Elevated Blood Pressures Are Common in the Emergency Department but Are They Important? A Retrospective Cohort Study of 30,278 Adults

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Study objective: We determine the frequency of elevated blood pressure (BP) readings in the emergency department (ED), the proportion of patients with prior or subsequent diagnosis of hypertension assigned in other settings, and the association between ED BP levels and cardiovascular outcomes after ED discharge.

Methods: This was a retrospective cohort study using electronic medical records for all adults treated and released from a large-volume ED in 2016 that were linked to administrative records for all health care encounters in the province for 2 years before and after the index ED visit. The primary outcome measure was a composite of stroke or transient ischemic attack, acute coronary syndrome, new heart failure, or death.

Results: Of 30,278 adults treated and released from the ED, 14,717 (48.6%) had elevated BP readings; 10,732 (72.9%) had no prior diagnosis of hypertension. Of the 3,480 patients with no prior diagnosis of hypertension but an ED BP greater than or equal to 160/100 mm Hg, 907 (26.1%) subsequently received a diagnosis of chronic hypertension or were prescribed antihypertensive therapy in other settings within 2 years. Among patients without a history of hypertension, those with an ED BP greater than or equal to 160/100 mm Hg were more likely to meet the composite outcome (stroke, transient ischemic attack, acute coronary syndrome, heart failure, or death) in the subsequent year (3.3% versus 2.5%) or 2 years (5.9% versus 3.8%) than those with ED BPs 120 to 139/80 to 89 mm Hg; however, after adjusting for age, sex, diabetes, atrial fibrillation, and prior cardiovascular disease, their risk was not elevated (adjusted hazard ratio 0.84; 95% confidence interval 0.71 to 1.004 during 2 years).

Conclusion: Elevated BP readings in the ED are common and are often the first time hypertension is detected; however, they were not associated with adverse cardiovascular outcomes within 2 years of the visit. [Ann Emerg Med. 2021;■:1-8.]

Please see page XX for the Editor's Capsule Summary of this article.

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INTRODUCTION

Given the high prevalence of hypertension in developed countries, detection and treatment is critical. Although blood pressure (BP) recordings in an emergency department (ED) are obtained in all but occasional cases, there is considerable debate about whether these measurements accurately reflect an individual's true BP. Two prospective cohort studies conducted in US EDs demonstrated strong concordance (63% to 81%) between elevated ED BP levels and elevated BP at subsequent outpatient clinic visits, regardless of the patient's presenting ED symptoms.[1,2] The strength of correlation is actually similar to that observed between first and subsequent measurements in population-based surveys in nonacute settings.[3] For example, in the Hypertension Detection and Follow-up Program, 63% of men and 58% of women with BP readings in the hypertensive range when BP was measured at home also had values in the hypertensive range when it was rechecked in a clinical setting.[4]

The American College of Emergency Physicians' (ACEP's) 2013 Clinical Policy statement recommended referring patients with asymptomatic markedly elevated BP for outpatient follow-up rather than instituting therapy in the ED, except in select situations such as hypertensive emergency.[5] Indeed, most adults with elevated BP in US EDs do not receive acute treatment.[6] An analysis from Korean EDs, however, reported that patients with a diagnosis of an ED hypertensive event (based on emergency physician diagnosis or prescription of antihypertensive medications) exhibited higher risks of major adverse cardiovascular events in the subsequent 3 years (crude hazard ratio [HR] 4.25; 95% confidence interval [CI] 3.83

Editor's Capsule Summary

What is already known on this topic

Many people presenting for emergency care have elevated blood pressures (BPs).

What question this study addressed

Of all comers with elevated BP readings in the emergency department (ED), how many receive a formal diagnosis of hypertension within 2 years of ED discharge? Is an elevated BP in the ED associated with an increased long-term risk of cardiovascular outcomes and death?

