AHA/ASA SCIENTIFIC STATEMENT

Primary Care of Adult Patients After Stroke

A Scientific Statement From the American Heart Association/American Stroke Association

The American Academy of Neurology affirms the value of this statement as an educational tool for neurologists.

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ABSTRACT: Primary care teams provide the majority of poststroke care. When optimally configured, these teams provide patient-centered care to prevent recurrent stroke, maximize function, prevent late complications, and optimize quality of life. Patient-centered primary care after stroke begins with establishing the foundation for poststroke management while engaging caregivers and family members in support of the patient. Screening for complications (eg, depression, cognitive impairment, and fall risk) and unmet needs is both a short-term and long-term component of poststroke care. Patients with ongoing functional impairments may benefit from referral to appropriate services. Ongoing care consists of managing risk factors such as high blood pressure, atrial fibrillation, diabetes, carotid stenosis, and dyslipidemia. Recommendations to reduce risk of recurrent stroke also include lifestyle modifications such as healthy diet and exercise. At the system level, primary care practices can use quality improvement strategies and available resources to enhance the delivery of evidence-based care and optimize outcomes.

Key Words: AHA Scientific Statements ■ aftercare ■ family practice ■ internal medicine ■ primary health care ■ secondary prevention, stroke ■ stroke rehabilitation

The care of patients with stroke begins in the hospital and continues in the community, where recovery, reintegration, and health maintenance take place over the years that follow.[1,2] Primary care clinicians provide most of this long-term care.[3] In a typical primary care practice of 2000 adults, 100 will have a history of stroke, and 5 to 10 will have a new stroke each year.[4–6] The needs of these patients can be complex according to the temporal phase of their illness, the cause and severity of their stroke, and other factors, including the presence of other chronic health conditions.[7] Approximately 50% to 80% will have hypertension, 20% to 30% will have diabetes, and 10% to 30% will have comorbid heart disease or atrial fibrillation.[4,8,9] Lung disease, depression, anxiety, kidney disease, and arthritis are also common. The care of patients with chronic illness and multiple coexisting conditions is a special expertise of primary care clinicians.[10–12] When primary care practices achieve their defining functions (ie, prevention of disease, management of acute symptoms, management of chronic disease), they provide easy access and care that is continuous, comprehensive, and coordinated.[10] They advocate for patients when specialty care is needed and ensure that different specialists and subspecialists work together.

Although there is a vast clinical science to guide primary care clinicians in caring for patients after stroke, it is dispersed across numerous original publications and professional guidelines. The purpose of this scientific statement is to summarize this literature and provide a practical system of goal-directed care for the whole patient over the duration of his or her life. We emphasize strategies to prevent recurrent stroke, recognize and manage stroke complications, and maximize function.

Primary care, like all medical specialties, needs to bridge the evidence-practice gap and ensure that every patient receives guideline-recommended care.[13–16] One year after stroke, 97% of eligible patients remain on antiplatelet therapy, but only 50% to 70% of patients achieve a blood pressure (BP) of <140/90 mm Hg, 79% remain on statin therapy, 84% remain at a nonsmoking status, and 48% exercise according to recommendations.[17,18] Only 17% achieve a healthy weight (body mass index <25 kg/m^2).[16,19] Unmet needs for physical rehabilitation, activities of daily living, mobility, pain control, and communication remain prevalent.[20] Many factors beyond the control of primary care clinicians contribute to shortfalls in poststroke care, including social factors (eg, lack of health insurance, lack of access to care for other reasons, social isolation, structural racism), lack of perceived benefit from therapy, or fear of side effects. However, effective communication by primary care clinicians can improve adherence with effective care by boosting motivation with accurate information and encouragement, and by overcoming language, cultural, and health literacy barriers.[21] This statement recognizes the challenges to optimal care and the central role of primary care in improving health on a population level.

