



Hypertension Prevalence, Cardiac Complications, and Antihypertensive Medication Use in Children

Craig P. Dobson, MD^{1,2}, Matilda Eide, MPH², and Cade M. Nylund, MD²

Objective To determine the prevalence of hypertension diagnosis in children of US military members and quantify echocardiography evaluations, cardiac complications, and antihypertensive prescriptions in the post-2004 guideline era.

Study design Using billing data from military health insurance (TRICARE) enrollees, hypertension cases were defined as 2 or more visits with a primary or unspecified hypertension diagnosis during any calendar year or 1 such visit if with a cardiologist or nephrologist.

Results During 2006-2011, the database contained an average 1.3 million subjects aged 2-18 years per year. A total of 16 322 met the definition of hypertension (2.6/1000). The incidence of hypertension increased by 17% between 2006 and 2011 (from 2.3/1000 to 2.7/1000; $P < .001$). Hypertension was more common in adolescents aged 12-18 years than in younger children (5.4/1000 vs 0.9/1000). Among patients with hypertension, 5585 (34%) underwent echocardiography. The frequency of annual echocardiograms increased from 22.7% to 27.7% ($P < .001$). In patients with echocardiography, 8.0% had left ventricular hypertrophy or dysfunction. Among the patients with hypertension, 6353 (38.9%) received an antihypertensive medication.

Conclusion The prevalence of hypertension in children has increased. Compliance with national guidelines is poor. Of pediatric patients with hypertension who receive an echocardiogram, 1 in 12 had identified cardiac complications, supporting the current recommendations for echocardiography in children with hypertension. Less than one-half of children with hypertension are treated with medication. (*J Pediatr* 2015;167:92-7).

In 2003, the American Heart Association (AHA) emphasized the fact that adult cardiovascular disease begins in childhood.¹ The next year, the National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents published its current guidelines, the Fourth Report on Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents.² This report was endorsed by the American Academy of Pediatrics and the AHA. Subsequent scientific statements by the AHA on ambulatory blood pressure monitoring in children^{3,4} and the National Heart, Lung and Blood Institute (NHLBI) on cardiovascular health⁵ have reemphasized the importance of diagnosing childhood hypertension. However, the US Preventive Services Task Force recently concluded there is insufficient evidence to support routine hypertension screening in children to prevent cardiovascular disease in adulthood.⁶ Little is known about the effects these guideline and recommendation changes have had on the diagnosis and treatment of hypertension in children.

We sought to identify secular trends in the diagnosis and treatment of childhood hypertension following the increased emphasis in the AHA, NHLBI, and American Academy of Pediatrics recommendations. In particular, the study was designed to evaluate whether clinicians follow the guidelines on the use of echocardiography for evaluation and medication for treatment. We also aimed to evaluate the prevalence of complications of hypertension, including left ventricular hypertrophy (LVH) and heart failure.

Methods

This retrospective cohort study was performed using a large healthcare billing database. Children of US uniformed services members enrolled in the Department of Defense health insurance program (TRICARE) aged 2-18 years were included. This age group includes more than 1.3 million subjects per year. The

From the ¹Department of Pediatrics, Tripler Army Medical Center, Honolulu, HI; and ²Department of Pediatrics, Uniformed Services University of the Health Sciences, Bethesda, MD

The views expressed in this article are those of the authors and do not reflect the official policy or position of the US Air Force, US Army, Department of Defense, or the US Government. This work was prepared as part of the official duties of C.D and C.N. The authors declare no conflicts of interest.

Portions of the study were presented as an abstract at the American Heart Association's Scientific Sessions, Dallas, TX, November 16-20, 2013.

0022-3476/\$ - see front matter. Published by Elsevier Inc.
<http://dx.doi.org/10.1016/j.jpeds.2015.04.016>

AHA	American Heart Association
ICD-9-CM	International Classification of Diseases, Ninth Revision, Clinical Modification
LVDD	Left ventricular diastolic dysfunction
LVH	Left ventricular hypertrophy
LVSD	Left ventricular systolic dysfunction
NHLBI	National Heart, Lung and Blood Institute

study was approved by the Institutional Review Boards of Walter Reed National Military Medical Center and the Military Health System.

Information on outpatient visits was extracted from the Military Health System database. This database is predominantly for healthcare administrative and epidemiologic use and is not directly linked to patients' individual electronic medical records. The database includes all medical billing records and outpatient prescriptions for eligible military beneficiaries for visits at military and civilian facilities.

