

Screening for Coronary Heart Disease with Electrocardiography: Recommendation Statement

► See related Putting Prevention into Practice on page 79.

This summary is one in a series excerpted from the Recommendation Statements released by the U.S. Preventive Services Task Force (USPSTF). These statements address preventive health services for use in primary care clinical settings, including screening tests, counseling, and preventive medications.

The complete version of this statement, including supporting scientific evidence, evidence tables, grading system, members of the USPSTF at the time this recommendation was finalized, and references, is available on the USPSTF website at <http://www.uspreventiveservicestaskforce.org/>.

A collection of USPSTF recommendation statements reprinted in *AFP* is available at <http://www.aafp.org/afp/uspstf>.

Summary of Recommendations and Evidence

The U.S. Preventive Services Task Force (USPSTF) recommends against screening with resting or exercise electrocardiography (ECG) for the prediction of coronary heart disease (CHD) events in asymptomatic adults at low risk of CHD events (*Table 1*).

D recommendation.

The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening with resting or exercise ECG for the prediction of CHD events in asymptomatic adults at intermediate or high risk of CHD events. **I statement.**

Rationale

IMPORTANCE

CHD is the leading cause of death in the United States in men and women, accounting for nearly 16% of all deaths each year. More than 1 million Americans have nonfatal or fatal myocardial infarction or sudden death from CHD annually. For some persons, these events are the first manifestations of CHD.

DETECTION

The USPSTF found adequate evidence that many resting and exercise ECG abnormalities are associated with an increased risk of a serious CHD event, after controlling for conventional risk factors.

There is inadequate evidence that adding ECG to conventional risk factor assessment leads to improved stratification of individuals into high-, intermediate-, or low-risk groups to guide risk management.

BENEFITS OF DETECTION AND EARLY INTERVENTION

For asymptomatic adults at low risk of CHD events, the USPSTF found adequate evidence that the incremental information offered

by resting or exercise ECG (beyond that obtained with conventional CHD risk factors) is highly unlikely to result in changes in risk stratification that would prompt interventions and ultimately reduce CHD-related events. The USPSTF based this conclusion on the epidemiology of CHD, the natural history of CHD, and established treatment strategies based on risk stratification.

For asymptomatic adults at intermediate or high risk of CHD events, the USPSTF found inadequate evidence to determine the extent to which the incremental information offered by resting or exercise ECG (beyond that obtained with conventional CHD risk factors) results in changes in risk stratification that would prompt interventions and ultimately reduce CHD-related events.

HARMS OF DETECTION AND EARLY INTERVENTION

There is adequate evidence that screening asymptomatic adults with resting or exercise ECG leads to harms that are at least small, including unnecessary invasive procedures, overtreatment, and labeling.

USPSTF ASSESSMENT

The USPSTF concludes with moderate certainty that the potential harms of screening for CHD with exercise or resting ECG equal or exceed the potential benefits in asymptomatic adults at low risk of CHD events.

The USPSTF concludes that evidence is lacking, and the balance of benefits and harms of screening for CHD with ECG in asymptomatic adults at intermediate or high risk of CHD events cannot be determined.

Clinical Considerations

PATIENT POPULATION

This recommendation applies to adult men and women without symptoms of heart

Table 1. Screening for Coronary Heart Disease with Electrocardiography: Clinical Summary of the USPSTF Recommendation

Population	Asymptomatic adults at low risk of CHD events	Asymptomatic adults at intermediate or high risk of CHD events
Recommendation	Do not screen with resting or exercise ECG Grade: D	No recommendation Grade: I (insufficient evidence)
Risk assessment	Several factors are associated with a higher risk of CHD events, including older age, male sex, high blood pressure, smoking, abnormal lipid levels, diabetes mellitus, obesity, and sedentary lifestyle. Calculators are available to ascertain a person's 10-year risk of a CHD event. Persons with a 10-year risk greater than 20% are considered to be high risk, those with a 10-year risk less than 10% are considered to be low risk, and those in the 10% to 20% range are considered to be intermediate risk.	
Screening tests	Several abnormalities on resting and exercise ECG are associated with an increased risk of a serious CHD event. However, the incremental information offered by screening asymptomatic adults at low risk of a CHD event with resting or exercise ECG (beyond that obtained with conventional CHD risk factors) is highly unlikely to result in changes in risk stratification that would prompt interventions and ultimately reduce CHD-related events.	
Balance of benefits and harms	The potential harms of screening for CHD with exercise or resting ECG equal or exceed the potential benefits in this population.	The USPSTF could not determine the balance between the benefits and harms of screening for CHD with resting or exercise ECG in this population.
Other relevant USPSTF recommendations	The USPSTF has made recommendations on screening for carotid artery stenosis, high blood pressure, lipid disorders, peripheral arterial disease, and obesity. These recommendations are available at http://www.uspreventiveservicestaskforce.org/ .	

NOTE: For the full recommendation statement and supporting documents, go to <http://www.uspreventiveservicestaskforce.org/>.

CHD = coronary heart disease; ECG = electrocardiography; USPSTF = U.S. Preventive Services Task Force.

disease or a diagnosis of cardiovascular disease. In this recommendation, CHD refers to coronary artery disease and ischemic heart disease.

ASSESSMENT OF RISK

Accurate identification of persons at high risk of CHD events, particularly nonfatal myocardial infarction and CHD death, provides the opportunity to intensify risk factor management to reduce the likelihood of one of these events. In addition, identifying persons at low risk may allow for a reduction in interventions with a low benefit-to-risk ratio in this risk stratum. Several factors are associated with higher risk of CHD events, including older age, male sex, high blood pressure, smoking, abnormal lipid levels, diabetes mellitus, obesity, and sedentary lifestyle.