METHODS

The members of the writing group were nominated by the chair and vice chair and approved by the American Heart Association (AHA) Stroke Council's Stroke Scientific Statement Oversight Committee. The content was developed from systematic literature reviews and professional guidelines. Where evidence or high-quality guidelines were not available, content was based on consensus among writing group members. All members of the writing group edited each interim draft of this statement for content and style. Members unanimously approved the version that was first submitted for peer review. The statement was then revised in response to peer review comments and comments from AHA committees. The final version was reapproved for publication by all members of the writing group and by the AHA Science Advisory and Coordinating Committee.
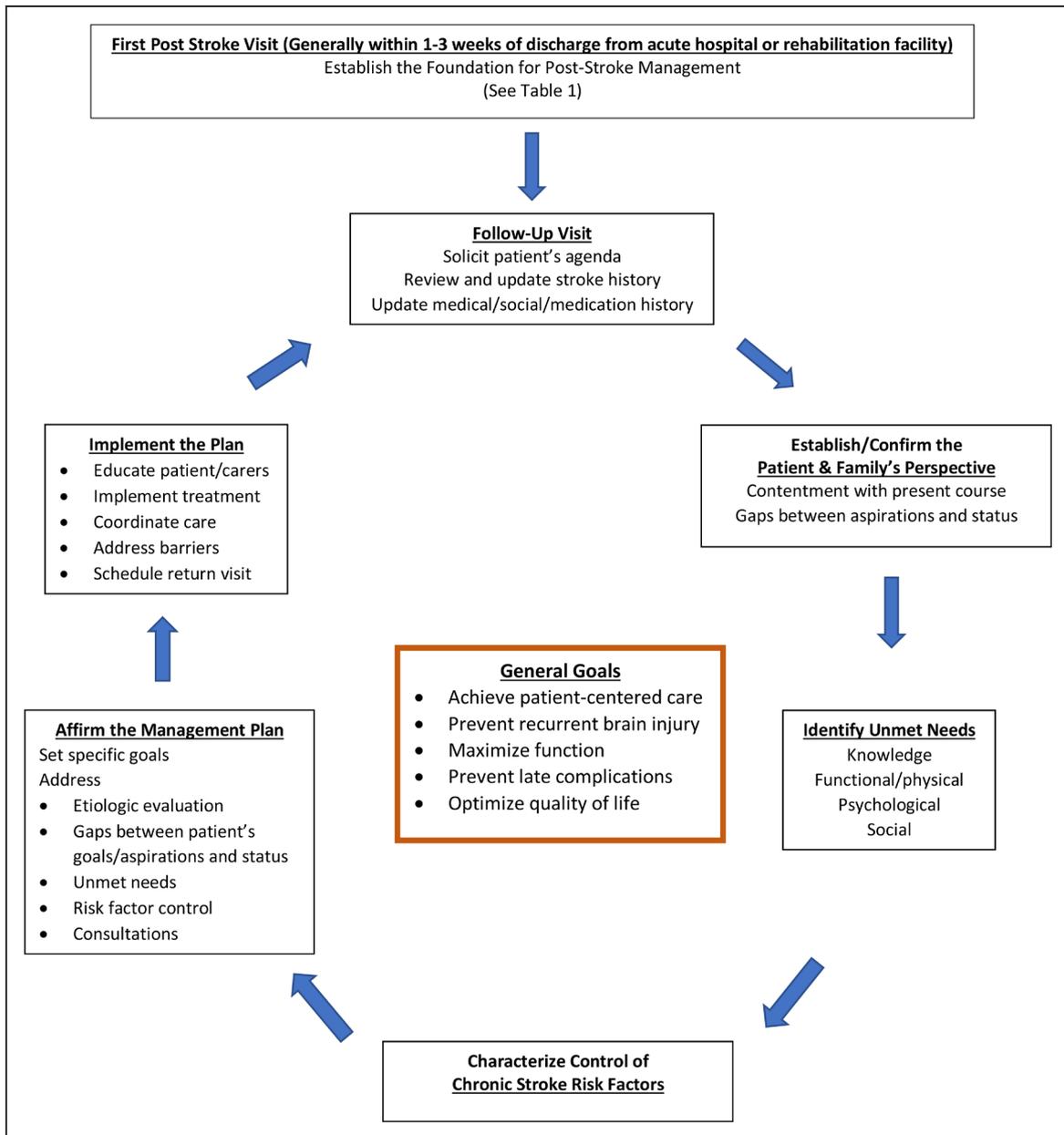
OVERALL CARE STRATEGY

Poststroke care is an iterative process of assessment, management, and feedback that adapts over time to the changing needs of the patient. To operationalize this process, we propose a template for primary care visits that is based on current notions of chronic care management[22] to help clinicians achieve 5 generally accepted goals for poststroke care[2]: provide patient-centered care, prevent recurrent brain injury, maximize function, prevent late complications, and optimize quality of life (Figure 1). The first of these, patient-centered care, is a philosophy that guides clinicians toward health outcomes that are most valued by individual patients. It emphasizes the alleviation of pain, fear, and anxiety.[12,23–25] It emphasizes patient autonomy and communication to identify patient values and preferences that underlie autonomous decisions.[12] In this section, we propose a 6-component strategy for use by primary care clinicians in achieving these 5 general goals.[26] All components can be covered in most office visits.

A final introductory comment: the first poststroke visit should occur soon after discharge from the acute care or rehabilitation hospital, in general, within 1 to 3 weeks. An early visit may reduce readmission and address inadvertent gaps in care that may exacerbate the high risk for stroke recurrence that marks the first 3 months after hospital discharge.[27–31] The current average interval to first medical visit for patients discharged home after stroke is 27 days.[32]

Establish the Foundation for Care

Special priorities for the first poststroke visit are listed in Table 1. First is to know the patient's experience, their understanding of what happened to them, and their concerns. These will shape much of the care to come. Next is to understand the stroke event in sufficient detail to classify the pathogenesis (eg, why did it happen?),[38] which is not always established during the inpatient stay.[34,35] Carotid imaging, when indicated, is usually completed in the hospital, but prolonged cardiac monitoring is usually deferred until after discharge. Approximately 10% of ischemic stroke events are related to carotid stenosis, and prolonged (eg, ≥30 days) rhythm monitoring will detect occult atrial fibrillation in ≈9% of patients.[36] Some cause-specific treatments are time sensitive, in particular, carotid revascularization, which if indicated, should be performed within 2 weeks for most patients.[38] Primary care clinicians should examine whether any part of the evaluation of cause was deferred to the outpatient setting. Dual antiplatelet therapy is initiated in the hospital and can reduce early recurrence by 25% but should be discontinued for many patients after 21 to 30 days to reduce bleeding risk[37]; based on nonrandomized evidence, patients with stroke related to 70% to 99% intracranial stenosis may benefit from dual antiplatelet therapy extended up to 90 days.[38,39] Patients are eligible for dual antiplatelet therapy if they have had a minor acute ischemic stroke or high-risk transient ischemic attack within the prior 12 to 24 hours and are not candidates for thrombolysis, endovascular therapy, endarterectomy, or anticoagulation.[26,37] At the first visit, the patient and clinician should work to identify and remediate precursors that may have contributed to the stroke. Was BP not optimally controlled? Was anticoagulation inadvertently discontinued? What can they do differently in the future to reduce the patient's risk of a recurrent stroke?