What this study adds to our knowledge

In this large ED cohort, half of patients had elevated BP readings, and almost three quarters of those had no history of hypertension. However, only a quarter of patients with an ED BP of 160/110 mm Hg received a formal diagnosis of hypertension, and after adjustment of other cardiovascular risk factors, there was no increased risk of poor outcomes.

How this is relevant to clinical practice

Emergency physicians often wonder whether they should be doing something about elevated BPs. This work supports referral to a longitudinal care physician to establish the diagnosis.

to 4.71) and 10 years (crude HR 3.20; 95% CI 2.50 to 4.11).[7] However, that study did not obtain data on actual BP measurements and included a mix of incident and prevalent hypertension cases (55% of patients had a history of hypertension), and after adjustment for other comorbidities the HRs were substantially smaller: 1.99 (95% CI 1.61 to 2.47) at 3 years and 1.27 (95% CI 0.78 to 2.05) at 10 years. On the other hand, an analysis using linked claims data in Ontario, Canada, demonstrated that patients with a primary ED diagnosis of hypertension who were discharged from the ED exhibited a low rate of subsequent cardiovascular events: less than 1% within 30 days, 3.4% at 1 year, and 5.4% at 2 years.[8]

Thus, there is some uncertainty in the literature about the import of elevated BP levels in the ED in patients without a prior diagnosis of hypertension. To address this gap in the literature, this study was designed to determine the frequency of elevated BP readings in the ED, the proportion of these patients with prior or subsequent diagnosis of hypertension assigned in other settings, and the association between ED BP levels and cardiovascular events in the subsequent 2 years.

MATERIALS AND METHODS

Study Design and Selection of Participants

This was a retrospective cohort study using administrative and electronic medical records for all adults treated and released from a large-volume ED in 2016 that were linked to administrative records for all health care encounters in the province for 2 years before and after the index ED visit (for a fuller description of these data sets, see Table E1, available online at http://www.annemergmed.com).

Setting

The University of Alberta Hospital is a tertiary care ED open 24 hours a day, every day of the year; is an academic teaching site for family medicine and Royal College emergency medicine; and assesses approximately 75,000 patients annually. The Canadian Health system is governed by the Canada Health Act, which ensures free service delivery through government funding, access to all for medically necessary services without user fees, transferability among provinces, and limitation of private health to cosmetic procedures.

Methods of Measurement

We interrogated the National Ambulatory Care Reporting System, linked with the University of Alberta Hospital Emergency Department Information System database (an electronic medical record), from January 1 to December 31, 2016, to determine the distribution of triage BPs in adults aged 18 years or older without a diagnosis of acute stroke, cerebral contusion, intracerebral hemorrhage, or anaphylaxis (for list of relevant *International Classification of Diseases, Ninth Revision [ICD-9]* and *ICD-10* codes, see Table E2, available online at http://www.annemergmed.com). We excluded patients who died in the ED, left against medical advice, were admitted to the hospital, or were transferred to other institutions, and for those with multiple ED visits we included only their first visit in this study. For patients with triage BPs greater than or equal to 140/90 mm Hg (stratified into 140 to 159/90 to 99, 160 to 179/100 to 109, and $\geq$180/110 mm Hg, and using the highest of systolic or diastolic BP to classify patients), we determined the primary ED diagnosis (as assigned by the emergency physician), Canadian Triage and Acuity Scale score on presentation (a previously validated index of severity for ED patients, in which 1 indicates resuscitation care and 5 indicates nonurgent care),[9]

antihypertensive medication use in the ED with the Pyxis MedStation system (Becton, Dickinson and Company, Franklin Lakes, NJ), and any prescriptions for antihypertensive medication in the first 90 days after discharge from the index ED visit (using the Alberta Pharmaceutical Information Network, which collects drug dispensation data from all pharmacies in Alberta for patients of any age). We cross-referenced the ED data with Alberta administrative data holdings, including hospitalization records in the Discharge Abstract Database, other ED visits in National Ambulatory Care Reporting System, and outpatient billing claims for the 2 years before and 2 years after the index ED visit to determine what proportion of patients had a diagnosis of hypertension[10,11] assigned in other settings and to determine the Charlson Comorbidity Index score for each patient (see Tables E1 and E2, available online at http://www.annemergmed.com). The Alberta administrative databases include records for every health care interaction anywhere in the province.

