



MINISTRY OF HEALTH
SINGAPORE

Use of ECG for screening for coronary heart disease in asymptomatic patients with hypertension

MOH CLINICAL GUIDANCE



College of Family
Physicians, Singapore



Academy of Medicine,
Singapore



Singapore
Cardiac Society



Oct 2008

Levels of evidence and grades of recommendation

Levels of evidence

Level	Type of Evidence
1 ⁺⁺	High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias.
1 ⁺	Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias.
1 ⁻	Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias
2 ⁺⁺	High quality systematic reviews of case control or cohort studies. High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2 ⁺	Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2 ⁻	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, e.g. case reports, case series
4	Expert opinion

Grades of recommendation

Grade	Recommendation
A	At least one meta-analysis, systematic review of RCTs, or RCT rated as 1 ⁺⁺ and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1 ⁺ , directly applicable to the target population, and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2 ⁺⁺ , directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1 ⁺⁺ or 1 ⁺
C	A body of evidence including studies rated as 2 ⁺ , directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2 ⁺⁺
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2 ⁺
GPP (good practice points)	Recommended best practice based on the clinical experience of the guideline development group.

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Statement of Intent

These guidelines are not intended to serve as a standard of medical care. Standards of medical care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge advances and patterns of care evolve.

The contents of this publication are guidelines to clinical practice, based on the best available evidence at the time of development. Adherence to these guidelines may not ensure a successful outcome in every case. These guidelines should neither be construed as including all proper methods of care, nor exclude other acceptable methods of care. Each physician is ultimately responsible for the management of his/her unique patient, in the light of the clinical data presented by the patient and the diagnostic and treatment options available.

Foreword

Hypertension is a risk factor for coronary heart disease and may also give rise to other cardiovascular diseases such as left ventricular hypertrophy. While it is important to monitor hypertensive patients to detect the development of cardiovascular disease and institute the necessary treatment to prevent further deterioration, we should avoid over-screening leading to unnecessary referrals, investigations, cost and anxiety.

The resting electrocardiogram (ECG) is the most widely used test for screening for cardiovascular diseases. A recent study by the National Heart Centre has however raised questions on the value of performing routine ECGs in asymptomatic subjects in the detection of coronary heart disease.

The Ministry of Health had thus convened an expert workgroup to review the scientific evidence for the use of the ECG as a screening tool for asymptomatic hypertensive patients and make the appropriate recommendations.

The workgroup has synthesized the evidence from international and local studies and applied their expertise to provide clinical guidance on the practical utility of ECGs in the management of asymptomatic hypertensive patients.

I would like to thank the members of the workgroup for their work and I hope that medical practitioners will find this set of clinical guidance useful in managing their hypertensive patients.

PROFESSOR K SATKU
DIRECTOR OF MEDICAL SERVICES

Executive summary of recommendations

Details of recommendations can be found in the main text at the pages indicated.

D A baseline standard 12-lead ECG should be done routinely for all patients upon the diagnosis of hypertension before initiating therapy (page 4).

Grade D, Level 4

GPP ECG may be done when clinically indicated in the follow-up of asymptomatic hypertensive patients. Routine use of ECG during the follow-up of asymptomatic patients is of uncertain value (page 5).

GPP

GPP ECG may be performed in the follow-up of asymptomatic hypertensive patients, when (page 6):

- new symptoms or signs develop (chest pain, breathlessness, palpitations, new murmurs or signs of heart failure).
- blood pressure control had been sub-optimal.
- there is a change in the global risk profile (new TIA, peripheral or carotid occlusive disease).
- during initiation of medication that might alter QT intervals or has proarrhythmic effect.
- upon new diagnosis of type 2 diabetes - more frequent screening may be useful in patients with type 2 diabetes as they are likely to experience atypical symptoms of coronary artery disease.
- upon first presentation of chronic kidney disease.
- any other indications for ECG occurs, e.g. pre-operative ECG.

GPP

1 Introduction

1.1 Background

The resting electrocardiogram (ECG) is the most widely used test for screening for cardiovascular diseases. The Ministry of Health's clinical practice guidelines on hypertension released in 2005 mentioned in the section on quality indicators for hypertension management that the ECG should be performed annually or more frequently, according to the cardiac status, in the follow-up of hypertensive patients.

A study by the National Heart Centre in 2005 at the National Heart Centre¹ showed that 30.7% of the referrals that they received were asymptomatic individuals with “abnormal” Electrocardiograms (ECGs). Outcomes of these referrals showed that apart from atrial fibrillation, all other asymptomatic ‘abnormal’ ECG cases did not yield significant cardiac abnormalities within six months of follow-up. This brings into question the practice of performing routine ECGs in asymptomatic subjects in the detection of coronary heart disease.

An expert workgroup was appointed to examine the evidence for annual ECG screening of hypertensive patients and make appropriate recommendations.

