Update on Stroke Prevention

Kari D. Moore, MSN, APRN, AGACNP-BC
University of Louisville
Department of Neurology
Comprehensive Stroke Center

1. The audience will be able to discuss current USPTF guideline regarding vascular disease
2. The audience will be able to discuss current guidelines for primary and secondary stroke prevention.
3. The audience will be able to discuss Kentucky’s “Know Your Numbers” Campaign – Cardiovascular Risk Assessment, Risk Reduction, and Education (CARE) Collaborative and how providers can participate.
4. The audience will be aware of updated stroke rehab guidelines

Stroke Incidence

- Fifth leading cause of death
- Fourth leading cause of death in women
- Every 4 minutes someone dies of a stroke
- 795,000 strokes annually
  - 610,000 First Stroke
  - 185,000 Re-current Stroke
- Stroke occurs every 40 seconds
- A leading cause of disability
- 6.5 million stroke survivors
  - 3.9 Million Women
  - 2.6 Million Men
  - 17% have trouble performing basic ADLs
- Over $69 billion cost annually

Source: Benjamin et al., Circulation; 2018: 137
Kentucky: How are we doing?

The Joint Commissioners, HFAP and DNV Certified Primary Stroke Centers in Kentucky (22)

TJC Comprehensive Stroke Centers (4) Acute Stroke Ready Hospitals (6)

Kentucky: How are we doing?

Stroke Risk Factors

Nonmodifiable Risk Factors:
- Age
  - ↑ 9%/Year in Men
  - ↑ 10%/Year in Women
- Race
  - ↑ Risk Blacks (38% higher than whites) and some Hispanic/Latino
- Genetics
  - Family h/o stroke ↑ stroke risk by 30%
  - Parental h/o stroke age < 65 associated with 3x ↑ risk
  - CADASIL, Fabry Disease, Coagulopathies, Ehlers-Danlos, Marfan Syndrome, Sickle Cell Disease

Modifiable Risk Factors:
- Hypertension
- Dyslipidemia
- Diabetes
- Atrial Fibrillation
- Cigarette Smoking
- Asymptomatic Carotid Stenosis
- Carotid Artery Disease
- Carotid Artery Disease (CADASIL, Fabry Disease, Coagulopathies, Ehlers-Danlos, Marfan Syndrome, Sickle Cell Disease

USPSTF Recommendations

For Cardiovascular Disease

Cardiovascular USPSTF Recommendations

- Screening for high blood pressure in adults
- Screening for diabetes in adults aged 40-70 who are overweight or obese (FBG ≥ 126, Hemoglobin A1c, 2 hour postload plasma)
- Screening all adults for obesity and offering multicomponent behavioral interventions for BMI ≥ 30 kg/m²
- Recommend Low to Moderate dose Statin Preventive Medication for dyslipidemia in:
  - Adults age 40-75 without h/o CVD, 1 or more CVD risk factors, AND calculated ASCVD event risk ≥ 10%
  - Provide tobacco cessation behavioral and pharmacologic interventions for those


Cardiovascular USPSTF Recommendations

- Do NOT screen for carotid stenosis with carotid ultrasound
- No Recommendations for screening for PAD due to insufficient evidence
- Aspirin Use

https://www.uspreventivetaskforce.org
Primary Stroke Prevention

Switching Gears

Image retrieved from: http://spice4life.co.za/love/changing-listening-gears-better-communication/

Primary Stroke Prevention Recommendations

Hypertension

• SMBP is recommended to improve control
• Patients should be treated with antihypertensive drugs to < 140/90 mmHg
• Successful lowering of BP is more important than drug choice
• Annual screening for high BP and promoting lifestyle modifications are recommended for people with prehypertension (120-139/80-89 mm Hg)
• Regular BP screening and appropriate treatment of patients with HTN, including lifestyle modification and pharmacological therapy, are recommended

