Stroke: Prevention is the Best Medicine

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Stroke Statistics

• Approximately 795,000 Americans suffer a stroke each year with nearly 77% being first time strokes.

• The incidence of first time strokes has decreased in those over age 65 by about 40% over the past 20 years but has remained unchanged in those age 45 – 65 and has increased in those under age 45.

• Nearly 20% of patients who have had a stroke will experience recurrent stroke

• 87 % of all strokes are ischemic, 10 % are intracerebral hemorrhage, and 3 % are subarachnoid hemorrhage

• Stroke has dropped to the 5th leading cause of death in the US but remains the leading cause of serious, long-term disability in adults.

• On average in the US, every 40 seconds someone has a stroke and every 4 minutes someone dies.

Estimated 10-year stroke risk in adults 55 years of age according to levels of various risk factors (FHS).

How can we reduce the incidence of first-time and recurrent strokes?
American Heart Association 2020 Impact Goals

• In 2011, AHA identified 7 Metrics (“Life’s Simple 7”) to be optimized in order to improve cardiovascular health in the United States

• Goal: Improve cardiovascular health of Americans by 20% while reducing deaths from cardiovascular disease and stroke by 20% by 2020

NOTE: AHA uses the term “cardiovascular health” to denote vascular health which includes prevention of stroke, heart attack and peripheral vascular disease and heart disease which includes a wide variety of cardiac conditions including heart failure.
American Heart Association 2020 Impact Goals

• 7 Metrics (“Life’s Simple 7”)
  • 4 Health Behaviors
    • Diet
    • Physical Activity
    • Smoking
    • Body Mass Index
  • 3 Health Factors
    • Blood Cholesterol
    • Blood Pressure
    • Blood Glucose
American Heart Association 2020 Impact Goals

• The 3 health factors are the most common risk factors for cardiovascular disease and stroke and are influenced by both medical management and health behaviors.

• The 4 health behaviors play a significant role in the management of other health factors as well as directly impacting cardiovascular health.

• For each metric, poor, intermediate and ideal levels of health have been identified for children and for adults.

• The age range for children varies between metrics based on available guidelines and data.
## American Heart Association 2020 Impact Goals

<table>
<thead>
<tr>
<th>Blood Pressure</th>
<th>Poor</th>
<th>Intermediate</th>
<th>Ideal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults &gt; age 20</td>
<td>SBP ≥140 mmHg or DBP ≥90 mmHg</td>
<td>SBP 120-139 mmHg DBP 80-89 mmHg or treated to goal</td>
<td>SBP &lt; 120 mmHg DBP &lt; 80 mmHg</td>
</tr>
<tr>
<td>Children age 8-19</td>
<td>&gt; 95&lt;sup&gt;th&lt;/sup&gt; percentile</td>
<td>90&lt;sup&gt;th&lt;/sup&gt;-95&lt;sup&gt;th&lt;/sup&gt; percentile or SBP ≥120 mmHg or DBP ≥80 mmHg</td>
<td>&lt; 90&lt;sup&gt;th&lt;/sup&gt; percentile</td>
</tr>
</tbody>
</table>

- Maintaining blood pressure in the intermediate range has been shown to lower the risk of stroke by approximately 40%
- Maintaining blood pressure in the ideal range reduces stroke risk by another 10-15%
Hypertension

• Primary Stroke Prevention Recommendations:
  • Regular blood pressure screening and appropriate treatment of patients with hypertension, including lifestyle modification and pharmacological therapy are recommended
  • Patients with hypertension should be treated with antihypertensive drugs to target a BP < 140/90 mmHg
  • Successful reduction of BP is more important in reducing stroke risk than the choice of a specific agent and treatment should be individualized on the basis of other patient characteristics and medication tolerance
  • Self-measured blood pressure monitoring is recommended to improve blood pressure control
Hypertension

• Secondary Stroke Prevention Recommendations:
  • Initiation of blood pressure therapy is indicated for previously untreated patients who after the first several days have a SBP > 140 mmHg or a DBP > 90 mmHg
  • Goals for target BP level or reduction from pretreatment baseline are uncertain and should be individualized, but it is reasonable to achieve a SBP < 140 mmHg and a DBP < 90 mmHg; For patients with a recent lacunar stroke, it might be reasonable to target a SBP of <130 mmHg
  • Several lifestyle modifications have been associated with BP reductions and are a reasonable part of comprehensive antihypertensive therapy
Hypertension