Outcome Measures

The cardiovascular outcomes we examined included any hospitalizations (in the Discharge Abstract Database) or ED visits (in the National Ambulatory Care Reporting System) in the entire province of Alberta for stroke or transient ischemic attack, heart failure, or acute coronary syndrome (for a list of *ICD* codes, see Table E2, available online at http://www.annemergmed.com). Survival status was ascertained from the Alberta Healthcare Registry File (which captures all deaths). The primary outcome measure was a composite of all of these outcomes and death. Secondary outcomes included individual components, as well as the composite of death, stroke, or transient ischemic attack.

When examining antihypertensive medication use in the ED, we included all agents available on formulary at the University of Alberta Hospital ED: parenteral labetalol, parenteral hydralazine, parenteral nitroprusside, parenteral nitroglycerin, parenteral esmolol, or any oral antihypertensive medication.

The Health Research Ethics Board of the University of Alberta approved this study with waiver of individual patient consent because we used previously collected data that were deidentified before analysis.

Primary Data Analysis

The majority of the statistics were descriptive. Categoric variables are described with percentages, whereas continuous variables are reported with means and SDs or medians and interquartile ranges, as appropriate. Crude outcomes within 2 years after ED visit were stratified by previous hypertension diagnosis and BP levels, and adjusted analyses comparing patients with a BP greater than or equal to 160/100 mm Hg versus 120 to 139/80 to 89 mm Hg were undertaken with Cox proportional hazards models to report HRs with 95% CIs. Confounders included in the model were selected according to a priori–established prognostic importance (based on clinical experience and existing literature on cardiovascular outcomes in patients with hypertension)[12] and included age, sex, diabetes, prior coronary disease, heart failure, atrial fibrillation, and prior stroke or transient ischemic attack. Data analyses were conducted with SAS (version 9.4; SAS Institute, Inc., Cary, NC) and R (version 3.5.2; R, Vienna, Austria).

RESULTS

Characteristics of Study Subjects

Of 68,761 adult patients presenting to the University of Alberta Hospital in 2016, after excluding those ineligible for our study (Figure 1) (principally, 8.9% who left without being seen, 25.0% who were hospitalized, 14.7% with repeated visits by the same patient, and 3.1% who were not Alberta residents), we analyzed BP data for 30,278 patients treated and released from the ED. Of the 14,717 patients

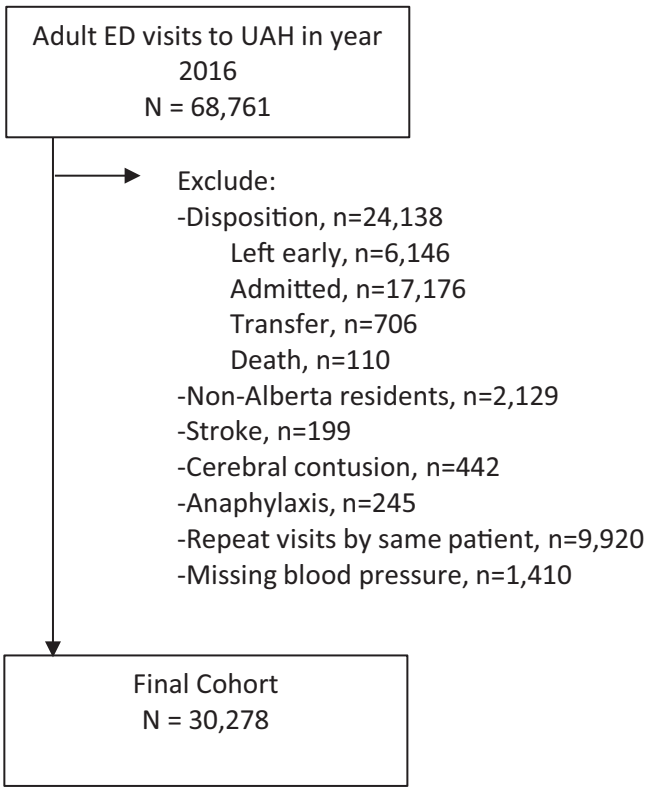

Figure 1. Derivation of the cohort. *UAH*, University of Alberta Hospital.

