



# **Clinical Insights:**

## ***Effective Care for Patients with Chronic Conditions***

***2011–2012***

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# Clinical Insights:

## Effective care for patients with asthma

The goals of asthma management are to reduce impairment by achieving asthma control and to reduce risk by preventing exacerbations and hospitalizations and preventing progressive loss of lung function. The essential elements of care to achieve these goals include:

**Medications:** The following medications may be recommended for patients with asthma, depending on individual circumstances. A step-wise approach is recommended depending on asthma severity and level of control; medication dosages are increased when asthma symptoms are not well-controlled and decreased when asthma symptoms are absent.

- **Long-acting (controller) medications:** Used to maintain long-term asthma control in patients who will benefit, including patients with persistent asthma and children and infants who require symptomatic treatment two or more times per week.
  - Inhaled corticosteroids (ICSs) are the most potent and consistently effective long-term controller medications for asthma. In general, ICSs are the treatment of choice.
  - For patients treated with ICSs who need additional control, inhaled long-acting beta<sub>2</sub>-agonists (LABAs) are more effective than leukotriene antagonists; e.g., montelukast, for patients 12 years and older.
  - LABA use without an ICS is contraindicated. Pediatric and adolescent patients who require addition of LABA to ICS should use a combination product.
  - Abruptly stopping long-acting controller medications, particularly LABAs, may result in acute worsening of symptoms (withdrawal). Therefore, once asthma control has been achieved and maintained, a step-down approach is recommended if possible without loss of asthma control.
- **Short-acting (rescue) medications:** Used as needed to promptly relieve acute symptoms.

**Patient education:** Successful asthma management requires that the patient and/or caregivers understand and have the skills to become active partners in asthma management. Education can decrease asthma hospitalizations and improve daily function. Key elements include respiratory monitoring (symptom and/or lung function), trigger recognition and avoidance, and proper use of appropriate medications. Observe patients using inhalers, spacers and/or spacer masks (for children), and/or nebulizers and provide guidance as needed to ensure correct use.

**Written asthma action plan** (either symptom-based or peak-flow-based): These are particularly recommended for: (1) patients with moderate or severe persistent asthma, (2) those with a history of severe exacerbations, and (3) patients with poorly controlled asthma. A written action plan should include:

- explicit, patient-specific recommendations for minimizing environmental triggers;
- steps to assess changes in symptoms or lung function (see “Respiratory monitoring” below) and adjust medication, as appropriate;
- actions to take when medications are ineffective or if an emergency situation arises;
- contacts for securing urgent care, if needed.

**Respiratory monitoring:** The nature and intensity of self-monitoring should be individualized, based on such factors as asthma severity, patient’s ability to perceive or report airflow obstruction, availability of peak-flow meters, and patient preferences. Either symptom monitoring or peak-flow measurement can be effective. Components of respiratory monitoring may include the following, depending on individual needs:

- **Symptom monitoring:** Early recognition of symptoms (cold, cough, chest tightness) and step-up in medications. (Symptom-based monitoring may be preferred in children.)
- **Peak-flow measurement:** Peak-flow-based monitoring should be considered for the following:
  - moderate or severe persistent asthma;
  - history of severe exacerbations;
  - patients who poorly perceive airflow obstruction and worsening asthma;
  - patients who prefer this approach.

Peak-flow measurement may be done daily, or for two- to three-week intervals when symptoms change, as part of a symptom-based action plan. Peak-flow measurement may also be helpful during exacerbations to guide treatment decisions.

- **Spirometry:** At diagnosis, on stabilization of symptoms and peak flow, and during progressive loss of asthma control. (Regular spirometry may not be needed in mild-to-moderate persistent asthma.)

**Trigger recognition and avoidance:** These include inhaled allergens (e.g., pollens, animal, cockroach, and dust-mite allergens); occupational exposures (e.g., chemicals and sprays); respiratory irritants (e.g., tobacco smoke, air pollution, and sprays); comorbid conditions (e.g., GERD and sinusitis); and other factors (e.g., medications, sulfites, and viral respiratory infections).

**Smoking cessation:** Encouraged for all patients, including avoidance of secondhand smoke.

**Depression monitoring:** The association between asthma and depression is less strong than for other chronic conditions such as cardiovascular disease or diabetes. However, screening is always appropriate for patients with any chronic condition. Screening improves the accurate identification of depression in primary care settings, and treatment of depressed adults identified in primary care settings decreases clinical morbidity. Two simple questions may be used as a screening tool (“Over the past two weeks, have you felt down, depressed, or hopeless?” and “Over the past two weeks, have you felt little interest or pleasure in doing things?”) Patients who screen positive (i.e., those who answer “yes” to either question) should undergo a full diagnostic interview.

**Influenza vaccination (seasonal):** Should take place annually for everyone 6 months and older.

#### **Pneumococcal vaccine (PPSV23):**

- **Patients with asthma:** Recommended for adults 19 through 64 years and children 2 through 18 years who are treated with prolonged high-dose oral corticosteroids. Children 2 through 18 years with underlying medical conditions also should receive PPSV23 after completing all recommended doses of 13-valent pneumococcal conjugate vaccine (PCV13), which provides broader protection for young children against pneumococcal diseases. (See revaccination below.)
- **General recommendations include:** All adults 65 and older; adults who smoke cigarettes; and adults 19 through 64 years who have certain medical conditions, including chronic pulmonary diseases (including asthma), chronic cardiovascular diseases, and diabetes\*. A one-time revaccination is recommended five years after the first for some groups, including patients with chronic kidney disease, those who are immunocompromised, and those vaccinated before 65\*.

\*Not a complete list.

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## Clinical Insights:

# Effective care for patients with permanent (chronic) atrial fibrillation

Atrial fibrillation is classified as paroxysmal, persistent, or permanent (chronic). These insights are intended to inform the ongoing management and effective care of patients with long-standing or permanent (chronic) atrial fibrillation (atrial fibrillation that has persisted for more than a year); cardioversion has either not been attempted or has failed.