• Secondary Stroke Prevention Recommendations:
  • The optimal drug regimen to achieve the recommended level of BP reduction is uncertain because direct comparisons are limited. The available data indicate that diuretics or the combination of diuretics and an angiotensin converting enzyme inhibitor (ACE-I) is useful.
  • The choice of specific drugs and targets should be individualized on the basis of pharmacological properties, mechanism of action and consideration of specific patient characteristics.
  • Many antihypertensive agents have side effects that make medication non-adherence problematic.
  • When working with clients on antihypertensive agents, solicit feedback about side-effects and attitudes about adherence. Consider a trial of an alternate agent if adherence due to side effects is a concern.
## American Heart Association 2020 Impact Goals

<table>
<thead>
<tr>
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<th>Poor</th>
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<tbody>
<tr>
<td><strong>Total Cholesterol</strong></td>
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<tr>
<td>Adults ≥ age 20</td>
<td>≥ 240 mg/dl</td>
<td>200-239 mg/dl or treated to goal</td>
<td>&lt; 200 mg/dl</td>
</tr>
<tr>
<td>Children age 6-19</td>
<td>≥ 200 mg/dl</td>
<td>170-199 mg/dl</td>
<td>&lt; 170 mg/dl</td>
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</tbody>
</table>

- It is recommended that all children be screened for dyslipidemia between the ages of 9 and 11 and again between age 17 and 21. More frequent screening may be indicated for children with a family history of dyslipidemia or premature cardiovascular disease, and for those with risk factors such as being overweight/obese, hypertension or diabetes or being a smoker.

- It is recommended that adults be screened every 5 years.
Dyslipidemia

- Population-based studies showed an association between elevated total cholesterol and/or LDL and increased risk of stroke. Lower LDL was also associated with an increased risk of intracerebral hemorrhage.
- Population-based studies showed an association between increased HDL levels and decreased risk of stroke.
- The relationship between triglycerides and ischemic stroke is unclear.
Dyslipidemia

• Primary Stroke Prevention Recommendations:
  • In addition to lifestyle changes, statin therapy is recommended per the ACC/AHA guidelines
    • People with clinical evidence of atherosclerotic cardiovascular disease (ASCVD)
    • People with an LDL > 190 mg/dl (without clinical evidence of ASCVD)
    • People age 40-79 with diabetes and an LDL 70-189 mg/dl (without clinical evidence of ASCVD)

• Secondary Stroke Prevention Recommendations
  • Statin therapy with intensive lipid lowering effects is recommended for stroke or TIA presumed to be of atherosclerotic origin in persons with an LDL > 100 mg/dl with or without clinical evidence of ASCVD
  • In persons experiencing stroke or TIA with clinical evidence of ASCVD, statin therapy with intensive lipid lowering effects if often implemented for LDL >70 mg/dl.
### American Heart Association 2020 Impact Goals

#### Level of Cardiovascular Health

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### Fasting Blood Glucose

| Adults ≥ age 20 | ≥126 mg/dl | 100-125 mg/dl or treated to goal | <100 mg/dl |
| Children age 12-19 | ≥126 mg/dl | 100-125 mg/dl | <100 mg/dl |

- Diabetes Mellitus is associated with a substantially increased risk for first ischemic stroke.
- 60-70% of persons experiencing a stroke or TIA have pre-diabetes or diabetes. It is estimated that approximately 8% of first-time strokes are due to diabetes.
- Good blood sugar control can slow progression of vascular disease but cannot prevent it.
- Stroke prevention in persons with diabetes is focused on more aggressive control of other vascular risk factors.
Diabetes Mellitus

• Primary Stroke Prevention Recommendations:
  • Control of blood pressure to target of < 140/90 mmHg is recommended in patients with Type I or Type II diabetes.
  • Treatment of adults with diabetes with a statin, especially those with additional risk factors, is recommended.