The NHLBI Fourth Report² guidelines for diagnosing hypertension require 3 separate measurements demonstrating blood pressure elevation before the diagnosis is assigned. The present study does not address the occurrence of patients meeting this definition, because vital signs are not part of the database. Rather, this study demonstrates the recognition of hypertension by providers. There is an expectation that providers have applied the definition appropriately before assigning the diagnosis of hypertension. In addition, to minimize classification bias and eliminate "rule-out" diagnoses, hypertension was defined as requiring at least 2 visits with any primary or unspecified hypertension code, or a single visit with a nephrologist or cardiologist who assigned the diagnosis.

All outpatient encounters between 2006 and 2011 in this age group were queried for diagnostic codes for primary or unspecified hypertension using *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) codes (Appendix 1; available at www.jpeds.com). Secondary hypertension codes and pregnancy-induced hypertension were excluded from the study, as was, notably, isolated blood pressure elevation (code 796.2).

Prevalence was calculated for each year and for the entire study period. To determine prevalence for the entire study period, each patient was counted only once. To estimate prepubertal and postpubertal differences in the study population, the prespecified analyses, described below, were performed using age group categories of 2-11 years and 12-18 years.

Each patient with a diagnosis of hypertension was queried using the American Medical Association's Current Procedural Terminology codes for echocardiography (Appendix 2; available at www.jpeds.com). In addition, a visit with a pediatric cardiologist was considered equivalent to being referred for echocardiography. This definition was used to determine the prevalence of compliance with the 2004 NHLBI guidelines, which specify that all patients with established hypertension be referred for echocardiography. When calculating the prevalence of cardiac complications, only patients with echocardiography Current Procedural Terminology codes were included.

LVH was defined using the ICD-9-CM codes for hypertensive heart disease (402.00, 402.10, and 402.90), cardiomegaly including hypertrophy (429.30), and unspecified cardiomyopathy (425.4, 425.8, and 425.9) (Appendix 1). Left ventricular systolic dysfunction (LVSD) was defined using congestive heart failure and left ventricular systolic failure

codes (428.x, 402.01, 402.11, and 402.91). The 428.4x series of combined systolic and diastolic failure were reported under systolic dysfunction. Isolated left ventricular diastolic dysfunction (LVDD) was collected as a separate query (428.3x). Overweight and obesity were defined using the 278.x series of codes (Appendix 1).

The use of antihypertensive medication was identified using the American Hospital Formulary Service Therapeutic Class Code fields (Appendix 3; available at www.jpeds.com). For each unique subject with hypertension, the first medication encountered in the database was used for analysis of medication prescription class relative percentages. The denominator for prevalence of medication use was limited to patients with a diagnosis of hypertension, as defined above.

Statistical Analyses

Trends in prevalence were analyzed with the Cochran-Armitage test of trend, and comparisons between groups were performed using the χ^2 test. For relative frequency of medications by age range, the Hochberg adjustment for multiple comparisons was used to maintain the overall type 1 error rate at a 5% significance level. All analyses were conducted using SAS 9.3 (SAS Institute, Cary, North Carolina). Comparisons between the age groups 2-11 years and 12-18 years were performed using the average population in each age group per year over the study period. In all analyses, $P \leq .05$ was considered significant.

Results

On average, in each year of the study period 2006-2011, 870 463 subjects (64%) were enrolled to military facilities, and 493 163 (36%) were enrolled to civilian facilities. Overall, 80% of the 5585 cardiology evaluations were performed at civilian facilities. During the study period, an average each year of 1 363 626 children aged 2-18 years were enrolled in TRICARE. Of these, 16 322 (39% females and 61% males) met the study definition of hypertension, yielding an average prevalence of 2.6/1000 over the 6 years. There was a 17% increase in the incidence of hypertension between 2006 and 2011 (from 2.3/1000 to 2.7/1000; $P < .001$) (Figure 1). Of the patients diagnosed with hypertension, 5066 (31.0%) were also diagnosed as overweight or obese during the study period.

When stratified by age, the prevalence of hypertension over the study period averaged 0.9/1000 in patients aged 2-11 years, compared with 5.4/1000 in those aged 12-18 years ($P < .001$). The prevalence of hypertension increased significantly in both age groups over the study period, with a 16.4% increase in the 12-18 year group (from 4.8/1000 to 5.6/1000; $P < .001$) and a much larger increase (34.3%) in younger patients (from 0.70/1000 to 0.94/1000; $P < .001$) (Figure 1).

Among patients aged 2-18 years with hypertension, 5585 (34.3%) had at least 1 echocardiogram or cardiac consult during the study period. The frequency of annual

Download English Version:

<https://daneshyari.com/en/article/6220293>

Download Persian Version:

<https://daneshyari.com/article/6220293>

[Daneshyari.com](https://daneshyari.com)