Table 1. Characteristics of 30,278 adults treated and released from a tertiary care Canadian ED.

Characteristic	Total, N=30,278	BP <140/90 mm Hg, N=15,561	BP 140–159/ 90–99 mm Hg, N=9,223	BP 160–179/ 100–109 mm Hg, N=3,893	BP ≥180/ 110 mm Hg, N=1,601
Age, mean (SD), y	46.0 (19.6)	42.5 (19.0)	46.8 (19.2)	53.0 (19.1)	57.6 (18.8)
Men	14,821 (48.9)	6,898 (44.3)	5,027 (54.5)	2,098 (53.9)	798 (49.8)
Rural residence	1,805 (6.0)	958 (6.2)	539 (5.8)	234 (6.0)	74 (4.6)
Systolic BP, mean (SD), mm Hg	136.9 (20.5)	122.5 (11.6)	143.9 (8.4)	159.8 (12.3)	181.5 (18.1)
Diastolic BP, mean (SD), mm Hg	82.8 (14.3)	74.2 (10.1)	87.5 (9.3)	95.7 (11.0)	106.6 (15.9)
CTAS score					
1 (higher acuity)	62 (0.2)	44 (0.3)	12 (0.1)	5 (0.1)	1 (0.1)
2	5,899 (19.5)	2,746 (17.6)	1,775 (19.2)	907 (23.3)	471 (29.4)
3	15,351 (50.7)	7,777 (50.0)	4,644 (50.4)	2,042 (52.5)	888 (55.5)
4	7,928 (26.2)	4,379 (28.1)	2,475 (26.8)	854 (21.9)	220 (13.7)
5 (lowest acuity)	1,038 (3.4)	615 (4.0)	317 (3.4)	85 (2.2)	21 (1.3)
Charlson score, mean (SD)	0.6 (1.5)	0.6 (1.5)	0.5 (1.3)	0.6 (1.4)	0.8 (1.5)
Diagnosis of hypertension in 2 y before ED visit	6,180 (20.4)	2,195 (14.1)	1,971 (21.4)	1,310 (33.7)	704 (44.0)
New diagnosis of hypertension in 2 y after ED visit	2,087 (6.9)	640 (4.1)	658 (7.1)	470 (12.1)	319 (19.9)
Primary ED diagnosis					
Trauma/injuries	7,767 (25.7)	4,045 (26.0)	2,466 (26.7)	942 (24.2)	314 (19.6)
Gastrointestinal (including abdominal pain)	3,804 (12.6)	2,105 (13.5)	1,120 (12.1)	433 (11.1)	146 (9.1)
Cardiac (including chest pain)	3,370 (11.1)	1,349 (8.7)	1,060 (11.5)	575 (14.8)	386 (24.1)
Infections	2,897 (9.6)	1,721 (11.1)	825 (8.9)	263 (6.8)	88 (5.5)
Psychiatric	1,359 (4.5)	683 (4.4)	446 (4.8)	172 (4.4)	58 (3.6)
Substance abuse issues (including overdoses)	1,282 (4.2)	703 (4.5)	356 (3.9)	152 (3.9)	71 (4.4)
Respiratory diseases	853 (2.8)	422 (2.7)	261 (2.8)	129 (3.3)	41 (2.6)
Other	8,946 (29.5)	4,533 (29.1)	2,689 (29.2)	1,227 (31.5)	497 (31.0)
Cardiovascular comorbidities					
Diabetes	3,112 (10.3)	1,339 (8.6)	958 (10.4)	532 (13.7)	283 (17.7)
Coronary artery disease, with/ without prior revascularization	1,656 (5.5)	774 (5.0)	475 (5.2)	266 (6.8)	141 (8.8)
Atrial fibrillation	1,172 (3.9)	600 (3.9)	308 (3.3)	183 (4.7)	81 (5.1)
Heart failure	740 (2.4)	391 (2.5)	176 (1.9)	103 (2.6)	70 (4.4)
Stroke/TIA	367 (1.2)	158 (1.0)	120 (1.3)	50 (1.3)	39 (2.4)
Time to physician initial assessment, median (IQR), min	132 (66–221)	135 (66–223)	131 (67–220)	131 (65–215)	117 (58–207)
Total ED LOS, median (IQR), h	5.5 (3.6–7.8)	5.4 (3.6–7.8)	5.4 (3.6–7.7)	5.7 (3.8–8.1)	5.8 (4.0–8.5)
Antihypertensive medication given in ED	423 (1.4)	121 (0.8)	99 (1.1)	76 (2.0)	127 (7.9)
Antihypertensive medication dispensed within 90 days of discharge from ED	7,425 (24.5)	2,795 (18.0)	2,309 (25.0)	1,472 (37.8)	849 (53.0)
New antihypertensive medication dispensed within 90 days of discharge from ED	2,240 (7.4)	745 (4.8)	625 (6.8)	441 (11.3)	429 (26.8)
Hypertension coded as a diagnosis at discharge	1,768 (5.8)	520 (3.3)	476 (5.2)	395 (10.1)	377 (23.5)
Treated by an outpatient physician within 1 mo of discharge from ED	20,922 (69.1)	10,565 (67.9)	6,349 (68.8)	2,784 (71.5)	1,224 (76.5)