• Secondary Stroke Prevention Recommendations
  • After a TIA or ischemic stroke, all patients should be screened for diabetes with testing of fasting plasma glucose, HgA₁C, or an oral glucose tolerance test
  • Use of existing guidelines from the American Diabetes Association for glycemic control and cardiovascular risk factor management is recommended
## American Heart Association 2020 Impact Goals

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<th>Ideal</th>
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<tbody>
<tr>
<td><strong>Physical Activity</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Adults ≥ age 20</td>
<td>None</td>
<td>1-149 min/week moderate or 1-74 min/week vigorous</td>
<td>≥ 150 min/week moderate or ≥ 75 min/week vigorous</td>
</tr>
<tr>
<td>Children age 12-19</td>
<td>None</td>
<td>&gt; 0 and &lt; 60 min of moderate or vigorous every day</td>
<td>≥ 60 min of moderate or vigorous every day</td>
</tr>
</tbody>
</table>

- Moderate intensity activities, such as brisk walking or stationary bike are intense enough to break a sweat and noticeably raise the heart rate
- Moderate intensity activity makes one short enough of breath so conversation is possible but avoided
- Vigorous (intensity) = activities like jogging, aerobics class
Physical Activity

• Physical inactivity increases the risk of stroke 25-30% compared to those who engage in regular physical activity.

• When coaching physical activity, consider work related activity

• General state of health and cardiovascular condition should be considered when increasing activity. Many people require gradual advancement to recommended activity levels.
Physical Activity

• Primary Stroke Prevention Guidelines Recommendation:
  • Healthy adults should perform at least moderate to vigorous intensity aerobic physical activity at least 40 min/day 3-4 days/week

• Secondary Stroke Prevention Guidelines Recommendations:
  • For patients who are capable, same as primary prevention
  • For individuals with disability supervision by a healthcare professional such as a physical therapist or cardiac rehabilitation specialist, at least on initiation should be considered

• Recent research has shown that multiple shorter activity sessions (10 to 15 minutes each) over the course of the day is of equal value to one longer session
## American Heart Association 2020 Impact Goals

### Level of Cardiovascular Health

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<th></th>
<th>Poor</th>
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<tbody>
<tr>
<td><strong>Current Smoking</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Adults ≥ age 20</td>
<td>Yes</td>
<td>Quit &lt; 12 months</td>
<td>Never or Quit &gt; 12 months</td>
</tr>
<tr>
<td>Children age 12-19</td>
<td>Tried in last 30 days</td>
<td>Never tried or never smoked a whole cigarette</td>
<td></td>
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</table>

- Smoking doubles the risk of stroke
- Consistent exposure to second-hand smoke nearly doubles the risk of stroke
- Recent studies have shown that e-cigarettes also increase the risk of heart disease and stroke
- The smoking rate in Minnesota has decreased significantly (from approx. 22% to 14.4% over the last decade). This is thought to be largely due to the smoking ban and cost-free smoking cessation resources
- The risk of cardiovascular disease/stroke approaches that of a non-smoker after 10 years of smoking abstinence.
Smoking Cessation

- Patient counseling
  - Research has shown that a provider telling someone they **must** quit increases the likelihood of success

- Medications
  - Nicotine replacement
  - Bupropion (Zyban)
  - Varenicline (Chantix)

- “Quit Plan”
  - Professional assistance in developing and modifying a Quit Plan has been shown to be the most effective tool in smoking cessation for many smokers
## Level of Cardiovascular Health

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<th></th>
<th>Poor</th>
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<tbody>
<tr>
<td><strong>Body Mass Index</strong></td>
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<tr>
<td>Adults &gt; age 20</td>
<td>≥ 30 kg/m²</td>
<td>25-29.9 kg/m²</td>
<td>&lt; 25 kg/m²</td>
</tr>
<tr>
<td>Children age 2-19</td>
<td>&gt; 95th percentile</td>
<td>85th-95th percentile</td>
<td>&lt; 85th percentile</td>
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</table>

- For stroke prevention, weight loss is recommended for adults with hypertension and a BMI > 25 kg/m² and for anyone with a BMI ≥ 30 kg/m².
- Most individuals benefit from a formalized weight loss program that includes lifestyle modification, in particular those that focus on and recognize incremental goals.
- Weight loss programs should provide education about healthy eating, healthful cooking techniques and increased activity.
- Bariatric surgery has been shown to lead to long-term weight loss and improved cardiovascular health when combined with lifestyle modification.
American Heart Association 2020 Impact Goals