First Post Stroke Visit (Generally within 1-3 weeks of discharge from acute hospital or rehabilitation facility)
Establish the Foundation for Post-Stroke Management
(See Table 1)

Follow-Up Visit
Solicit patient's agenda
Review and update stroke history
Update medical/social/medication history

Implement the Plan
- Educate patient/carers
- Implement treatment
- Coordinate care
- Address barriers
- Schedule return visit

Establish/Confirm the Patient & Family's Perspective
Contentment with present course
Gaps between aspirations and status

General Goals
- Achieve patient-centered care
- Prevent recurrent brain injury
- Maximize function
- Prevent late complications
- Optimize quality of life

Affirm the Management Plan
Set specific goals
Address
- Etiologic evaluation
- Gaps between patient's goals/aspirations and status
- Unmet needs
- Risk factor control
- Consultations

Identify Unmet Needs
Knowledge
Functional/physical
Psychological
Social

Characterize Control of Chronic Stroke Risk Factors

Figure 1. Cycle of patient-centered primary care after stroke.

Because there are important and complex decisions to make early after a stroke, this is when primary care physicians and neurologists may want to collaborate most closely. The work they do around the time of this visit can improve the transition to long-term primary care management.

After the first visit, it is helpful to document a brief narrative of the patient's stroke to anchor stroke-specific care for future visits. Useful information may include pre-stroke risk factors, symptoms, results of the diagnostic evaluation, anatomic location of the stroke, emergency therapy (if any), hospital course, presumed pathogenesis (including unrecognized or incompletely treated risk factors), and subsequent progress in rehabilitation. This narrative can be updated at future visits.

Even when a primary care clinician has known a patient for years, a stroke can alter the goals and content of their relationship. New physical and medical conditions require attention, preventive treatments that a patient may not have valued in the past become more pressing, and the consequences of brain injury can alter a patient's relationships, social roles, and sense of self. Keeping aware of the patient and his or her new situation becomes the basis for almost everything a primary care clinician can do. Foundational work for every visit, therefore, includes monitoring the consequences of the stroke and updating the medical and social history. Approximately 60% of stroke survivors have some neurological symptoms, and 5% to 50% have moderate disability, requiring some assistance with basic activities of daily living.[40,41] An

Table 1.   Special Priorities for First Poststroke Visit

Obtain and review hospital records
Solicit the patient's experience
Technical understanding of the acute event
Early questions
Fears
Psychological consequences
Classify the stroke pathogenesis
Confirm that the pathogenetic evaluation is complete
Confirm that specific treatment for the pathogenesis is in place if applicable
Implement time-sensitive management if indicated
Carotid revascularization
Antiplatelet therapy
Statin therapy
Check if the patient is a candidate for dual antiplatelet therapy*
If yes, are they taking it?
If yes, discontinue at 21 d if appropriate
Identify and remediate precursors of the stroke
Why did it happen?

*For eligibility, see Preventing Recurrent Stroke. Extending dual antiplatelet therapy to 90 d is reasonable for a stroke related to severe stenosis of an intracerebral artery.

Table 2.   Poststroke Complications

Anxiety
Cognitive impairment
Communication difficulty
Contractures
Depression
Dysphagia
Falling
Fatigue
Fracture
Hemiplegic shoulder pain
Mobility impairment
Osteoporosis
Pressure ulcers
Seizure (early and late)
Skin breakdown
Spasticity
Thromboembolism
Urinary or bowel incontinence

CLINICAL STATEMENTS AND GUIDELINES

updated social history considers the patient's past social circumstances, premorbid roles, family circumstances, and how any of these may have changed because of the stroke. Ultimately, the clinician's awareness of the patient enables him or her to work with the patient, the family, and the multidisciplinary care team to address the social, emotional, and physical aspects of health.

Establish/Confirm the Patient's and Family's Perspective

Patient-centered care is fostered by a welcoming space where patients can express their values, aspirations, questions, fears, and needs. With the patient's consent, caregivers can help identify the patient's needs, family's needs, and opportunities to improve everyone's satisfaction.[42,43] Family and caregiver collaboration improves risk factor management and outcomes.[44]

Screen for Complications and Unmet Needs

Poststroke complications include anxiety, bone fracture, cognitive impairment, contractures, depression, falling, fatigue,[45] hemiplegic shoulder pain, osteoporosis, pressure ulcers, seizure, spasticity, and thromboembolism[45–49] (Table 2). Some stroke complications can be prevented; others can be managed to reduce morbidity. Most readmissions within 30 days, furthermore, are medical rather than neurological and may be reduced by early primary care interventions.[50]

Depression is highly prevalent in the several months after stroke, but it continues to affect up to 25% of patients at 2 years.[48,51] All major professional guidelines include a recommendation to screen for depression after stroke, provided there are resources in place to treat patients who screen positive.[48] Treatment is identical to treatment for depression in patients without stroke.

