will be compared at baseline vs. project completion via the administered assessment tools.

Data sources and collection

We shall utilize the electronic medical record system of the WSUPG. Data will be collected using a data mining tool. The data mining tool and data extraction process are as follows:

The data-mining tool used to build the patient database and understand physician behavior is called Healthcaresmartgrid™, a patent pending product manufactured by Process Proxy Corporation (PPC). Healthcaresmartgrid™ is a data mining and process improvement technique, which uses structured and unstructured data mining and modeling methods, using a patented machine learning process called Process Arbitrage. HealthcaresmartgridTM will use analytical algorithms and fuzzy neural network variant, a proprietary tool provided by Process Proxy Corporation (PPC), to mine electronic medical records data to identify the study variables. The process enters the distinct variables into Excel files and creates a database. In this project, an existing secure portal between the NextGen Electronic Health Record (EHR) will transmit data in any format including HL7 (health language 7) to a secure HIPAA compliant server of PPC. Consultations, progress notes, radiology dictations, ICD and CPT coding data, lab results information, pharmacy orders and computerized physician order entry of enrolled patients will be stored in secure databases. The key personnel in this project have used this technology successfully for clinical applications.

Data analysts will compile the de-identified data of the study at monthly intervals and analyze the use of evidence based medicine in the care of the study and control patients.

Variables collected will include:

- Demographics
- Age
- Gender - Women
- Race/Ethnicity
- Insurance status
- Chronic co-morbid conditions which serve as risk factors for stroke:
- Hypertension,
- Hyperlipidemia,
- Diabetes mellitus,
- Substance abuse
- Congestive heart failure.
- Primary Prevention metrics
- Indications and contraindications of the medications,
- Medicine reconciliation,
- Use of antithrombotic
- Atrial fibrillation
- Counseling regarding exercise
- Smoking
- Stroke education
- Lipid values
- Hypercoagulable workup for oral contraceptive users

Deviation from guidelines in the intervention group will be reported to the investigator team. The investigators will match these to the recommendations in the most recent guidelines published by the American Heart Association and the American Stroke Association and the contents of the educational materials created by this group. The Healthcaresmartgrid™ will create 120 character messages as suggested by the investigative team and send short messages to the smart phones and pagers of all the participating physicians during the study period. Webcasts and live interactive sessions will also be done as part of continuing medical education.

Differences in the practices of the care providers in the intervention and the control groups over the course of the study period will be analyzed and statistical analysis done.

Quality Metrics

For stroke risk factors, we aim to demonstrate the following improvements:

Condition	Baseline adherence to quality metric	Project completion
Systolic blood pressure	30%	60%
LDL	40%	80%
Atrial fibrillation	40%	70%
Physical activity	20%	40%

With the inclusion of four practice sites, we will designate the Med-Peds outpatient clinic as the control group. Practitioners from Internal Medicine, FM, and Geriatrics will receive monthly education presentations but the Med-Peds attending staff and residents will not receive the educational sessions. Although we cannot control for other avenues of continuing medical education that the Med-Peds personnel may pursue during the study period, it is very unlikely that they will receive a curriculum comparable to that being offered to the intervention group (18 hours of education focusing on stroke, especially stroke in women).

We shall analyze the adherence to quality metrics in the three intervention sites (Geriatrics, Internal Medicine, and FM) compared to the control group (Med-Peds). This comparative analysis will be done at baseline and then post-intervention. We shall also analyze the proportion of practitioners with improvement on two more quality metrics at each of the sites. Finally, for specific quality measures, such as use of anticoagulants for AF, we shall compare the performance across the four sites.

Engagement of the target population will be reflected in the drop out rate, which we aim to keep < 10%. The interventions in this project could be replicated at other centers since the assessment tools and educational programs are widely applicable.

5. Detailed Work Plan and Deliverables

The broad timeline for the project is as follows:

- January 2013-March 2013: Obtain IRB approval, study initiation
- April 2013-September 2014: Study enrollment and completion
- October 2014-December 2014: Final data analysis, manuscript preparation

In the initial few months, the study personnel will have monthly meetings. Main study tasks will be identified including obtaining IRB approval, finalizing the speakers for the educational curriculum, finalizing data collection instruments and plans, and identifying primary care practitioners with an interest in study participation. The main study procedure will be carried out over 18 months. This will include the stroke education curriculum for practitioners, assessment of stroke risk factor quality metrics, and patient education. The final three months of the project will focus on data analysis, abstract preparation for a scientific meeting, and manuscript preparation.

The table below documents specific steps:

Time frame	Project task	Responsible personnel
Jan-March 2013	Submit for IRB approval	
Jan-March 2013	Plan for PICME initiation	
Jan-March 2013	Identify practitioners willing to participate in project at each practice site	
Jan-March 2013	Monthly planning meetings	
Jan-March 2013	Finalize speakers for the 18 month stroke education curriculum	
Jan-March 2013	Finalize data extraction tools and process for electronic alerts	
April 2013-September 2014	Implement stroke education curriculum	
April-May 2013	Primary care quality metric assessment (baseline)	
April 2013-September 2014	Patient education sessions	
April-May 2013	PCP knowledge assessment (baseline)	
August-September 2014	Primary care quality metric assessment (post-intervention)	

August-September 2014	PCP knowledge assessment (post-intervention)	
October 2014-December 2014	Data analysis	
October 2014-December 2014	Abstract and manuscript preparation	

The Performance Improvement CME will be divided into three stages.

- Stage A is learning from current practice performance assessment and five CME credits will be awarded for completion of the initial cognitive assessment and tracking compliance with stroke prevention guidelines in their patients from March through June of 2013.
- Stage B is the educational intervention and will involve attending the monthly didactic sessions, completion of the web based training tool and using the EMR Reminder protocol. In completing this stage, practitioners will receive an additional 5 CME credits. Stage B would start in July of 2013 and go through June of 2014.
- Stage C involves learning from the evaluation of the performance improvement effort and would include another five CME credits. The practitioners would take a post-intervention cognitive exam and continue to monitor their compliance rate with stroke prevention guidelines. Those completing the post intervention monitoring from July through September of 2014 and completing an evaluation and attestation form would receive an additional five credits for a total of 20 credits.

We may also apply for Internal Medicine and/or Pediatrics Maintenance of Certification for this activity.

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