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</thead>
<tbody>
<tr>
<td>Healthy Diet Pattern: number of AHA recommended goals met</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adults ≥ age 20</td>
<td>&lt;2 primary goals</td>
<td>2-3 primary goals</td>
<td>4-5 primary goals</td>
</tr>
<tr>
<td>Children age 5-19</td>
<td>&lt;2 primary goals</td>
<td>2-3 primary goals</td>
<td>4-5 primary goals</td>
</tr>
</tbody>
</table>

• Primary dietary goals include:
  • ≥ 4.5 cups of fruits and vegetables/day
  • ≥ 2 fish or shellfish/week (3.5oz. servings)
  • ≥ 3 whole grains/day (1oz. servings)
  • ≤ 1500 mg sodium/day
  • ≤ 36fl oz./week sugar sweetened beverages

• Secondary dietary goals include:
  • ≥ 4 nuts, seeds and legumes/week (nuts/seeds 1oz servings; legumes ½ cup)
  • ≤ 2 processed meats/week (1.75 oz. servings)
  • < 7% of calories from saturated fat
Healthy Diet

• There is limited research on reducing stroke risk with a healthy diet but there is evidence that stroke risk factors such as hypertension, hyperlipidemia and diabetes can be reduced by a healthy diet.

• Primary Stroke Prevention Recommendations
  • Reduced intake of sodium and increased intake of potassium as indicated in the US Dietary Guidelines for Americans are recommended to lower blood pressure
  • A Dietary Approaches to Stop Hypertension (DASH)-style diet which emphasizes fruits, vegetables, and low-fat dairy products and reduced saturated fat is recommended to lower blood pressure
  • A Mediterranean diet supplemented with nuts may be considered in lowering the risk of stroke
Healthy Diet

- Secondary Stroke Prevention Recommendations
  - It is reasonable to recommend that patients reduce sodium intake to less than approximately 2.4g/day. Further reduction to < 1.5g/day is also reasonable and is associated with even greater BP reduction.
  - It is reasonable to counsel patients to follow a Mediterranean-type diet instead of a low-fat diet. The Mediterranean-type diet emphasizes vegetables, fruits, and whole grains and includes low-fat dairy products, poultry, fish, legumes, olive oil and nuts. It limits intake of sweets and red meats.
Healthy Diet

• Review of the studies used to support the recommendation for Mediterranean-type diet was done by HCMC dieticians who found that the research had significant limits and did not clearly show superiority to a traditional low-fat, healthy diet.

• In January, at the 2018 International Stroke Conference, data from the Memory and Aging project was presented.
  • A diet that blends low-sodium, high vegetable, lean protein and olive oil aspects of the DASH and Mediterranean diets along with an emphasis on green leafy vegetables and berries appears to preserve cognitive performance over time in the overall aging population and also appeared to benefit cognitive performance in stroke survivors.
Evidence-based Individual Approaches for Improving Health Behaviors

- Set specific, shared proximal (short-term) goals
  - Set specific goals including a personalized plan to achieve goals (e.g. over the next 3 months increase fruits by 1 serving/day, reduce smoking by ½ pack per day or walk 30 minutes 3 x week)
- Establish self-monitoring (dietary or activity diary, web-based tracking tool or phone app)
- Schedule regular follow-up (in-person, telephone, electronic) with a clear frequency and duration to assess progress, modify plans, and/or set new goals.
- Provide feedback about progress toward goals
Evidence-based Individual Approaches for Improving Health Behaviors

• Increase self-efficacy – increase the client’s perception that they can successfully change their behavior (setting reasonable proximal goals is key to this)

• Use motivational interviewing when clients are resistant or ambivalent about behavior change
  • Explore and aid in resolution of reasons for resistance through self-awareness, self-motivation

• Solicit long-term support from family, friends, peers when possible

• Use a multicomponent approach
  • Combine ≥ 2 of above strategies into behavior change efforts
Evidence-Based Healthcare Systems
Approaches to Support Improvements in Health Behaviors