This is the clinical guidance on a specific issue, supplementing the MOH series of Clinical Practice Guidelines.

1.2 Development of guidelines

These guidelines were developed by a team comprising cardiologists, neurologist, nephrologist as well as general practitioners. A systematic search of scientific literature was conducted to locate clinical studies and practice guidelines that looked at the effectiveness of ECG screening in hypertension. The workgroup deliberated on the findings and made the recommendations based on the best available current evidence and their expert judgment.

1.3 Objectives

The main objective of these guidelines is to make evidence-based recommendations on the use of ECG for screening for coronary heart disease in asymptomatic patients with hypertension.

1.4 Review of guidelines

Evidence-based clinical practice guidelines are only as current as the evidence that supports them. Users must keep in mind that new evidence could supersede recommendations in these guidelines. The workgroup advises that these guidelines be scheduled for review five years after publication, or when new evidence appears that requires updating of the recommendations.

2 Use of ECG for screening for coronary heart disease in asymptomatic patients with hypertension

2.1 General introduction

The presence of heart disease influences the prognosis and management of patients with hypertension. Target organ damage from hypertension may manifest as acute myocardial infarction, angina pectoris, congestive cardiac failure or left ventricular hypertrophy. In the evaluation of patients with hypertension, cardiac disease may be found through history, physical examination and routine investigations. Decisions on treatment would follow an adequate assessment of hypertensive target organ damage and overall cardiovascular risk.

The 12-lead electrocardiogram has been used in the evaluation of heart disease in patients with hypertension. While widely available, relatively low in cost and easy to use, its low sensitivity can potentially lead to unnecessary labelling, procedures and over-treatment in asymptomatic patients. The benefits from using the 12 lead ECG as a screening tool in asymptomatic hypertensive patients has to be weighed against potential harm.

2.2 Use of ECG in assessment of cardiovascular risk on the first diagnosis of hypertension

ECG is done routinely upon the diagnosis of hypertension for two reasons. Firstly, it can detect the presence of target organ damage, as well as presence of left atrial dilatation, left ventricular hypertrophy, myocardial ischaemia, arrhythmia and changes indicative of prior heart attack. Secondly, baseline ECG could identify conduction defects that would help the physician to decide on the initial antihypertensive regimen.²

D A baseline standard 12-lead ECG should be done routinely for all patients upon the diagnosis of hypertension before initiating therapy.³⁻¹⁰

Grade D, Level 4

2.3 Screening with ECG in the follow-up of asymptomatic hypertensive patients

A few systematic reviews reported that the sensitivity of resting ECG abnormalities for detecting coronary heart disease events in asymptomatic individuals is low.¹¹⁻¹³ A systematic review by Pewsner D et al included studies done on asymptomatic hypertensive patients and reported that the sensitivity of the six most commonly used 12 lead electrocardiogram criteria was low in detecting left ventricular hypertrophy (median sensitivity ranged from 10.5% to 21%).¹¹

Although there is limited evidence to determine the magnitude of harm from using ECG as a screening tool for coronary heart disease events, harm from false-positive tests (that is, unnecessary invasive procedures, over-treatment and labelling) are likely to occur.

The U.S. Preventive Services task force (USPSTF) found insufficient evidence to recommend for or against routine screening with ECG to detect coronary artery stenosis and coronary heart disease in patients at increased risk for coronary heart disease events (older or younger adults with one or more risk factors are considered to be at increased risk). However, the USPSTF recommended against routine screening with resting ECG for the presence of coronary artery stenosis and prediction of coronary heart disease in adults who have low 10-year coronary heart disease risk (men <50 years of age and women <60 years of age who have no risk factor for coronary heart disease are considered to be at low risk).¹⁴

There is insufficient evidence for the use of ECG in the follow-up of hypertensive patients whose baseline ECG was normal. In randomised controlled trials, ECG was often done yearly, but these studies were performed to assess the risk/benefit of therapy.^{15,16}

GPP ECG may be done when clinically indicated in the follow-up of asymptomatic hypertensive patients. Routine use of ECG during the follow-up of asymptomatic patients is of uncertain value.

GPP

GPP ECG may be performed in the follow-up of asymptomatic hypertensive patients, when:

- new symptoms or signs develop (chest pain, breathlessness, palpitations, new murmurs or signs of heart failure).
- blood pressure control had been sub-optimal.
- there is a change in the global risk profile (new TIA, peripheral or carotid occlusive disease).
- during initiation of medication that might alter QT intervals or has proarrhythmic effect.
- upon new diagnosis of type 2 diabetes - more frequent screening may be useful in patients with type 2 diabetes as they are likely to experience atypical symptoms of coronary artery disease.
- upon first presentation of chronic kidney disease.
- any other indications for ECG occurs, e.g. pre-operative ECG.

GPP

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