Unmet needs are remediable gaps between what a patient would like to be able to do or experience and what he or she is currently doing or experiencing (Table 3).[52–54] Estimates of the prevalence of unmet needs in the months and years after hospital discharge range from 20% to 75%.[52,55,56] In addition to asking patients and caregivers about unmet needs, screening tools have been developed.[20,54] Even in the subacute or chronic phase of stroke, many patients still benefit from physical, speech, or occupational therapy. Those in need can often be identified by asking, "Would this patient benefit from referral for any services to improve their functional impairments and promote their health and wellbeing?"

Characterize Control of Chronic Stroke Risk Factors

Two important questions to ask at poststroke visits are: "What caused this patient's stroke?" and "Are we doing everything we can to prevent a recurrent stroke?" The answer to the latter starts with characterizing the control of stroke risk factors for which treatment is of proven benefit. Among the most prevalent and important risk factors are hypertension, atrial fibrillation, carotid stenosis, and dyslipidemia. For each of these, specific treatment reduces the risk for recurrence (ie, Class 1, Level of Evidence A recommendations). It is also important

Table 3. Common Unmet Needs After Stroke

Communication assistance
Cognitive impairment screening
Depression
Fear of falling
Follow-up primary care
Independence in activities of daily living
Mobility impairment
Pain
Physical rehabilitation
Returning to work
Sexual performance
Spasticity
Urinary or bowel incontinence

to identify diabetes and intracranial atherosclerotic stenosis, for which treatments exist, although with lower evidence of effect (ie, Class 1, Level of Evidence B-R recommendations). Because patients often miss doses or prematurely discontinue medication therapy, active adherence monitoring is important and can reveal the cause for falling short of treatment goals.[57,58] Concern about the risks for adverse consequences is often responsible for medication nonadherence, in particular, among low-income or historically disenfranchised groups.[59]

In addition to medical conditions that affect stroke prognosis, several socioeconomic factors are associated with poor outcome.[60–62] Designing care to accommodate poverty, food insecurity, low educational achievement, lack of access to care, lack of transportation, and other social determinants of health is challenging but central to the mission of primary care. The American Academy of Family Physicians recommends a practice culture that values health equity and a team-based approach that includes asking patients about their social determinants of health, identifying community resources, and connecting patients to those resources.[63] Employment of a social worker on the team is instrumental.

Beyond socioeconomic factors, Black race and Hispanic ethnicity have been associated with inferior quality of poststroke care and greater risk for recurrence, compared with White race.[17,64–68] The inequity has been attributed to institutional, cultural, and interpersonal racism.[66] Primary care clinicians can potentially mitigate this inequity through strategies such as those advocated by the American Academy of Family Physicians and training themselves and their staff to redress implicit bias.[66]

Set the Plan

The best plans in primary care arise from collaboration between patient and clinician.[69] Plans are based on a list of problems, like high blood pressure or shoulder pain. When patients are invited to define those problems, clinicians may be surprised by the result. Family responsibilities, for example, may top a list that includes obesity, inactivity, blood pressure, or diabetes. Accommodating patient-identified problems is necessary to later move on to other problems. Two related concepts are tailoring, which involves applying clinical guidelines to the patient's specific circumstances and goals, and sequencing or prioritizing care. Patients with stroke, especially those with major neurological deficits, can be overwhelmed by new medications and services after discharge from the acute care setting.[70] Together, patients and their clinicians should negotiate a plan of care whereby certain clinical issues are prioritized and arrangements are made for timely follow-up to address issues that are deferred. Once problems are identified, action plans can be created based on things the patient wants to achieve and which they are confident they can achieve.[69] Setting realistic goals helps avoid unnecessary defeat. The typical office visit concludes with plans to reinforce successful behavior, address unmet needs, and close gaps between goals and achievements.[2]

Implement the Plan and Schedule the Return Visit

When patients leave the office, they and their caregivers manage themselves. Self-management support, therefore, is a foundation of chronic disease management.[22] It starts from the problems, goals, and plans that emerge from collaborative care. It continues with patient and caregiver education for knowledge (about health, disease, prognosis, therapy, when to call 9-1-1) and skills in monitoring, problem solving, and decision making.[2,44,69,71] Self-monitoring for control of BP, diabetes, and weight is now part of care pathways in professional guidelines. Self-monitoring provides feedback that can be combined with self-management to achieve better risk control.[72] Emerging evidence suggests that team care involving a registered nurse or pharmacist can improve chronic disease management, although most studies did not embed these health care professionals in primary care practices.[73,74] For many care goals, community nursing, pharmacy, social work, physiatry, physical therapy, speech therapy, occupational therapy, and medical specialties may each have a role.[3,75] A return visit should be scheduled at an interval that accounts for the patient's condition, risk factor stability, and risk for failure to achieve goals.