CTAS, Canadian Triage and Acuity Scale; *TIA*, transient ischemic attack; *IQR*, interquartile range; *LOS*, length of stay.
Data are presented as No. (%) unless specified.

(48.6%) with elevated BP readings, 10,732 (72.9%) had no prior diagnosis of hypertension. The most common ED diagnoses were trauma/injuries (25.7%), gastrointestinal complaints (12.6), and cardiac symptoms (11.1%) (Table 1).

Compared with patients with nonelevated BP levels, those with measured BP greater than or equal to 140/90 mm Hg in the ED were older, more likely to be men, more likely to have lower Canadian Triage and Acuity Scale scores (reflecting more urgent presenting complaints), and, although their Charlson scores did not differ from those of patients with BP less than 140/90 mm Hg, more likely to have a history of hypertension (36.9% versus 18.2%), diabetes (12.0% versus 8.6%), or prior coronary disease (6.0% versus 5.0%; all $P<.001$) (Table 1). Patients with elevated BP readings were treated sooner than those without them, and they spent longer in the ED (Table 1). Patients with the highest BPs (≥180/110 mm Hg) were older, had the highest Charlson comorbidity scores, had the shortest times until physician initial assessment, and experienced slightly longer ED stays (Table 1).

The ED attending physicians rarely prescribed antihypertensive medication in the ED (2.1% of all patients with BP >140/90 mm Hg and 7.9% of those with BP ≥180/110 mm Hg) (Table 1). Of the 14,717 patients with BP greater than or equal to 140/90 mm Hg in the ED, 3,985 (27.1%) had a prior diagnosis of chronic hypertension (at least 2 outpatient visits or 1 hospitalization with a diagnosis of hypertension in the 2 years before the index ED visit), 70.4% were treated in outpatient follow-up within a month, and 31.4% were dispensed an antihypertensive medication within 90 days of discharge from the ED. Of the 1,601 patients with BP greater than or equal to 180/110 mm Hg, 704 (44.0%) had a prior diagnosis of chronic hypertension, 76.5% were treated in outpatient follow-up within a month, and 53.0% were dispensed an antihypertensive medication within 90 days of discharge from the ED.