All Class I, Level A

Meschia, et al., 2014. Stroke

Primary Stroke Prevention Recommendations

Hyperlipidemia

• Treatment with statin is recommended in patients estimated to have high 10 year risk for cardiovascular events. AHA Class I, Level A
  – Moderate-intensity statin therapy should be initiated or continued for adults 40-75 years of age with diabetes. NHLBI Grade A
  – Adults age 40-75 with LDL-C 70-189 mg/dL, without clinical ASCVD or diabetes and with an 10 year ASCVD risk of ≥ 7.5% should be treated with moderate to high intensity statin. NHLBI Grade B
  – Adults ≥ age 21 with LDL-C ≥ 190 mg/dL should be treated with high intensity statin unless contraindicated; use maximum tolerated statin intensity. NHLBI Grade B
• Lifestyle Modification
  – Niacin may be considered for low HDL. Class IIb, Level B
• Treatment with nonstatin lipid-lowering therapies (fibric acid derivatives, bile acid sequestrants, niacin, and ezetimibe) may be considered in those who cannot tolerate statins, but their efficacy in preventing stroke is not established. Class IIb, Level C

Meschia, et al., 2014. Stroke; 45
Stone, et al., 2014. JACC; 63(25), 2889-2934

Risk-Enhancing Factors

• Family history of premature ASCVD (male, age >55 yrs, female, age >65 yrs)
• Primary hypercholesterolemia (LDL-C ≥ 190 mg/dL, or 5.0-5.8 mmol/L)
• Metabolic syndrome: Increased waist circumference, elevated FPG (≥ 110 mg/dL), elevated blood pressure, elevated glucose, and low HDL (< 40 mg/dL or < 1.03 mmol/L) in men and < 55 yrs in women with all three factors, 5 if patient is hypertensive
elevated lipid panel with or without albuminuria: not treated with diabetes or hypertension
• Chronic inflammatory conditions such as psoriasis, RA, or MS/ME
• History of perimenopausal menopause (before age 40) and history of pregnancy-associated conditions that increase total ASCVD risk such as preeclampsia
• High-risk race/ethnicity (e.g., South Asian ancestry)
• Lipid abnormalities: Associated with increased ASCVD risk
  – Irisinemia elevated, primary hypercholesterolemia (LDL-C ≥ 190 mg/dL)
  – If uncontrolled
  – Elevated high-normal C reactive protein (≥ 1.0 mg/L)
  – Elevated LDL: A relative indication for the use of a statin in patients with high risk ASCVD and LDL cholesterol ≥ 130 mg/dL
  – Erectile dysfunction: a relative indication for the use of a statin in high risk ASCVD patients
  – ≥ 3 MIRMs

NHLBI Grade B

J Am Coll Cardiol. Nov 2018; DOI: 10.1016/j.jacc.2018.11.003
Primary Stroke Prevention Recommendations

Atrial Fibrillation

- Valvular a-fib with CHA₂DS₂-VASC score ≥ 2 and low risk for hemorrhage anticoagulation with warfarin with goal INR 2.0-3.0 is recommended (Class I, Level A)
- Valvular a-fib with CHA₂DS₂-VASC score ≥ 2 and low risk for hemorrhage anticoagulation with dabigatran (level B), apixaban (level B), and rivaroxaban (level B). Selection should be individualized
- Closure of LAA may be considered for high risk a-fib patients deemed unsuitable for anticoagulation (Class IIb, Level B)

Risk of hemorrhage scales:

- HAS-BLED
- score > 2 moderately predictive of bleeding
- ATRIA
- score 0-3, < 3% risk/year
- score of 5-10, > 5% risk/year

Primary Stroke Prevention Recommendations

Asymptomatic Carotid Stenosis

- Should be on aspirin and statin, screened for other vascular risk factors, and medical therapies and lifestyle changes should be instituted (Class I, Level C)
- Reasonable to consider CEA with > 70% stenosis and < 3% risk of perioperative stroke, MI, death. Effectiveness compared to medical management is not known (Class I, Level A)
- Prophylactic CAS may be considered if stenosis is at least 60% by angiography and 70% by validated carotid ultrasound. Effectiveness compared to medical management is not known (Class I, Level B)

Current Recommendations by AAN
- Reasonable to consider CEA for patients between age 40-75 with asymptomatic stenosis 60-99% if the patient has an expected five year life expectancy and if the surgical stroke or death risk is documented < 3% (Class I, Level A)