PREVENTING RECURRENT STROKE

The risk for recurrence approaches 8% in the first year after an ischemic stroke.[76,77] After the first year, the annual risk levels out at ≈2%, which is still ≈4 times higher than

Table 4. Summary of 2021 Class 1 Recommendations for Secondary Stroke Prevention From the American Heart Association Relevant to Office-Based Primary Care Practice*

Diagnostic evaluation
Image the carotid artery for anterior circulation stroke events
ECG to screen for atrial fibrillation
Image the brain with computed tomography or magnetic imaging to confirm the diagnosis
Perform complete blood cell count, prothrombin time, partial thromboplastin time, glucose, hemoglobin A1c, creatinine, lipid profile for insight into risk factors and therapy
Vascular risk factor management
Recommend and facilitate optimal lifestyle practices†
Treat hypertension to a goal of <130/80 mm Hg for most patients
Prescribe atorvastatin 80 mg/d if there is no major-risk cardiac course of embolism, no other indication for statin therapy, and LDL-C >100 mg/dL‡
Target hemoglobin A1c ≤7% for most patient with diabetes
Select glucose-lowering medications with proven cardiovascular benefit in addition to metformin for patients with diabetes
Offer multidimensional care (lifestyle, nutrition counseling, self-management, medications) to achieve glycemic control and improve risk factors for patients with diabetes
Facilitate weight management for patients with overweight or obesity
Additional recommendations for the management of large-artery atherosclerosis
Prescribe 325 mg/d aspirin for patients with stroke related to 50%–99% intracranial stenosis
Refer patients with 70%–99% ipsilateral extracranial carotid stenosis for endarterectomy within 6 mo of the index event
Refer selected patients with 50%–69% ipsilateral extracranial carotid stenosis for endarterectomy
Provide intensive medical therapy§ regardless of carotid surgery
Cardioembolism
Prescribe an oral anticoagulant for atrial fibrillation or flutter unless contraindicated
Select apixaban, dabigatran, edoxaban, or rivaroxaban in preference to warfarin for patients with atrial fibrillation or flutter, except for patients with moderate to severe mitral stenosis or a mechanical heart valve
Warfarin is recommended over novel oral anticoagulants for patients with atrial fibrillation associated with moderate to severe mitral stenosis or mechanical valves
Patient behavior
Facilitate behavior change to improve stroke literacy, lifestyle, and medication adherence
Health equity
Address social determinants of health (such as literacy level, language proficiency, medication affordability, food insecurity, housing, transportation) when managing stroke risk factors
Monitor health care performance measures on a population level to identify and reduce disparities
Use the AHRQ Universal Precautions Toolkit for Health Literacy[80] to ensure that oral instructions to patients are understandable and sensitive to health literacy
Antithrombotic medications
For noncardioembolic ischemic stroke or TIA, aspirin 50–325 mg, clopidogrel 75 mg, or combination aspirin 25 mg/dipyridamole 200 mg twice daily is recommended
For patients with recent minor (National Institutes of Health Stroke Scale ≤3) noncardioembolic ischemic stroke or high-risk TIA (ABCD[2] score ≥4), dual antiplatelet therapy (aspirin plus clopidogrel) should be initiated early (ideally within 12–24 hours of symptom onset) and continued for 21–90 d, followed by single antiplatelet therapy.‖

LDL-C indicates low-density lipoprotein cholesterol; and TIA, transient ischemic attack.

*See the AHA/American Stroke Association guideline, "2021 Guideline for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack,"[38] for additional details, including additional class 1 recommendations regarding special cardiac, arterial, genetic, vascular, and other conditions.

†Optimal lifestyle practice: regular physical activity, weight management, smoking cessation, avoidance of passive tobacco smoke, avoidance of excessive alcohol use, and avoidance of certain substances such as stimulants and intravenous opioids. A healthy Mediterranean-type diet and sodium restriction are also recommended, but as class 2A.

‡The 2018 Cholesterol Clinical Practice Guideline[81] goal offers slightly different recommendations, treating patients with ischemic stroke or TIA differently based on risk status and age. Most patients with stroke or TIA, however, are recommended for high-intensity statin therapy (atorvastatin or rosuvastatin) to lower LDL-C by ≥50%. For high-risk patients, including those with aortic arch atheroma, prescribe high-intensity statin therapy to reduce LDL-C by ≥50% and achieve an LDL-C value <70 mg/dL.

§Intensive medical therapy: antiplatelet therapy, blood pressure control to target, lipid-lowering therapy.

‖For patients with ischemic stroke or TIA within 30 d related to severe stenosis of a major intracranial artery, dual antiplatelet therapy for up to 90 d is reasonable to further reduce recurrent stroke risk.

the risk in a person without prior stroke. In addition to clinically evident recurrences, 30% of patients with an acute stroke have clinically inapparent disease on brain imaging and elevated risk for future inapparent events, including small-vessel disease, which can accelerate cognitive and physical impairment.[78] Fortunately, medical and surgical interventions are highly effective in preventing recurrent brain ischemia.[79]

A first step in outpatient primary care is to confirm the cause of the stroke (see Establish the Foundation for Care) because the pathogenesis guides specific preventive therapy. Indicated diagnostic tests (Table 4) that have not yet been completed should be prioritized on arrival in the community, especially carotid imaging and cardiac rhythm monitoring. Although most patients will have a stroke caused by 1 of 3 mechanisms (ie, cardioembolism, large-vessel disease, or small-vessel disease), it is important to consider other causes (eg, arterial dissection, vasculitis, patent foramen ovale, sickle cell disease, Moyamoya, hypercoagulable states, carotid web, and fibromuscular dysplasia) that may have highly specialized and effective treatments. A full list of stroke causes and secondary prevention recommendations can be found in the AHA/American Stroke Association guideline, "2021 Guideline for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack."[38] Despite careful searching, the cause of stroke remains uncertain for ≈30% of patients.