- Electronic systems for scheduling and tracking visits for behavior change and treatments
- Electronic medical records systems to help assess, track and report on specific health behaviors (and health factors like BP, cholesterol, glucose)
- Practical paper or electronic toolkits for assessment of key health behaviors and health factors
- Electronic systems to facilitate provision of feedback to clients
- Education and on-going training for providers including relevant ethnic and cultural issues
- Integrated systems to provide care by multidisciplinary teams of providers


Atrial Fibrillation (a-fib)

• A-fib is associated with a 4 to 5 fold increase in stroke risk
  • In patients with a-fib and no prior stroke or TIA, the stroke risk is 2-4% per year.
  • Risk of embolic stroke due to a-fib increases with age. Over age 80, it is estimated that 25% of strokes are due to a-fib.
  • A-fib is associated with increased stroke mortality

• Stroke risk is significant (approximately 20-fold) if valvular disease and a-fib are present

• Anticoagulation in patients with an indication based on CHA₂DS₂ VASc criteria reduces the incidence of stroke by approximately 68%
# Atrial Fibrillation

**CHA$_2$DS$_2$ VASc Scoring System**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestive Heart Failure</td>
<td>1 point</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1 point</td>
</tr>
<tr>
<td>Age &gt; 75 years</td>
<td>2 points</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1 point</td>
</tr>
<tr>
<td>Stroke or TIA</td>
<td>2 points</td>
</tr>
<tr>
<td>Vascular Disease</td>
<td>1 point</td>
</tr>
<tr>
<td>Age 64-75 years</td>
<td>1 point</td>
</tr>
<tr>
<td>Sex Category (Female)</td>
<td>1 point</td>
</tr>
</tbody>
</table>
Atrial Fibrillation

• Primary Stroke Prevention Recommendations:

  • Active screening for a-fib in the clinic setting for patients over age 65 by pulse assessment, followed by EKG as indicated can be useful.

  • For patients with valvular a-fib, a CHA$_2$DS$_2$ VASc score $\geq$ 2 and acceptably low risk of hemorrhagic complications, long-term anticoagulation therapy with warfarin with a target INR or 2.0 to 3.0 is recommended

  • For patients with non-valvular a-fib, a CHA$_2$DS$_2$ VASc score $\geq$ 2 and acceptably low risk of hemorrhagic complications, oral anticoagulants are recommended. Treatment options include warfarin (Vitamin K inhibitor “VKA”), dabigatran or one of the oral Factor Xa inhibitors (e.g. apixaban, rivaroxaban, edoxaban) with an indication for non-valvular a-fib may be used
Atrial Fibrillation

• Secondary Stroke Prevention Recommendations:
  
  • Warfarin with a target INR of 2.0 to 3.0, dabigatran or Factor Xa inhibitor are all indicated for prevention of recurrent stroke in patients with non-valvular a-fib whether paroxysmal or permanent.

  • For patients who are unable to take oral anticoagulants, aspirin alone is recommended. The addition of clopidogrel to aspirin therapy might be reasonable.
Antiplatelet Therapy

- Primary Stroke Prevention Recommendations:
  - The use of aspirin for cardiovascular (including but not specific to stroke) prophylaxis is reasonable for people whose risk is sufficiently high (10-year risk > 10%) based on the AHA CV risk calculator.
  - Aspirin 81-100mg every other day can be useful for prevention of a first stroke among women, including those with diabetes whose risk is sufficiently high for benefit to outweigh the risks associated with treated (primarily GI bleeding)
  - Aspirin is not useful in preventing stroke in people who are at low risk.
Antiplatelet Therapy

• Secondary Stroke Prevention Recommendations:
  • For patients with non-cardioembolic stroke or TIA, the use of an antiplatelet agent, rather than oral anticoagulation is recommended to reduce risk of recurrent stroke
  • Aspirin 50-325mg, combination aspirin 25mg and extended-release dipyridamole 200mg (Aggrenox) twice daily, or clopidogrel (Plavix) 75 mg are reasonable treatment options for prevention of recurrent stroke
  • For patients who have an ischemic stroke or TIA while taking aspirin, there is no evidence that increasing the aspirin dose is beneficial.
    • Testing for aspirin resistance might be helpful and would indicate the need to change to a different agent.
  • Aspirin reduces the risk of recurrent stroke by approximately 15%
  • Clopidogrel and combination aspirin and extended-release dipyridamole are slightly more effective than aspirin alone.
QUESTIONS???

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