Primary Stroke Prevention Recommendations

Diet and Nutrition

- Reduced sodium intake and increased intake of potassium as indicated by the US Dietary Guidelines (Class I, Level A)
- DASH diet (Class I, Level A)
- Mediterranean Diet (Class I, Level B)

Obesity

- BMI 25-29 kg/m² and obese > 30 kg/m², weight reduction is recommended for lowering BP (Class I, Level A) and for reducing stroke risk (Class I, Level B)

Primary Stroke Prevention Recommendations

Antiplatelet agents and aspirin

- Use of aspirin for cardiovascular prophylaxis is reasonable for ASCVD 10 year risk > 10% Class IIa, Level A
- Aspirin considered for CKD with GFR < 45 Class IIb, Level C. Does not apply for severe CKD with GFR < 30
- Clopidogrel may be reasonable for the prevention of first stroke in people with PAD Class IIb, Level B
- Antithrombotic regimens other than aspirin and clopidogrel are not recommended for prevention of first stroke due to lack of RCTs Class III, Level C

Primary Stroke Prevention Recommendations

Miscellaneous

- Antithrombotic treatment and catheter based closure for PFO is not recommended Class III, Level C
- Closure of PFO in patients with migraine is not recommended Class III, Level B
- Screening for intracranial aneurysms in every carrier of autosomal dominant polycystic kidney disease or Ehlers-Danlos type 4 mutations is not recommended Class III, Level B
- Counseling along with drug therapy for cigarette smoking using nicotine replacement, bupropion, varenicline is recommended for active smokers Class I, Level A
- Screening for sleep apnea with questionnaire, physical exam, and if indicated polysomnography may be considered Class IIb, Level C
- Alternatives to estrogen contraceptives should be considered in women with migraine with aura Class IIb, Level B
Secondary Stroke Prevention

Switching Gears

Image retrieved from: http://spice4life.co.za/love/changing-listening-gears-better-communication/

Secondary Stroke Prevention

Mechanism of Stroke/TIA Matters!

TOAST: Subtypes of Ischemic Stroke

• Large artery atherosclerosis
• Cardioembolism
• Small Vessel (Lacunar)
• Other Determined Etiology
  — Genetic
  — Trauma
  — Hypercoaguable state
• Other Undetermined Etiology (Cryptogenic)

Adams, HP Jr., et al., Stroke, 1993; 24: 35-41

Antiplatelets for Secondary Stroke Prevention

• Noncardioembolic Strokes use antiplatelets Class I, Level A
  — Aspirin Class I, Level A
  — Plavix (Clopidogrel) monotherapy Class IIa, Level B
  — Aggrenox (aspirin/ER dipyridamole) BID Class I, Level B
• For patients with severe intracranial stenosis (> 70-99%) dual antiplatelet therapy with aspirin + clopidogrel 75 mg daily x 3 months Class III, Level B
  — Lower rate of recurrence at 90 days (SAMMPRIS)
  — Fewer microemboli @ 7 days (CLAIR & CARESS)
• Aspirin + Clopidogrel initiated within 24 hours and continued x 90 days may be considered in TIA and minor stroke Class IIb, Level B
• Long term use of DAPT is not recommended

Kernan et al., 2014. Stroke; 45:2160-2236

Anticoagulation for Secondary Stroke Prevention

• Non-Valvular Atrial Fibrillation
  — Apixaban Class I, Level A
  — Warfarin Class I, Level A
  — Combination of anticoagulation with anti-platelets is not warranted unless, CAD, stent placement or ACS Class Iib, Level (Selection individualized based on cost, risk factors, tolerability, patient preference, drug interactions, renal function, clinical characteristics, and time in INR therapeutic range for those on warfarin)
  — Rivaroxaban Class IIa, Level B
  — Initiate within 14 days, large infarcts may be > 14 days Class IIA, Level B
  — LAA Closure with Watchman Device is uncertain Class IIb, Level B
  — Reversal agents:
    • Factor Xa inhibitors FDA clearance Andexanet alfa (Andexxa) for rivaroxaban and apixaban
    • Idarucizumab (Praxbind) reversal agent for direct thrombin inhibitor dabigatran

Kernan et al., 2014. Stroke; 45:2160-2236

Embolic Stroke of Undetermined Source (ESUS)

• ESUS Criteria
  — Non Lacunar stroke (lacune: subcortical infarct ≤ 1.5 cm)
  — Absence of extracranial or intracranial atherosclerosis causing ≥ 50% stenosis
  — No high risk source of embolism
  — No other specific cause of stroke identified


Example Cryptogenic Stroke Algorithm
**Patent Foramen Ovale (PFO)**

- Present 25-30% healthy adults;
- 50% of those with cryptogenic stroke;
- Risk of paradoxical embolism with R > L shunt.