**Medications:** The following medications may be recommended for patients with permanent (chronic) atrial fibrillation, depending on individual circumstances:

- **Antithrombotic/anticoagulant therapy with aspirin or warfarin to reduce stroke risk:** Choice of regimen (aspirin vs. warfarin) should be based on risk stratification (CHADS<sub>2</sub> score — a clinical prediction rule for estimating stroke risk in patients with atrial fibrillation), consideration of the expected net clinical benefit of warfarin (rate of events prevented by warfarin minus intracranial hemorrhages attributable to warfarin), availability of high-quality monitoring services, and patient preference. In some risk categories, CHADS<sub>2</sub> scores of 0 or 1, there may be little/no net clinical benefit. The net clinical benefit of warfarin is clear with CHADS<sub>2</sub> scores of 2 or more, and greatest in patients with CHADS<sub>2</sub> scores of 4 to 6, those with prior history of stroke, and those aged 85+. The threshold of benefit at which patients will chose warfarin anticoagulation varies, and some people at intermediate risk may reasonably decide against it.

- Clopidogrel (Plavix) is not superior to aspirin and does not replace warfarin.
- Dabigatran (Pradaxa), a direct thrombin inhibitor, has been recently approved by the FDA. Dabigatran was equivalent to warfarin in a recent noninferiority trial and does not require INR testing, dose adjustments, or food restrictions. In addition, other new types of anticoagulation medications are under development.

- **Rate control to maintain hemodynamic stability and/or avoid symptoms and to prevent long-term cardiomyopathy:**
  - **Pharmacological:** First-line agents are beta blockers or nondihydropyridine calcium channel blockers. A second-line agent is digoxin; it is not effective at controlling rate with exertion, but is a reasonable choice for sedentary patients and those with heart failure. Amiodarone is also effective, but not a primary therapy for rate control.
  - **Nonpharmacological:** For patients who remain symptomatic despite pharmacological rate control. Options include radiofrequency AV node ablation with permanent pacemaker or AV nodal conduction modification.

### Written action plan that includes:

- *For all patients:* Instructions on how to identify and respond to heart rate changes that are persistently outside the patient's target range.
- *For patients on warfarin:* Instructions for consistent dosing and education about potential drug interactions, dietary and activity guidelines, International Normalized Ratio (INR) monitoring, and appropriate response to missed warfarin doses and signs of bleeding. Patients should have access to clinical support systems for addressing out-of-range INR results.

### Monitoring:

- *For all patients:* Regular assessment of heart rate, with patient at rest and after exercise.
- *For patients on warfarin:* Routine INR monitoring is required. Goal INR will vary depending on individual circumstances, but the general INR target is 2–3. Attention to potential drug interactions is important.

**Smoking cessation:** Encouraged for all patients, including avoidance of secondhand smoke.

### CHADS<sub>2</sub> stroke risk classification scheme for patients with atrial fibrillation

Risk Factor	Letter Assigned	Point Value
Congestive heart failure	C	1
Hypertension	H	1
Age ≥75	A	1
Diabetes mellitus	D	1
History of ischemic stroke or transient ischemic attack	S	2

A patient's CHADS<sub>2</sub> score is the sum of the points assigned for each risk factor. The higher the score, the higher the patient's risk for stroke.

**Depression monitoring:** Screening is always appropriate for patients with any chronic condition. Screening improves the accurate identification of depression in primary care settings, and treatment of adults identified in primary care settings decreases clinical morbidity. Two simple questions may be used as a screening tool (“Over the past two weeks, have you felt down, depressed, or hopeless?” and “Over the past two weeks, have you felt little interest or pleasure in doing things?”) Patients who screen positive (i.e., those who answer “yes” to either question) should undergo a full diagnostic interview.

**Influenza vaccination (seasonal):** Should take place annually for everyone 6 months and older.

**Pneumococcal vaccine:**

- **Patients with atrial fibrillation:** If other indications are present (see below).
- **General recommendations include:** All adults 65 and older; adults who smoke cigarettes; and adults 19 through 64 years who have certain medical conditions, including chronic pulmonary diseases (including asthma), chronic cardiovascular diseases, and diabetes\*. A one-time revaccination is recommended five years after the first for some groups, including patients with chronic kidney disease, those who are immunocompromised, and those vaccinated before age 65\*.

\*Not a complete list.

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## Clinical Insights:

### Effective care for patients with chronic obstructive pulmonary disease (COPD)

The goals of COPD management are to relieve symptoms, prevent disease progression, improve exercise tolerance and health status, prevent and treat complications and exacerbations, and reduce mortality. The essential elements of care to achieve these goals include:

**Smoking cessation:** Encouraged for all patients, to slow disease progression, including avoidance of secondhand smoke.

**Medications:** For patients with few or intermittent symptoms (Stage I: Mild COPD), use of a short-acting inhaled bronchodilator as needed to control dyspnea is sufficient. Monotherapy with a long-acting bronchodilator or inhaled corticosteroid (ICS) is recommended for symptomatic patients with moderate to severe COPD for reducing exacerbations. Patients with FEV<sub>1</sub> of less than 60 percent predicted may be more likely to derive benefit from treatment than those with higher FEV<sub>1</sub>. The following medications, either alone or in combination, may be recommended for patients with COPD, depending on individual patient circumstances, such as response to therapeutic trials:

- **Bronchodilators:** Given as needed or on a regular basis to prevent or reduce symptoms. May also reduce disease progression in patients with FEV<sub>1</sub> of less than 60 percent.
  - The principal bronchodilators are short-acting and long-acting beta<sub>2</sub>-agonists and anticholinergics or a combination of these.
  - Although methylxanthines (e.g., theophylline) are not recommended as part of routine care, they may be added or substituted if patients have limited benefit and/or intolerable side effects with bronchodilators and/or ICS.
  - Abruptly stopping daily-use bronchodilators may result in acute worsening of symptoms (withdrawal.)
- **Corticosteroids:** ICS may reduce frequency of exacerbations and slow declines in health status in severe or very severe COPD with frequent exacerbations (three or more in past three years). However, several recent trials have shown an increased risk of pneumonia associated with ICS use in patients with severe COPD. Try to limit oral corticosteroid therapy to short-course treatment of exacerbations.