Table 4 also lists the class 1 treatment recommendations from the AHA/American Stroke Association that apply the most common stroke causes and risk factors.[38] The AHA recommendations are similar to those of the Heart and Stroke Foundation of Canada.[82] Carotid revascularization for carotid stenosis, anticoagulation for atrial fibrillation, BP lowering, statin therapy, and antiplatelet therapy are proven in clinical trials to prevent recurrent vascular events. Lifestyle improvement, diabetes management, and weight optimization are also recommended as class 1. However, class 1 for these is assigned based on high-quality evidence that they reduce risk factors for stroke rather than more direct evidence that they prevent recurrent stroke.

Hypertension management is particularly important because 50% to 80% of patients have hypertension, and treatment is highly effective. Two trials showed that BP lowering after stroke reduces the risk for recurrence by 30% to 40%, one using indapamide alone[83] and the other using perindopril with the addition of indapamide as needed.[84,85] The results of these trials provide the evidence to prioritize the selection of thiazide diuretic, angiotensin receptor blocker, or angiotensin-converting enzyme inhibitor for patients with stroke. However, choosing a BP-lowering regimen should consider patient comorbidities, drug tolerance, and preferences.[38] The 2021 AHA/American Stroke Association guideline cites moderate-quality evidence to strongly recommend a goal of <130/80 mm Hg after ischemic stroke for most patients.[38] Treatment tolerance, safety, and patient characteristics are considerations for target BP, as for drug selection.

Research on strategies to prevent recurrent stroke or transient ischemic attack has been dominated by studies of single surgical and pharmaceutical interve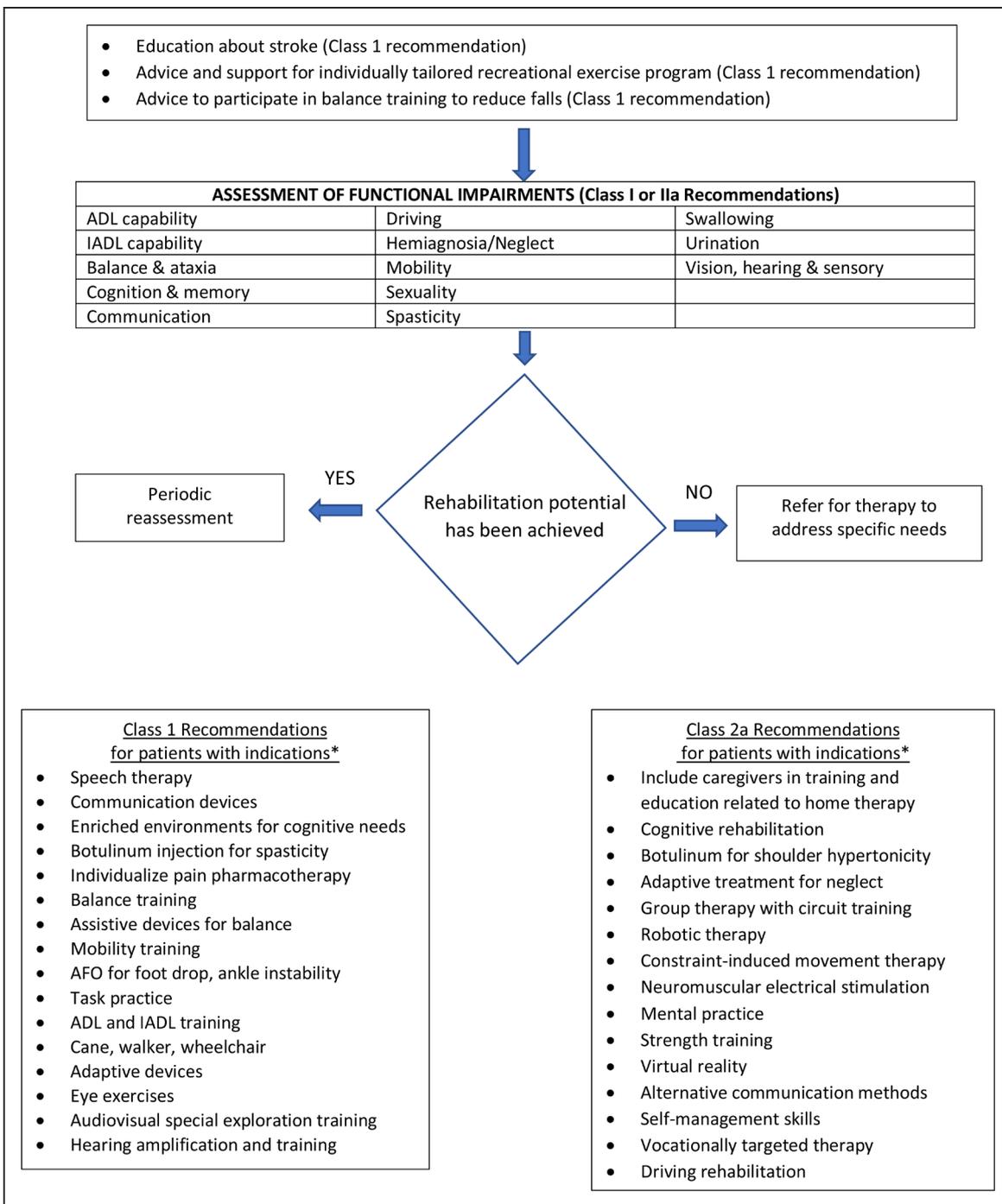ntions. Only recently have investigators and funding agencies ventured into research on interventions that address so-called lifestyle factors, including diet quality, physical activity, obesity, tobacco use, and substance use disorders.[86] Lifestyle interventions can improve cardiovascular risk factors but have not yet been shown to prevent clinical vascular events after stroke or transient ischemic attack.[87]