**Diagnosis:**
- Echo with bubble study (TEE has double the sensitivity of TTE).

**Treatment:**
- Antiplatelet therapy first line; unclear benefit of anticoagulation;
- Evaluation of venous hypercoagulability and systemic DVT;
- Percutaneous endovascular closure in select patients (REDUCE, CLOSE).

**Dyslipidemia, Glucose, Obesity, & Sodium**

- Patients with AIS or TIA and other ASCVD co-morbidities need lifestyle modification, dietary changes, and medication.
- Statin therapy with intensive lipid-lowering effects is recommended for stroke & TIA presumed to be of atherosclerotic origin and LDL ≥ 100mg/dL.
- Risk of paradoxical embolism with R > L shunt.

**Extracranial Carotid Stenosis**

- Asymptomatic:
  - Accounts for most revascularization procedures in the US.
  - Data less compelling.
  - Randomized trial ongoing to establish benefit (CREST2).

- Symptomatic:
  - Hypoperfusion;
  - Thrombosis;
  - Embolism.

**Extracranial Symptomatic Carotid Stenosis**

- Meta-analysis: NASCET, ECST, VA trials (6092 patients)
  - CEA beneficial for > 70% stenosis
    - NNT 6.3 (prevent 1 stroke in 5 years) ARR 16% at 5 years
  - CEA beneficial for 50-69% stenosis
    - NNT 22 at 5 years, ARR 4.6%
  - No benefit CEA for occlusion.

- Timing: Greatest benefit 48 hours – 2 weeks.

**CEA vs. CAS**

- Conditions favoring CAS:
  - Surgically inaccessible lesion;
  - Radiation induced stenosis;
  - Restenosis after prior endarterectomy;
  - Contralateral carotid occlusion;
  - Clinically significant co-morbid cardiopulmonary disease.

- Class III/IV CHF;
- Left Main CAD;
- ≥ 2 vessel CAD;
- LV EF ≤ 30%;
- Severe Lung Disease;
- Severe Renal Disease;
What We Know About Hypertension

• Overall prevalence—1.3 million (38.9%) Kentuckians
  — 686,000 (41.3%) men, 646,100 (36.8%) women
  — 29.0% adults nationally*

• Currently not taking meds to control hypertension - 247,600 (18.6%) Kentuckians
  — 137,900 men
  — 109,700 women

• Overall control rate (< 140/90mmHg)
  — 53.0% in 2010 nationally*


2017 ACC/AHA BP Rx Algorithm

ACC/AHA 2017 HTN Guidelines

National Quality Forum (NQF) 18

• Measure Description: The percentage of patients 18 to 85 years of age who had a diagnosis of hypertension (HTN) and whose blood pressure (BP) was adequately controlled (<140/90) during the measurement year.


Blood Pressure Record Card
CARE Collaborative Fundamentals

- Participants must be adults, at least 18 years of age.
  - Cannot be used with minors.
- Is not a screening.
  - Participants are educated about BP zone and lifestyle changes that will help improve blood pressure.
- May be initiated anywhere blood pressure is taken.
  - The Educational Encounter occurs during normal interaction.
- With a little practice, the Educational Encounter should only take 1-2 minutes to complete, including data reporting.

CARE Collaborative Data

- Nearly half of all participants “come back” for at least 1, or more, visits
  - For each participant who actually “came back” s/he improved BP 50% of the time
- For returning participants, 1 out of 3 educational encounters resulted in a lifestyle change
  - Weighted by total educational encounters, or returning participants.