**Written symptom response plan:** This should include steps to take for dealing with new, different, or worsening symptoms.

**Long-term oxygen therapy** can help improve survival in patients with:

- **PaO<sub>2</sub> ≤ 55 mm Hg**
- **SaO<sub>2</sub> ≤ 88 percent**
- **PaO<sub>2</sub> 55–60 mm Hg** with signs of pulmonary hypertension, peripheral edema suggesting right-sided heart failure, or polycythemia (hematocrit >55 percent).

**NIPPV:** Non-invasive positive pressure ventilation (NIPPV) is particularly beneficial for COPD exacerbations associated with hypercapnia or respiratory failure.

**Pulmonary rehabilitation or exercise:** All patients benefit from exercise training programs, improving with respect to both exercise tolerance and symptoms of dyspnea and fatigue. In patients with severe airway obstruction, pulmonary rehabilitation can reduce hospitalizations and improve health status and exercise capacity. The specific components vary: patient education, self-management strategies, nutritional support, respiratory muscle training, and exercise prescription. Benefits of programs lasting at least six weeks can include improved exercise tolerance, decreased dyspnea, and decreased fatigue.

**Respiratory monitoring:** The primary purposes of spirometry are for diagnosis and determining when to initiate treatment (when FEV<sub>1</sub> is <60 percent predicted). Patients with FEV<sub>1</sub> <60 percent predicted may be more likely to benefit from regular treatment than those with higher FEV<sub>1</sub>. There is less evidence that spirometry is helpful when there is significant change in symptoms or a complication or that periodic testing is useful to monitor changes over time.

**Trigger avoidance:** These include the avoidance of tobacco smoke, occupational dusts/chemicals, and indoor/outdoor air pollutants.

**Surgical treatments:** For carefully selected patients, consideration of bullectomy, lung volume reduction surgery, or lung transplant may be appropriate.

**Depression monitoring:** Chronic disease is a risk factor for depression. Screening improves the accurate identification of depression in primary care settings, and treatment of depressed adults identified in primary care settings decreases clinical morbidity. Two simple questions may be used as a screening tool (“Over the past two weeks, have you felt down, depressed, or hopeless?” and “Over the past two weeks, have you felt little interest or pleasure in doing things?”) Patients who screen positive (i.e., those who answer “yes” to either question) should undergo a full diagnostic interview. In addition, anxiety associated with chronic respiratory distress may be a major cause of decreased quality of life for patients with COPD, and appropriate treatment may improve outcomes.

**Influenza vaccination (seasonal):** Should take place annually for everyone 6 months and older.

**Pneumococcal vaccine:**

- **Patients with COPD:** Recommended for adults 19 through 64 years with chronic pulmonary diseases, including COPD. (See revaccination below.)
- **General recommendations include:** All adults 65 and older; adults who smoke cigarettes; and adults 19 through 64 years who have certain medical conditions, including chronic pulmonary diseases (including asthma), chronic cardiovascular diseases, and diabetes\*. A one-time revaccination is recommended five years after the first for some groups, including patients with chronic kidney disease, those who are immunocompromised, and those vaccinated before age 65\*.

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## Clinical Insights:

### Effective care for patients with coronary heart disease (CHD)

**Medications:** The following medications may be recommended for patients with CHD, depending on individual circumstances:

- **Beta blockers (or calcium-channel blockers, if beta blockers not tolerated):** To lower risk of heart attack, stroke, and CHD death; may also help manage angina.
- **Aspirin (low-dose) and/or other antiplatelet agent:** To lower risk of heart attack.
  - Dual antiplatelet therapy (DAT) with both a thienopyridine (clopidogrel or prasugrel) and aspirin is recommended for at least one year following drug-eluting stent placement and for at least one month (and ideally up to 12 months) following bare-metal stent placement to reduce risk of in-stent thrombosis. Some experts recommend indefinite DAT until data are available to determine the optimal duration; recommendations differ following stent placement for acute coronary syndromes. *Earlier discontinuation should be considered if the risks of bleeding outweigh the anticipated benefit.*

Antiplatelet therapy, both monotherapy and DAT, is associated with an increased risk of gastrointestinal (GI) bleeding. In patients receiving antiplatelet therapy, concomitant use of proton-pump inhibitors or histamine type-2 receptor antagonists (H2RAs) reduces the risk of GI bleeding and is:

- recommended in patients with history of upper GI bleeding;
- appropriate in those with multiple risk factors for GI bleeding (including advanced age; use of anticoagulants, steroids, or NSAIDs; and infection with *H. pylori*).

Recent studies have shown an association between PPIs and thrombotic events, independent of clopidogrel use. Therefore, decisions about concomitant use of PPIs and thienopyridines need to balance both CV and GI complications in weighing benefits and harms. The FDA recommends against concomitant use of clopidogrel with the PPI omeprazole.

- **Statins:** To reduce risk of heart attack, stroke, and CHD death.
- **ACE inhibitors (ACEIs) (or angiotensin-2 receptor blockers, if ACEI not tolerated):** To lower risk of heart attack, stroke, and CHD death.
- **Anti-anginal medications [long- and/or short-acting nitrates, calcium-channel blockers, and/or sodium channel blocker ranolazine (Ranexa®) in addition to beta blockers]:** As needed to prevent/treat stable angina.
- **NOTE:** If needed to achieve blood pressure control, diuretics may be added to initial therapy.

**Written action plan:** The plan should include steps for responding to new, different, or worsening symptoms.

**Management of lipid levels:** Measure lipid profile at least annually. Repeat lipid profiles at about four to six weeks after hospitalization and two to three months after initiation of or change in lipid-lowering medications.