MAXIMIZING FUNCTION AND INDEPENDENCE

Approximately 800 000 US adults will have a new stroke each year, and 10% will die within 30 days.[5,88] At the time of their stroke, ≈5% of patients <55 years of age and 40% >85 years of age have premorbid moderate disability (modified Rankin Scale score >2).[41] By 90 days after a stroke, new stroke-related disability of at least moderate severity develops in 10% of younger adults to 30% of adults >65 years of age.[40] The cumulative burden of premorbid and new disability likely exceeds 10% in younger adults and 50% in older adults.[89] Life-changing indirect effects include depression, loss of income, and social isolation. The US Centers for Disease Control and Prevention estimated in 2009 that 1 076 000 adults >18 years of age (2.4% of the population) were at least moderately disabled as a result of stroke (ie, required an assistive device for mobility, required assistance for activities of daily living or instrumental activities of daily living, or were limited in their ability to work around the home or at a job).[90]

Recovery begins early after stroke, and it can take years for a patient to achieve maximum restoration in function. Motor strength and limb mobility improve rapidly in the first 30 days and reach maximum recovery by ≈4 months when rehabilitation is provided.[91] Restoration of ability to engage in physical activities stretches beyond this time, however, because of brain remodeling (ie, healthy brain taking over functions of infarcted brain), adaptation of compensating strategies, restoration of confidence, and use of adaptive equipment. Effective rehabilitation therapies exist not just for motor recovery but for cognition (ie, memory, orientation, attention, and language), communication, incontinence, pain, dysphagia, sensory impairment (ie, vision, neglect), spasticity, balance, and mobility.[92] Improvements in each of these domains follows the same course as for motor improvement, with rapid early recovery followed by a longer time to maximum restoration of function. Stroke recovery can fluctuate over time, depending on many factors, such as caregiver support, chronic comorbid conditions, episodic acute events, access to assistive devices, joint flexibility, spasticity, pain, and degree of intact motor function.

All patients who have had a stroke should have an assessment of their capacity to perform activities of

- Education about stroke (Class 1 recommendation)
- Advice and support for individually tailored recreational exercise program (Class 1 recommendation)
- Advice to participate in balance training to reduce falls (Class 1 recommendation)

ASSESSMENT OF FUNCTIONAL IMPAIRMENTS (Class I or IIa Recommendations)

ADL capability	Driving	Swallowing
IADL capability	Hemiagnosia/Neglect	Urination
Balance & ataxia	Mobility	Vision, hearing & sensory
Cognition & memory	Sexuality	
Communication	Spasticity	

YES ← **Rehabilitation potential has been achieved** → NO

Periodic reassessment

Refer for therapy to address specific needs

Class 1 Recommendations for patients with indications*
- Speech therapy
- Communication devices
- Enriched environments for cognitive needs
- Botulinum injection for spasticity
- Individualize pain pharmacotherapy
- Balance training
- Assistive devices for balance
- Mobility training
- AFO for foot drop, ankle instability
- Task practice
- ADL and IADL training
- Cane, walker, wheelchair
- Adaptive devices
- Eye exercises
- Audiovisual special exploration training
- Hearing amplification and training

Class 2a Recommendations for patients with indications*
- Include caregivers in training and education related to home therapy
- Cognitive rehabilitation
- Botulinum for shoulder hypertonicity
- Adaptive treatment for neglect
- Group therapy with circuit training
- Robotic therapy
- Constraint-induced movement therapy
- Neuromuscular electrical stimulation
- Mental practice
- Strength training
- Virtual reality
- Alternative communication methods
- Self-management skills
- Vocationally targeted therapy
- Driving rehabilitation

Figure 2. An algorithm for screening and management of poststroke physical rehabilitation needs in primary care.
Class or recommendations from the 2016 AHA poststroke rehabilitation guidelines.[92] ADL indicates activities of daily living; AFO, ankle-foot orthosis; and IADL, instrumental activities of daily living.

daily living and instrumental activities of daily living, their communication abilities, and their functional mobility (Figure 2).[1,92] This assessment determines the need for rehabilitation services. The assessment is initiated during admission to the hospital, rehabilitation center, or skilled nursing facility and again as part of discharge planning, but it should be repeated in the office setting. Capabilities and needs for rehabilitation can change over time and across the continuum of stroke recovery.

Three questions can be helpful in this assessment: (1) What could the patient do before the stroke that they cannot do now? (2) What does the patient want to be able to do? (3) Has the patient reached full potential? Sometimes the answers to these questions are apparent on observation in the office of mobility, speech, balance, gait, and mood. Other times, the answers may come from direct inquiry of patients and caregivers. Direct inquiry is essential to classify the capability to perform activities

of daily living and instrumental activities of daily living and can uncover other gaps between what a patient did before the stroke and what they would like to be able to do now. Common questions include, "Are you still able to shop for groceries?" and "Are you able to prepare and eat your favorite meals at home?"

