

**Critical Review Form
Prognosis**

Levy P, Ye H, Compton S, Zalenski R, Byrnes T, Flack JM, Welch R. Subclinical hypertensive heart disease in black patients with elevated blood pressure in an inner-city emergency department. Ann Emerg Med. 2012 Oct;60(4):467-74.

Objective: "to estimate the point prevalence of echocardiographically defined subclinical hypertensive heart disease in a cohort of predominantly black, inner-city ED patients with asymptomatic yet profoundly elevated blood pressure." (p. 468)

Methods: This prospective, observational study was conducted at Detroit Receiving Hospital in Detroit, MI between April 2006 and July 2007. Patients aged 35 years and older with stage 1 or greater hypertension (defined as a blood pressure \geq 140/90 mmHg both at triage and on repeat measurement one hour later) were eligible for enrollment as long as they did not have symptoms attributable to an acute hypertensive crisis or underlying cardiac disease. Patients who required hospital admission for any reason were excluded, as were patients with a known cardiac condition, those "at risk for heart disease from a cause other than hypertension (ie, renal failure)," and those with documented evidence of abnormal cardiac structure or function.

Following enrollment, all patients underwent the following testing: ECG, urine dipstick, blood urea nitrogen (BUN), b-type natriuretic peptide (BNP), and echocardiography. The primary outcome of interest was subclinical hypertensive heart disease, defined as either left ventricular hypertrophy, left ventricular systolic dysfunction (ejection fraction \leq 50%), or left ventricular diastolic dysfunction.

A total of 200 patients were enrolled, of whom 180 (90%) underwent echocardiography. After excluding 19 patients who turned out to have a history of cardiac disease, 161 patients were included in the final analysis. The mean age was 49.8 years, 51.6% were male, and 93.8% were black. Only 57.8% had health insurance. Although the large majority of patients (93.8%) were aware they had a diagnosis of hypertension, only 68.3% were receiving antihypertensive therapy. The mean systolic and diastolic blood pressures were 183.9 mmHg and 109.5 mmHg.

Guide		Comments
I.	Are the results valid?	
A.	Was the sample of patients representative? <i>In other words, how were subjects selected and did they pass through some sort of "filtering" system which could bias your results based on a non-representative sample. Also, were objective criteria used to diagnose the</i>	No. These were emergency department patients with asymptomatic elevated blood pressure (\geq 140/90 mmHg) and no history of significant cardiac disease. Unfortunately, this was a convenience sample of patients enrolled during business hours on weekdays only. Twenty patients who were enrolled, but did not return for an echocardiogram, were also excluded.

	<i>patients with the disorder?</i>	
B.	<p>Were the patients sufficiently homogeneous with respect to prognostic risk?</p> <p><i>In other words, did all patients share a similar risk from during the study period or was one group expected to begin with a higher morbidity or mortality risk?</i></p>	Presumably yes. Patients without a known history of cardiac disease were excluded, and all patients presented with elevated blood pressure that persisted over the first hour of the emergency department stay. While certain individual patients may have a higher risk than others (due to cocaine or ethanol abuse, for example), the group as a whole appears to be homogenous with respect to risk.
C.	<p>Was follow-up sufficiently complete?</p> <p><i>In other words, were the investigators able to follow-up on subjects as planned or were a significant number lost to follow-up?</i></p>	No. Ten percent of patients were excluded because they did not undergo cardiac echocardiography. Furthermore, patients were not followed beyond the ED stay, and it is not known what (if any) interventions were required based on the echo findings, or what, if any, increased risk of morbidity and mortality was observed in those found to have subclinical hypertensive heart disease.
D.	<p>Were objective and unbiased outcome criteria used?</p> <p>Investigators should clearly specify and define their target outcomes before the study and whenever possible they should base their criteria on objective measures.</p>	Yes. The authors were very specific with regards to what constituted subclinical hypertensive heart disease, including, "left-ventricular hypertrophy, defined by left-ventricular mass indexed to height greater than or equal to 46 g/m for women or greater than or equal to 49 g/m for men; left-ventricular systolic dysfunction determined by Simpson's biplane method, defined by an ejection fraction less than or equal to 50%; or left-ventricular diastolic dysfunction, defined by diastolic velocity measured at the medial mitral annulus by tissue Doppler imaging (e=) less than 8 cm/second." (p. 469)
II.	What are the results?	
A.	<p>How likely are the outcomes over time?</p> <p><i>For the defined follow-up period, how likely were subjects to have the outcome of interest.</i></p>	<ul style="list-style-type: none"> • The point prevalence of subclinical hypertensive heart disease was 90.7% (95% CI 85.2% to 94.3%). <ul style="list-style-type: none"> ○ Among these patients, 89.7% were found to have diastolic dysfunction. ○ Twenty-five patients (15.5%) had evidence of systolic dysfunction
B.	<p>How precise are the estimates of likelihood?</p> <p><i>In other words, what are the confidence intervals for the given outcome likelihoods?</i></p>	See above.
III.	How can I apply the results to	

	patient care?	
A.	Were the study patients and their management similar to those in my practice?	Mostly yes. This study enrolled patients presenting to the ED with significantly elevated blood pressure but no signs or symptoms of end-organ dysfunction. This is similar to a large number of patients that present to our ED. The racial make-up of this study was almost entirely African-American, and likely the percentage of these patients was somewhat higher than observed in our institution.
B.	Was the follow-up sufficiently long?	No. The only outcome measured in this study was the presence of subclinical (e.g. asymptomatic) hypertensive heart disease. The authors did not look at the long-term morbidity or mortality of this diagnosis, or the possibility that diagnosis in the ED (with subsequent alterations in blood pressure management) could change these outcomes.
C.	Can I use the results in the management of patients in my practice?	No. While this study does indicate that a large of patients presenting to the ED with asymptomatic hypertension likely have some degree of associated cardiac disease (when looking at a largely African-American population of patients), it remains unclear whether diagnosis in the ED is necessary to alter the course of the disease, or whether echocardiography is even necessary (as opposed to more aggressive blood pressure control in these patients with poorly controlled hypertension). This study should not be used to condone the routine performance of echocardiography in the ED among this patient population.

Limitations:

- 1. This study enrolled a convenience sample of patients (Monday through Friday, 9 AM to 4 PM), and hence is at some risk of selection bias. It is possible that patients presenting at night may be more or less likely to have insurance and/or primary care follow-up.**
- 2. The outcome assessed (subclinical hypertensive heart disease) is not patient-centered and is of uncertain clinical significance.**
- 3. This study did not look at the potential benefit of early identification of subclinical hypertensive heart disease; it is possible that echocardiography in this patient**

population would not affect outcomes, but that these patients merely require more aggressive management of their poorly controlled hypertension.

4. This study cohort comprised a population of nearly entirely African-Americans, and these results may not apply to other patient populations ([external validity](#)).

Bottom Line

This prospective observational study found that among patients presenting to the ED with asymptomatic elevated blood pressure, the prevalence of subclinical hypertensive heart disease is very high (90.7%; 95% CI 85.2% to 94.3%). This study does not demonstrate the utility of diagnosis subclinical hypertensive heart disease and does not suggest that routine echocardiographic screening should be performed in the ED.