- Regardless of baseline LDL levels, most patients with CHD will benefit from statin therapy to reduce LDL by 30 to 40 percent.
- Some expert guidelines recommend higher doses of statins (as tolerated) to reach specific LDL targets (e.g., below 100 or below 70), based on trials comparing lower doses vs. higher doses of statins. However, based on current evidence, the majority of the benefit of statins is achieved by lowering LDL by 30 to 40 percent.
- In patients who have achieved their LDL goal but whose triglycerides are 200–499, some expert guidelines (ATP-III and ACC/AHA) recommend additional therapy (e.g., higher-dose statin or add-on fibrates or niacin) to reduce non-HDL cholesterol (total cholesterol minus HDL) to <130 mg/dl (<target LDL+30).
- Currently, no randomized trials have examined whether efforts to achieve either target LDL or target non-HDL cholesterol levels with add-on fibrates or niacin reduces cardiovascular event rates. Trials have shown some benefit for high-dose statins compared with low-dose statins for reducing CVD events, but have not specifically compared adjusting statin dosing to achieve LDL treatment targets.

**Blood pressure management:** To achieve goal <140/90 with lifestyle changes and medications as needed. Blood pressure should be measured at each physician visit.

**Physical activity:** Encourage 30–60 minutes of activity seven days per week (minimum 5 days per week), as tolerated. Cardiac rehabilitation is recommended for those with recent acute coronary syndrome or revascularization and could be considered for all patients.

**Weight management:** To achieve or maintain BMI of 18.5 to 24.9 kg/m<sup>2</sup>. If weight loss is needed, the initial goal should be to gradually reduce body weight by about 10 percent. When waist circumference equals/exceeds 40 inches (102 cm) in men or 35 inches (88 cm) in women (thresholds may vary by ethnic group), consider lifestyle changes and treatments aimed at elements of the metabolic syndrome, as indicated. (The 2009 AHA/NHLBI Joint Interim Statement *Harmonizing the Metabolic Syndrome*, defines the criteria for clinical diagnosis of metabolic syndrome as elevated waist circumference [noted above]; elevated triglycerides greater than/equal to 150 mg/dl or drug treatment for elevated triglycerides; reduced HDL less than 40 mg/dl in men and less than 50 mg/dl in women or drug treatment for reduced HDL; elevated blood pressure greater than/equal to 130/85 mm Hg or on antihypertensive drug treatment in a patient with a history of hypertension; elevated fasting glucose greater than/equal to 100 mg/dl or on drug treatment for elevated glucose. Any three of five criteria constitute diagnosis of metabolic syndrome).

**Smoking cessation:** Encouraged for all patients, including avoidance of secondhand smoke and smokeless tobacco.

**Depression monitoring:** Chronic disease in general, and coronary heart disease in particular, is a risk factor for depression, and depression is associated with worse prognosis and higher risk of cardiac events in patients with CHD. Screening improves the accurate identification of depression in primary care settings, and treatment of depressed adults identified in primary care settings decreases clinical morbidity. Two simple questions may be used as a screening tool (“Over the past two weeks, have you felt down, depressed, or hopeless?” and “Over the past two weeks, have you felt little interest or pleasure in doing things?”) Patients who screen positive (i.e., those who answer “yes” to either question) should undergo a full diagnostic interview.

**Influenza vaccination (seasonal):** Should take place annually for everyone 6 months and older.

#### **Pneumococcal vaccine:**

- **Patients with coronary heart disease:** Recommended for adults 19 through 64 years who have chronic cardiovascular diseases. (See revaccination below.)
- **General recommendations include:** All adults 65 and older; adults who smoke cigarettes; and adults 19 through 64 years who have certain medical conditions, including chronic pulmonary diseases (including asthma), chronic cardiovascular diseases, and diabetes\*. A one-time revaccination is recommended five years after the first for some groups, including patients with chronic kidney disease, those who are immunocompromised, and those vaccinated before age 65\*.

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# Clinical Insights:

## Effective care for patients with diabetes mellitus (DM)

**Medications:** The following medications may be recommended for patients with diabetes, depending on individual circumstances:

- **Antihyperglycemic agents, including insulin.**
- **ACE inhibitors (or angiotensin-2 receptor blockers, if ACEI not tolerated):** Reduce blood pressure, slow progression of diabetic nephropathy in those with microalbuminuria or macroalbuminuria, and reduce cardiovascular mortality.
- **Diuretics, beta blockers, and/or calcium-channel blockers:** As needed to control hypertension and reduce cardiovascular events.
- **Statins (and/or other lipid-lowering agents as needed):** Reduce risk of cardiovascular events, including mortality.
- **Aspirin (low-dose) (or other antiplatelet agent; i.e., clopidogrel, if aspirin is contraindicated):** Primary prevention of cardiovascular (CVD) events in men over 50 and women over 60 with at least one additional major risk factor (family history of CVD; hypertension; smoking; dyslipidemia; or albuminuria); secondary prevention in patients with a history of CVD.

**Heart disease management:** Patients with diabetes are at high risk of developing vascular disease including coronary heart disease, peripheral arterial disease, and stroke. In those with diabetes, the mortality benefit from treating hypercholesterolemia and hypertension is greater than the mortality benefit from treating elevated blood glucose. Control of hypertension also reduces the development and progression of diabetic nephropathy and retinopathy.

**Blood pressure management for adults:** A goal of <130 systolic is appropriate for most patients with diabetes. Patients with diabetes should be treated to <80 diastolic. Blood pressure (BP) should be measured at each physician visit. Regimens including ACEI (or ARB if ACEI not tolerated) are recommended for patients with hypertension and microalbuminuria or macroalbuminuria.

**Blood pressure management for pediatrics:** Goal is BP  $\leq$  90th percentile for age, sex, and height or <130/80, whichever is lower. Treatment for BP >90th percentile should focus on lifestyle changes (including physical activity, weight loss). If BP is consistently >95th percentile for age, sex, and height, or if target BP is not reached with 3 to 6 months of lifestyle changes, medication is recommended in addition to lifestyle changes. Regimens including ACEI (or ARB if ACEI not tolerated) are recommended for patients with hypertension and microalbuminuria or macroalbuminuria.