Structured instruments for functional assessment and determination of rehabilitation needs are not commonly used in primary care, but a few can be helpful in special circumstances, especially to identify fall risk.[93] The Berg Balance Scale and Morse Scale classify fall risk.[94] The timed up and go test and the 10-meter walk test classify mobility skill.[95] Screening patients after they have had a stroke for cognitive impairment by using a validated brief instrument (eg, the Mini-Mental State Examination or Montreal Cognitive Assessment test) is recommended.[92,96–98] Guidelines emphasize routine screening before hospital discharge, during the first year, and possibly later. Case finding is warranted, of course, when cognitive impairment is suspected from clinical observation or report by the patient or acquaintances. Formal neuropsychological testing is rarely needed. The Patient Health Questionnaire-9 test screens for depression.

Once functional status is classified and unmet rehabilitation potential has been identified, the next step is to link the patient with appropriate rehabilitation resources. Figure 2 is based on the 2016 AHA guidelines for adult stroke rehabilitation and recovery.[92] Listed in the figure are the class 1 and class 2 recommendations for rehabilitation interventions for patients with specific indications. Where available, these interventions should be offered to eligible patients. Connecting patients to appropriate rehabilitation services may be as easy as making a referral to a local multidisciplinary outpatient rehabilitation facility, such as a rehabilitation hospital with outpatient services. However, specialty resources may include otolaryngology clinics with hearing and speech programs; neuro-ophthalmologists; orthotists; driver assessment programs (eg, a local department of motor vehicles or Easter Seals Program); a neurologist or physiatrist who can provide botulinum injection therapy; a vascular neurologist to determine cause; stand-alone physical, occupational, and speech therapy programs; and psychology (Table in the Data Supplement).

Aerobic exercise is important for all patients after stroke, regardless of specific rehabilitation needs. Exercise improves functional ability, walking endurance, balance, cardiovascular health, and secondary stroke prevention.[99,100] Primary care clinicians can improve physical activity participation by their patients through structured practices of assessment, counseling, and referral. Linking patients to community exercise programs is particularly effective. Recent meta-analyses suggest that office-based practices can help patients increase levels of physical activity by 20% to 40%.[101] The process starts by asking

patients about their physical activity. Simple tools are available for this, such as the "Exercise Vital Sign" that includes 2 questions regarding the number of days per week and minutes per week the patient engages in moderate to vigorous activity. These questions can be included in office workflow (eg, the electronic medical record) and responses flagged to prompt further discussion between clinician and patient.[101] The minimal amount of physical activity required to achieve a meaningful health benefit after stroke has not been defined. For the average US adult, however, the AHA and US government recommend 150 minutes per week of moderate activity (eg, walking briskly) or 75 minutes per week of vigorous activity (eg, jogging, running, carrying heavy groceries, strenuous fitness class).[102] If patients with a stroke can achieve these goals, it would be reasonable to support their efforts.

PRACTICE QUALITY IMPROVEMENT

Quality improvement begins when clinicians identify an aspect of care to upgrade[103]; for example, clinicians may set a goal of improving BP control for patients with hypertension. Key features of quality improvement include (1) an iterative process of continuous planning, implementing change, study, testing, and redesign; (2) an agreed-on methodology (eg, Lean, Six Sigma); (3) empowerment of front-line workers and service users; and (4) data to inform and monitor the process (eg, audit and feedback).[103] Quality improvement specifically goes beyond an audit to include ongoing practice change through human engagement in goal setting, reflecting and evaluating, and planning to reach goal.

Quality improvement solutions are sometimes invented to meet unique needs for a health care professional, practice, or health system, but often they are adapted from discoveries in health services research or implementation science, a field within health services research that seeks to improve the use of evidence-based research by clinicians and policymakers.[103–105] Effective interventions relevant to stroke care include employment of pharmacists in a practice to improve medication adherence and achieve better control of hypertension and diabetes[74,106–108] and patient self-monitoring with or without self-management to improve BP control.[109]

In the field of stroke care, health services research has discovered effective interventions for poststroke care, often addressing the critical postdischarge transition period.[3,71,75,110–114] A broad conclusion from this research is that hospital-based or system-based collaborative care and case management can help patients with stroke to improve risk factor control. Effective models include advanced practice clinicians who are part of or in close communication with primary care teams, meet personally with patients, and have prescription authority. However, the benefit of case management may be reduced in circumstances of

high-quality primary care. Interventions directed at patient education or behavior alone are not effective.[71,113]

CONCLUSIONS

Stroke is a complex disease with many causes, consequences, and treatments. All patients with stroke need high-quality primary care to manage new needs, prevent recurrence, remediate complications, optimize quality of life, and facilitate prompt access to specialists as needed. A simple approach to office-based primary care builds on this specialty's foundational strengths to enhance care for 7 million US residents with a recent or remote stroke event. Primary care is developed, organized, and financed differently around the world, but the needs of patients are universal. The strategy we propose and the science that underlies it may be transferrable to other health systems and populations.

ARTICLE INFORMATION

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

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*Modest.

†Significant.

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*Modest.

†Significant.

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