To Participate in the CARE Collaborative, Contact:

Kentucky Department for Public Health
Kentucky Heart Disease & Stroke Prevention Program
275 East Main Street, HS2W-E
Frankfort, KY 40621
Fax: 502-564-4667

- Lonna Boisseau
  Task Force Coordinator
  502-564-7996, Ext. 4445
  lonna.boisseau@ky.gov

- Bonita A. Bobo, RN, HHS
  Program Manager
  502-564-7996, Ext. 4436
  bonitaa.bobo@ky.gov

SBP Impact on Mortality and CVD

<table>
<thead>
<tr>
<th>Impacts on Mortality - SBP</th>
<th>Reduction in SBP (mmHg)</th>
<th>Stroke</th>
<th>CHD</th>
<th>Total Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2↓</td>
<td>-6%</td>
<td>-4%</td>
<td>-3%</td>
</tr>
<tr>
<td></td>
<td>3↓</td>
<td>-8%</td>
<td>-5%</td>
<td>-4%</td>
</tr>
<tr>
<td></td>
<td>5↓</td>
<td>-14%</td>
<td>-9%</td>
<td>-7%</td>
</tr>
</tbody>
</table>

Switching Gears

Stroke Rehab e134

Image retrieved from: http://spice4life.co.za/love/changing-listening-gears-better-communication/

Stroke Rehab e134

Winstein et al., 2016. Stroke; 47:e98-169

L O U I S V I L L E . E D U

72 pages
227 Recommendations

Winstein et al., 2016. Stroke; 47:e98-169

L O U I S V I L L E . E D U

Background

• > 2/3 stroke survivors receive rehab services post hospitalization
• Many gaps exist due to lack of large scale, rigorous RCTs
• More than 80% of the > 6 million stroke survivors live in the community (home, assisted living, intermediate care, transitional living)
• Many unmet needs persist
  – Social reintegration
  – Health related quality of life
  – Maintenance of activity
  – Self efficacy
• Apathy exists in >50% of stroke survivors one year post stroke
• Fatigue is common and debilitating
• Daily physical activity of community living stroke survivors is low
• Depressive symptomatology is high
• The end of formal rehab post stroke is usually 3-4 months but does not end the restorative process

Winstein et al., 2016. Stroke; 47:e98-169

Winstein et al., 2016. Stroke; 47:e98-169

L O U I S V I L L E . E D U

3. Assessment

• Weakness
• Aphasia – 1 million stroke survivors with aphasia in US
• Neglect
• Visual field deficit – 30%
• Cognitive changes
  – Cognitive impairment > 1/3 stroke survivors at 3 and 12 months
  – Associated with poor long term survival, higher disability, and institutionalization
• Sensory deficits
• Hearing Loss – 21% of posterior circulation strokes – usually accompanied by vertigo and other post circulation stroke symptoms
• Dysarthria
• Coordination
• ADLs, IADLs – 35-40% of stroke survivors have difficulty with ADLs and > 50% require assistance with IADLs

Winstein et al., 2016. Stroke; 47:e98-169

Winstein et al., 2016. Stroke; 47:e98-169

L O U I S V I L L E . E D U

4. Sensorimotor Impairments and Activities

• Dysphagia
  – 42-67% of stroke patients 3d after stroke
  – about half aspirate and 1/3 of these develop pneumonia
  – Formal Swallow Screen should be performed before PO intake
• Limb Apraxia
• Dysarthria and Speech Apraxia
• Spasticity
• Balance and Ataxia
• Interventions
  – Adaptive Equipment - Tailored Exercise Programs
  – DME - Prisms
  – Orthotics - Visual Field Retraining strategies
  – Wheelchairs - Audiology Referral

Winstein et al., 2016. Stroke; 47:e98-169

Winstein et al., 2016. Stroke; 47:e98-169

L O U I S V I L L E . E D U
5. Transitions in Care and Community Rehabilitation

Medical and Rehab continuity into the community
- Individualized D/C Planning includes long term needs
  - Consider telephone visits, telehealth, or web based support

Social and Family Caregiver Support
- Caregiver Education on:
  - “How To’s” of physical care needs and financial assistance
  - Medications
  - Respite
  - Domestic assistance
  - Caregivers need family and friends for emotional and physical assistance

Referral to Community Resources
- Home environment assessment, Vocational counseling, support groups, social services, psychological services, driving evaluation, and sexual health counseling

Winstein et al., 2016. Stroke; 47:e98-169

Questions