**Management of lipid levels for adults:** Regardless of baseline LDL levels, most patients over the age of 40 with diabetes will benefit from statins to reduce LDL by ~30 to 40 percent. Some expert guidelines recommend higher doses of statins (as tolerated) to reach specific LDL targets (e.g., below 100 for those without CVD or below 70 for those with CVD). Trials have shown some benefit for high-dose statins compared with low-dose statins for reducing CVD events but have not specifically compared adjusting statin dosing to achieve LDL targets. The use of combination therapy (statins and other lipid-lowering agents) has not been evaluated for CVD outcomes or safety. Lipid profile should be measured at least annually. Lipid profile may be measured every two years in patients with low-risk lipid values (LDL <100; HDL >50; TG <150).

- **All patients:** Lifestyle modification focusing on dietary changes, weight loss if indicated, and increased physical activity can improve the lipid profile.
- **Patients with CVD:** Statin therapy is recommended.
- **Patients without CVD over age 40 with one or more risk factors for CVD:** Statin therapy is recommended.
- **Patients without CVD under age 40:** Consider statin use for those who have LDL above 100 mg/dl after lifestyle intervention or for those with more than one CVD risk factor. (Recommendations regarding statins in this group are based on expert opinion rather than clinical trial evidence.)
- **Patients with type 1 diabetes:** There is little evidence to guide the use of statins or the selection of LDL targets in this group. In patients with other cardiovascular risk factors, lipid goals are similar to those for patients with type 2 diabetes. This recommendation is based on expert opinion only.

### **Management of lipid levels for pediatrics (type 1 and 2):**

- Assess lipid profile soon after diagnosis, but after glycemic control is achieved, if there is a family history of high cholesterol (>240) or early coronary heart disease (CVD event before age 55) or if family history is unknown. Otherwise, the initial lipid profile can be done at puberty (age >10). Repeat every 5 years if LDL <100; annually if lipids are abnormal.
- After age 10, if LDL levels do not improve with optimal non-pharmacologic treatment, consider statin therapy in those with:
  - LDL 130–159 and one or more CVD risk factors (family history, hypertension, or smoking);
  - LDL >160.

**Glycemic control for adults:** A1C levels should be measured at least twice yearly in patients who are achieving glycemic goals; quarterly in patients who are not achieving glycemic goals or for whom therapy has changed.

The American Diabetes Association (ADA) guidelines recommend an A1C target of <7 percent for non-pregnant adults with type 1 and type 2 diabetes. There is good evidence that A1C targets around or below 7 percent are associated with lower rates of microvascular and neuropathic complications in type 1 and type 2 diabetes. Tight control primarily benefits patients with early microvascular and/or neuropathic complications. However, A1C targets should be individualized based on discussion about the possible benefits and harms.

There is no evidence in the immediate term that an A1C target of <7 percent is associated with fewer macrovascular events. In older patients with long-standing type 2 diabetes (>8–12 years) regimens needed to achieve A1C levels <7 percent have been associated with higher risks of severe hypoglycemia. In one large well-designed trial, mortality was higher among those who achieved an A1C of 6.4 percent compared to patients with an A1C of 7.5 percent. One trial suggests that there may be a reduction in long-term CVD events for a selected group of newly diagnosed patients who had three to four years of tight glycemic control.

Less stringent targets (e.g., A1C >7 percent) are appropriate for patients for whom the potential risks of intensive glycemic control may exceed the benefits. This may include those with:

- limited life expectancy;
- advanced micro- or macrovascular complications;
- multiple/extensive comorbid conditions, including the frailty syndrome;
- history of severe hypoglycemia.

**Glycemic control for pediatrics:** Some studies suggest that both recurrent severe hypoglycemia and chronic hyperglycemia may impair cognitive development in young children. Glycemic goals in children may need to be modified (i.e., relaxed) in order to achieve control while avoiding hypoglycemic episodes. Age-specific glycemic goals should be selected.

**Nephropathy:** Annual screening tests for microalbuminuria are recommended starting at diagnosis for all patients with type 2 diabetes. In patients with type 1 diabetes, begin annual screening five years after diagnosis. Annual screening is not necessary in patients on ACEI or ARB therapy. Some experts recommend continued annual screening after detection of microalbuminuria (even in patients on ACEI or ARB); however, this recommendation is controversial and not supported by trial evidence. Experts also recommend annual measurement of serum creatinine for estimating Glomerular Filtration Rate. If micro- or macroalbuminuria is detected, treatment typically includes ACEI or ARBs.

**Pediatric diabetes:** Begin annual screening once patients reach age 10 and have had diabetes for five years.

**Retinopathy:** Dilated and comprehensive eye exams are recommended annually or more frequently if retinopathy is progressing. Less frequent exams (every two to three years) may be considered following one or more normal exams.

- *Type 2 diabetes:* Begin annual screening shortly after diagnosis.
- *Type 1 diabetes:* For adults and children aged 10 years and older with diabetes for 3 to 5 years, begin annual screening within five years after diagnosis.

Screening is generally not recommended before age 10. Diabetes-related eye disease that is severe enough to threaten vision is rare before puberty, but the duration of diabetes before puberty may increase the risk of diabetic retinopathy, so it is important to consider each case individually.

**Neuropathy, peripheral:** Experts suggest screening for distal symmetric polyneuropathy (DPN) and comprehensive foot examination, including testing for loss of protective sensation at diagnosis and then annually for all patients.

- **Foot care:** Patients, especially those at high risk for foot conditions (e.g., with neuropathy), should examine their own feet daily.

**Patient education:** Self-management education that supports patients in gaining the knowledge, skills, and abilities needed for self-care can improve clinical outcomes and quality of life. Current best practices focus on helping patients gain skills to make informed self-management choices. A written action plan for responding to hypoglycemia, hyperglycemia, and sick day management is needed.

**Medical nutrition therapy and weight management:** Individualized therapy provided by a registered dietitian or other professional with special expertise can decrease A1C.

- Moderate weight loss (5 percent to 10 percent of body weight) in overweight and obese individuals improves glucose tolerance, reduces blood pressure, improves lipid levels, and reduces cardiovascular risks.
- Bariatric surgery should be considered in carefully selected patients with type 2 diabetes and BMI  $\geq$  35.

**Physical activity:** Encourage 150 minutes of aerobic physical activity per week (e.g., 30 minutes daily on five days) and resistance training three times per week unless contraindicated.