Risk factors can be combined in many ways to allow classification of a person's risk of a CHD event as low, intermediate, or high. Several calculators and models are available to quantify a person's 10-year risk of CHD events. The Framingham Adult Treatment Panel III calculator (<http://cvdrisk.nhlbi.nih.gov/calculator.asp>) performs well for the U.S. population. Persons with a 10-year risk greater than 20% are generally considered high risk, those with a 10-year risk less than 10% are

considered low risk, and those in the 10% to 20% range are considered intermediate risk.

SCREENING TESTS

Many resting and exercise ECG abnormalities have been associated with an increased risk of CHD events, such as myocardial infarction and CHD death. Although exercise ECG is considered more sensitive for detecting coronary artery stenosis, the magnitude of increased risk of CHD events, as well as the sensitivity of ECG abnormalities for predicting future events, is similar for resting and exercise ECG.^{1,2} Performing baseline ECG so that results may be compared with future ECG findings is considered screening by the USPSTF and is not recommended for asymptomatic adults at low risk of CHD; evidence is insufficient about its usefulness in adults at increased risk.

For asymptomatic adults at low risk of CHD events, a resting or exercise ECG is unlikely to provide additional information about CHD risk beyond that obtained with conventional CHD risk factors (i.e., Framingham risk factors) or to result in changes in risk stratification that would prompt interventions and ultimately reduce CHD-related events. False-positive results may cause harms in low-risk asymptomatic adults; for more information about harms, go to the Suggestions

for Practice Regarding the I Statement section and the Discussion section (available at <http://www.uspreventiveservicestaskforce.org>).

TREATMENT

Regardless of ECG findings, asymptomatic adults at increased risk of CHD are usually treated with a combination of diet and exercise modifications, lipid-lowering medications, aspirin, hypertension management, and tobacco cessation. The net benefit of the use of aspirin and the intensity of lipid-lowering therapy depends on a person's baseline risk of CHD.

USEFUL RESOURCES

The USPSTF has made recommendations on the use of aspirin to prevent cardiovascular disease, screening for lipid disorders, the use of additional risk factors to determine intermediate CHD risk, and screening for hypertension. These recommendations and their supporting evidence are available on the USPSTF website at <http://www.uspreventiveservicestaskforce.org>.

SUGGESTIONS FOR PRACTICE REGARDING THE I STATEMENT

In deciding whether to screen with resting or exercise ECG in asymptomatic adults who are at intermediate or high risk of CHD events, clinicians should consider the following:

Potential Preventable Burden. Although evidence is insufficient to determine whether screening adults at increased risk is beneficial, those who are at intermediate risk of CHD events have the greatest potential for net benefit from ECG screening. Reclassification into a higher risk category might lead to more intensive medical management that could lower the risk of CHD events, but it might also result in harms, including such adverse medication effects as gastrointestinal bleeding and hepatic injury. The risk-benefit tradeoff would be most favorable if persons could be accurately reclassified from intermediate to high risk. Regardless of ECG findings, persons who are already at high risk should receive intensive risk factor modification, and those who are already classified as low risk are unlikely to benefit.

For persons in certain occupations, such as pilots and heavy equipment operators for whom sudden incapacitation or sudden death may endanger the safety of others, considerations other than the health benefit to the individual patient may influence the decision to screen

for CHD. Although some exercise programs initially screen asymptomatic participants with exercise ECG, evidence is insufficient to determine the balance of benefits and harms of this practice.

Potential Harms. In all risk groups, an ECG abnormality (as a result of a true- or false-positive result) can lead to invasive confirmatory testing and treatments that have the potential for serious harm, including unnecessary radiation exposure and the associated risk of cancer. Studies report that up to 3% of asymptomatic patients with an abnormal exercise ECG result receive angiography and up to 0.5% undergo revascularization, even though revascularization has not been shown to reduce CHD events in asymptomatic persons. Angiography and revascularization are associated with risks, including bleeding, contrast-induced nephropathy, and allergic reactions to the contrast agent.

Current Practice. Screening with resting or exercise ECG in low-risk patients is not recommended by any organization. However, evidence on current clinical use of screening for CHD with resting or exercise ECG in asymptomatic patients is sparse. Anecdotal evidence suggests that it is performed with some frequency.

Costs. Although the cost of resting ECG may be low, the downstream costs of resulting diagnostic testing and treatments can be substantial.

This recommendation statement was first published in *Ann Intern Med*. 2012;157(7):512-518.

The "Other Considerations," "Discussion," "Update of Previous USPSTF Recommendation," and "Recommendations of Others" sections of this recommendation statement are available at <http://www.uspreventiveservicestaskforce.org/uspstf/uspstf.htm>.

The U.S. Preventive Services Task Force recommendations are independent of the U.S. government. They do not represent the views of the Agency for Healthcare Research and Quality, the U.S. Department of Health and Human Services, or the U.S. Public Health Service.

REFERENCES

1. Chou R, Arora B, Dana T, Fu R, Walker M, Humphrey L. Screening asymptomatic adults for coronary heart disease with resting or exercise electrocardiography: systematic review to update the 2004 U.S. Preventive Services Task Force Recommendation. Evidence synthesis no. 88. AHRQ publication no. 11-05158-EF-1. Rockville, Md.: Agency for Healthcare Research and Quality; 2011. <http://www.ncbi.nlm.nih.gov/books/NBK63671/>. Accessed July 17, 2012.
2. Chou R, Arora B, Dana T, Fu R, Walker M, Humphrey L. Screening asymptomatic adults with resting or exercise electrocardiography: a review of the evidence for the U.S. Preventive Services Task Force. *Ann Intern Med*. 2011;155(6):375-385. ■