**Smoking cessation:** Encouraged for all patients, including avoidance of secondhand smoke.

**Depression monitoring:** Chronic disease is a risk factor for depression. Screening improves the accurate identification of depression in primary care settings, and treatment of depressed adults identified in primary care settings decreases clinical morbidity. Two simple questions may be used as a screening tool (“Over the past two weeks, have you felt down, depressed, or hopeless?” and “Over the past two weeks, have you felt little interest or pleasure in doing things?”) Patients who screen positive (i.e., those who answer “yes” to either question) should undergo a full diagnostic interview.

**Influenza vaccination (seasonal):** Should take place annually for everyone 6 months and older.

**Pneumococcal vaccine (PPSV23):**

- **Patients with diabetes:** Recommended for adults 19 years and older and children 2 through 18 years. Children 2 through 18 years with underlying medical conditions also should receive PPSV23 after completing all recommended doses of 13-valent pneumococcal conjugate vaccine (PCV13), which provides broader protection for young children against pneumococcal diseases. (See revaccination below.)
- **General recommendations include:** All adults 65 and older; adults who smoke cigarettes; and adults 19 through 64 years who have certain medical conditions, including chronic pulmonary diseases (including asthma), chronic cardiovascular diseases, and diabetes\*. A one-time revaccination is recommended five years after the first for some groups, including patients with chronic kidney disease, those who are immunocompromised, and those vaccinated before age 65\*.

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## Clinical Insights:

### Effective care for patients with heart failure (HF)

The material in these insights is primarily intended for use in patients with symptomatic reduced left ventricular ejection fraction (LVEF) (i.e., stage C and D heart failure). Treatment objectives for patients with primarily diastolic dysfunction (i.e., those with normal or near-normal ejection fraction) are similar at this time; trials are under way to determine optimal evidence-based management strategies for this population. Management approaches for HF secondary to valvular causes differ and are not discussed here.

**Fluid balance:** Changes in volume status often precede onset of clinical exacerbations by several days. Patients are advised to restrict sodium intake and record their weight daily. A written action plan may instruct patients to notify their physician or adjust medication (diuretic) doses in response to predetermined changes in body weight and/or symptoms; this approach may reduce the incidence of clinical deterioration.

**Medications:** The following medications may be recommended for patients with HF, depending on individual circumstances:

- **Diuretics:** Regulate volume status and improve symptoms and exercise tolerance. In selected patients, education and counseling of patients and/or caregivers regarding self-adjustment of diuretic dose in response to changes in volume status may be appropriate.
- **ACE inhibitors (or angiotensin-2 receptor blockers [ARBs], if ACEI not tolerated):** Relieve symptoms, improve clinical status, and reduce mortality and hospitalization.
- **Beta blockers (specifically bisoprolol, carvedilol, or sustained-release metoprolol):** Reduce symptoms, improve clinical status, and reduce mortality and hospitalization.
- **Additional medications** should be considered in certain patient subgroups, such as those with persistent or worsening symptoms despite optimal therapy with an ACEI and beta blocker. The choice of additional therapies will depend on clinical considerations that include (but are not limited to) age, renal function, serum potassium, blood pressure, and volume status. Note that the combination of an ACEI, ARB, and aldosterone antagonist is not recommended. Options for additional medications include:
  - addition of an ARB (instead of or in addition to ACEI, if either ACEI or BB are contraindicated or not tolerated);
  - addition of an aldosterone antagonist (for moderate or severe HF or post-MI);
  - addition of the combination of hydralazine/isosorbide dinitrate (including for patients of African descent).
- **Digoxin (in many cases):** Improve symptoms, exercise tolerance, and quality of life; reduce hospitalization in patients with persistent symptoms.
- **Aspirin (low-dose) or other antiplatelet agent:** When otherwise indicated (e.g., HF of ischemic origin or patients with drug-eluting stent) to reduce risk of cardiovascular events. However, aspirin use is controversial in patients with chronic HF because there is some evidence that it may reduce the benefits of ACEI. Clopidogrel may not attenuate ACEI benefits, but has not been shown to improve HF outcomes.
- **Statins:** When otherwise indicated per National Cholesterol Education Program guidelines (e.g., HF of ischemic origin) to reduce risk of cardiovascular events.

**Blood pressure management:** To achieve goal <130/80, if tolerated. In trials, optimal outcomes are seen at SBP 110 to 130. Blood pressure should be measured at each physician visit. Particularly in elderly patients, care should be taken to avoid postural hypotension. (NOTE: neither JNC-VII nor 2009 ACC/AHA HF guideline specifies a particular BP goal.)

**Management of lipid levels** with therapeutic lifestyle changes and medications, if needed, in accordance with recommended guidelines. Based on current evidence, the majority of the benefit of statins for patients with co-morbid CHD and CHD-risk equivalents is achieved by lowering LDL by 30 percent to 40 percent. Lipid profile should be measured at least annually.

**Physical activity:** Improvements in symptoms, exercise capacity, and quality of life have been found in context of formal programs involving 20–45 minutes, 3–5 days a week of aerobic exercise. Alternatively, several short periods per day, as tolerated.

**Smoking cessation:** Encouraged for all patients, including avoidance of secondhand smoke.

**Devices:** In selected patients with clinical indications, consideration of cardiac resynchronization therapy (CRT) and/or implantable cardioverter-defibrillator (ICD) placement may be appropriate. In these patients, ICDs may reduce risk of sudden cardiac death (SCD). CRT may improve symptoms, exercise capacity, quality of life, and survival, and decrease hospitalization.

Decisions should take into account the patient's functional status; prognosis based on severity of heart failure and comorbid conditions; and preferences.

**Depression monitoring:** Chronic disease is a risk factor for depression. Screening improves the accurate identification of depression in primary care settings, and treatment of depressed adults identified in primary care settings decreases clinical morbidity. Two simple questions may be used as a screening tool ("Over the past two weeks, have you felt down, depressed, or hopeless?" and "Over the past two weeks, have you felt little interest or pleasure in doing things?") Patients who screen positive (i.e., those who answer "yes" to either question) should undergo a full diagnostic interview. In addition, anxiety associated with chronic dyspnea may be a major cause of decreased quality of life for patients with HF, and appropriate treatment may improve outcomes.

**Influenza vaccination (seasonal):** Should take place annually for everyone 6 months and older.

**Pneumococcal vaccine:**

- **Patients with heart failure:** Recommended for adults 19 through 64. (See revaccination below.)
- **General recommendations include:** All adults 65 and older; adults who smoke cigarettes; and adults 19 through 64 years who have certain medical conditions, including chronic pulmonary diseases (including asthma), chronic cardiovascular diseases, and diabetes\*. A one-time revaccination is recommended five years after the first for some groups, including patients with chronic kidney disease, those who are immunocompromised, and those vaccinated before age 65\*.

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## Clinical Insights:

### Effective care for primary prevention of stroke

Individuals with hypertension, diabetes, and atherosclerotic vascular disease (coronary heart disease, heart failure, or peripheral vascular disease) are at increased risk of stroke. Management approaches for these other conditions (e.g., use of statins) can also reduce stroke risk.

**Individualized risk assessment:** Use of a stroke risk-assessment tool (e.g., Framingham Stroke Profile) is recommended to estimate risk of first stroke and guide appropriate use of interventions to modify risk factors and/or further diagnostic testing. Risk assessment should include screening for hypertension and diabetes as per established guidelines.

Depending on individual circumstances, management of the following modifiable risk factors can reduce the risk of first stroke:

- **Blood pressure screening and management of hypertension** or isolated systolic hypertension (SBP >160 and DBP <90) in older adults. Blood pressure levels <140/<90 are associated with lower risk of stroke. In patients with diabetes or renal disease, lower targets (<130/80) may be recommended.
- **Smoking cessation:** Encouraged for all patients, including avoidance of secondhand smoke.
- **Diabetes screening and management,** with emphasis on tight control of hypertension. It is not clear that intensive glycemic control (target A1C <7 percent) reduces stroke risk. (ACCORD/ADVANCE showed no difference in stroke rates for intensive vs. traditional glycemic control.) Especially for individuals with additional cardiovascular risk factors (e.g., age >40, elevated LDL, etc.), a statin is recommended.

For patients with atherosclerotic vascular disease, management of these other conditions can reduce stroke risk.

#### **Antithrombotic/anticoagulant therapy:**

- *Aspirin:* encouraged for women aged 55 to 79 years when the potential benefit of reduction in ischemic stroke outweighs the potential harms of gastrointestinal bleeding; shared decision making should be encouraged when the benefits and risks are closely balanced (see figure 4 on page STR-3; USPSTF, 2009). Aspirin is not recommended for the primary prevention of stroke in men (recommendations differ for primary prevention of myocardial infarction).
- *Atrial fibrillation with valvular disease:* anticoagulation (warfarin).
- *Atrial fibrillation, nonvalvular (permanent):* choice of regimen (aspirin vs. warfarin) should be based on risk stratification (e.g., the CHADS<sub>2</sub> score, a clinical prediction rule for estimating stroke risk in patients with atrial fibrillation), consideration of the expected net clinical benefit of warfarin (rate of events prevented by warfarin minus intracranial hemorrhages attributable to warfarin), availability of high-quality monitoring services, and patient preference. (See additional information in Clinical Insights: Atrial Fibrillation.)
- *Patients with mechanical heart valves (with or without atrial fibrillation):* anticoagulation, with target level depending on location of valves and other patient factors.

**Management of lipid levels** with therapeutic lifestyle changes and medications, if needed, in accordance with recommended guidelines (i.e., NCEP).

**Physical activity:** Recommendations according to established guidelines (at least 150 minutes of moderate-intensity physical activity per week; 30 minutes daily on five days).

**Weight management:** Among overweight and obese individuals, weight loss according to established guidelines is recommended to lower blood pressure and is reasonable as an approach to reduce stroke risk.

**Carotid endarterectomy or carotid stenting, in highly selected individuals:** Those with asymptomatic carotid stenosis (degree of stenosis varies depending on measurement method) and life expectancy of at least five years in settings where the peri-procedural risk (within 30 days) of stroke and death is less than 3 percent. Note that the margin of potential benefit of revascularization has narrowed as medical therapies have become more effective. The benefit of any revascularization procedure in asymptomatic women remains uncertain.

- Patient selection should be guided by assessment of the patient's overall health, life expectancy, and preferences.
- Screening for asymptomatic carotid stenosis is not recommended.

**Depression monitoring:** Screening is always appropriate for patients with any chronic condition. Screening improves the accurate identification of depression in primary care settings, and treatment of adults identified in primary care settings decreases clinical morbidity. Two simple questions may be used as a screening tool (“Over the past two weeks, have you felt down, depressed, or hopeless?” and “Over the past two weeks, have you felt little interest or pleasure in doing things?”) Patients who screen positive (i.e., those who answer “yes” to either question) should undergo a full diagnostic interview.

**Influenza vaccination (seasonal):** Should take place annually for everyone 6 months and older.

**Pneumococcal vaccine:** All adults 65 and older, adults who smoke cigarettes, and adults 19 through 64 years who have certain medical conditions, including chronic pulmonary diseases (including asthma), chronic cardiovascular diseases, and diabetes\*. A one-time revaccination is recommended five years after the first for some groups, including patients with chronic kidney disease, those who are immunocompromised, and those vaccinated before age 65\*.

\*Not a complete list.

Source: *Ann Intern Med.* 2009;150:396–404.

Aspirin for the Prevention of Cardiovascular Disease:  
U.S. Preventive Services Task Force Recommendation Statement  
<http://www.annals.org/content/150/6/396.full.pdf+html>

**Figure 4.** Estimated number of strokes prevented and estimated harms of using aspirin for 10 years in a hypothetical cohort of 1000 women on the basis of age and 10-year stroke risk.

As indicated, the estimated number of strokes avoided varies with 10-year stroke risk. The estimated harms of using aspirin vary with age. Therefore, both 10-year stroke risk and age must be considered when determining whether the potential harms of aspirin use outweigh the potential benefit in terms of strokes prevented. The shaded areas indicate the combinations of 10-year stroke risk and age for which the number of harms (GI bleeding) are greater than the number of strokes prevented.\*

Variable	Estimated Strokes Prevented (per 1000 Women), <i>n</i>		
	Age 55–59 Years	Age 60–69 Years	Age 70–79 Years
10-year stroke risk			
1%	1.7	1.7	1.7
2%	3.4	3.4	3.4
3%	5.1	5.1	5.1
4%	6.8	6.8	6.8
5%	8.5	8.5	8.5
6%	10.2	10.2	10.2
7%	11.9	11.9	11.9
8%	13.6	13.6	13.6
9%	15.3	15.3	15.3
10%	17	17	17
11%	18.7	18.7	18.7
12%	20.4	20.4	20.4
13%	22.1	22.1	22.1
14%	23.8	23.8	23.8
15%	25.5	25.5	25.5
16%	27.2	27.2	27.2
17%	28.9	28.9	28.9
18%	30.6	30.6	30.6
19%	32.3	32.3	32.3
20%	34	34	34
	Estimated Harm, <i>n</i>		
Type of event			
GI bleeding	4	12	18

\* Calculations of estimated benefits and harms rely on assumptions and are by nature somewhat imprecise. Estimates of benefits and harms, especially at the borders of the shaded and unshaded areas, should be considered in the full context of clinical decision making and used to stimulate shared decision making. The calculations in the table are based on the following assumptions: that there is a 17% risk reduction of strokes with regular aspirin use (3) and that gastrointestinal bleeding includes serious hemorrhage, perforation, or other complications leading to hospitalization or death. Harm of GI bleeding in the table assumes that risk for GI bleeding increases with age and that the women are not taking nonsteroidal anti-inflammatory drugs, do not have upper GI pain, or do not have a history of GI ulcer (2). “Strokes prevented” is the net reduction of strokes, which includes a decrease in ischemic strokes and a small increase in hemorrhagic strokes.

## Clinical Insights:

### Effective care for secondary prevention of stroke in patients with prior transient ischemic attack or stroke (TIA)

The following approaches are appropriate for all patients with ischemic stroke or TIA, regardless of mechanism. About 20 percent of ischemic strokes are associated with cardiogenic cerebral embolism; about half of these occur in patients with a history of atrial fibrillation. (A full discussion of secondary prevention strategies in patients with cardioembolic strokes secondary to conditions such as valvular heart disease, cardiomyopathy, and acute myocardial infarction is outside the scope of this review; see the AHA/ASA Guidelines for Prevention of Stroke in Patients with Ischemic Stroke or Transient Ischemic Attack.)

#### Risk factor control, including:

- **Blood pressure management:** All patients, including those with no history of hypertension, according to established guidelines (JNC-7). An absolute target BP level and reduction are uncertain and should be individualized; benefits are seen with reductions of about 10/5 mm Hg from baseline. Choice of agents should be individualized; available data support the use of diuretics alone or combined with an ACE inhibitor.
- **Management of lipid levels:** Done according to established guidelines for patients with coronary heart disease. (For established guidelines refer to “Management of lipid levels” section of the Clinical Insights: Effective Care for Patients with Coronary Heart Disease [CHD]). For those with atherosclerotic ischemic stroke or TIA, LDL  $\geq$ 100, and without known CHD, statins are recommended and reduce recurrent stroke rates.
- **Antiplatelet therapy:** Aspirin, alone or with extended-release dipyridamole, or clopidogrel alone, as appropriate based on individual patient characteristics and preferences.
- **For patients with cardioembolic stroke and atrial fibrillation:** Warfarin therapy is recommended (aspirin for those who cannot take warfarin). There is no evidence that increasing the intensity of anticoagulation or adding another antiplatelet agent offers additional protection against future ischemic events.
- **Smoking cessation:** Encouraged for all patients, including avoidance of secondhand smoke.
- **Reduce alcohol consumption:** In patients who consume more than 5 alcoholic beverages per day.
- **Weight management:** Among overweight and obese individuals, weight loss may be a helpful strategy to manage blood pressure. No study has demonstrated that weight loss reduces recurrent stroke.
- **Physical activity:** For those capable, at least 30 minutes of moderate-intensity physical activity one to three days per week. For those with disability after stroke, a supervised rehabilitation program may be considered.

#### For patients with TIA or stroke and documented carotid artery disease:

- Continued maximal medical therapy as outlined above.
- Carotid endarterectomy or carotid artery stenting in appropriately selected patients with symptomatic carotid stenosis (>50 percent):
  - In patients with history of carotid TIA or stroke in the past 12 months, carotid endarterectomy reduces the risk of subsequent stroke in settings where the procedure can be done with 30-day stroke and death rates less than 6 percent.
  - Recommendation for carotid endarterectomy should consider patient age, sex, comorbidities, severity of initial symptoms, and preferences. Older age (>80 years) and other comorbidities (such as coronary artery disease and diabetes) can greatly increase the short-term risk of death or stroke due to carotid surgery, and alter the risk-benefit ratio.

**Depression monitoring:** Screening is always appropriate for patients with any chronic condition. Screening improves the accurate identification of depression in primary care settings, and treatment of adults identified in primary care settings decreases clinical morbidity. Two simple questions may be used as a screening tool (“Over the past two weeks, have you felt down, depressed, or hopeless?” and “Over the past two weeks, have you felt little interest or pleasure in doing things?”) Patients who screen positive (i.e., those who answer “yes” to either question) should undergo a full diagnostic interview.

**Influenza vaccination (seasonal):** Should take place annually for everyone 6 months and older.

**Pneumococcal vaccine:** All adults 65 and older, adults who smoke cigarettes; and adults 19 through 64 years who have certain medical conditions, including chronic pulmonary diseases (including asthma), chronic cardiovascular diseases, and diabetes\*. A one-time revaccination is recommended five years after the first for some groups, including patients with chronic kidney disease, those who are immunocompromised, and those vaccinated before age 65\*.

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