Of the 10,732 patients without a history of hypertension who had elevated BPs during their index ED visit, 7,057 (65.8%) were treated in outpatient follow-up within a month and 1,495 (13.9%) were prescribed a new antihypertensive agent within 90 days of ED discharge. In the 3,480 patients without a history of hypertension who had BP greater than or equal to 160/100 mm Hg at ED triage, 2,350 (67.5%) were treated in outpatient follow-up within a month, 870 (25.0%) were prescribed a new antihypertensive agent within 90 days of ED discharge, and 907 (26.1%) subsequently received a diagnosis of chronic hypertension or were prescribed antihypertensive therapy in other settings within 2 years.

Patients without a history of hypertension but with an ED BP greater than or equal to 160/100 mm Hg were more likely to meet the composite outcome (stroke, transient ischemic attack, acute coronary syndrome, heart failure, or death) in the subsequent year (3.3% versus 2.5%) or 2 years (5.9% versus 3.8%) than those without a history of hypertension and ED BP 120 to 139/80 to 89 mm Hg (Figure 2); however, after adjusting for age, sex, diabetes, atrial fibrillation, and prior cardiovascular disease,

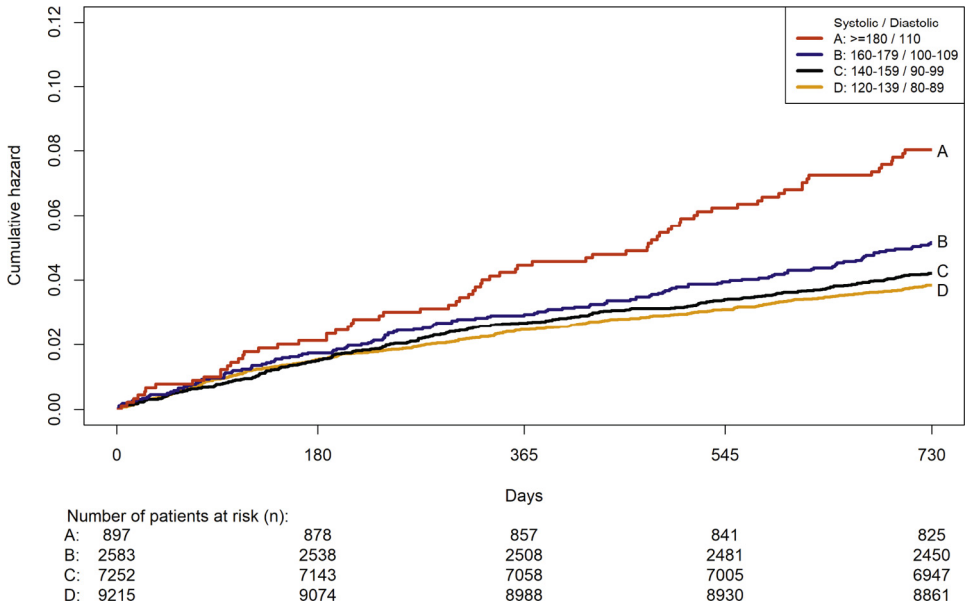

Figure 2. Occurrence of death, stroke, transient ischemic attack, acute coronary syndrome, or new heart failure over time, by ED triage BP in patients with no history of hypertension.

Table 2. Outcomes within 2 years by ED BP strata, broken down by whether the patient had a history of hypertension.

ED BP, mm Hg	N	Death	Stroke or TIA	Death, Stroke, or TIA	Acute Coronary Syndrome	New Heart Failure Event*	Composite Outcome of Death, Stroke, TIA, Acute Coronary Syndrome, or Heart Failure	Adjusted HR for Composite Outcome†
Patients without diagnosis of hypertension before ED visit								
120–139/80–89	9,215	277 (3.0)	49 (0.5)	319 (3.5)	19 (0.2)	42 (0.5)	354 (3.8)	1 (Ref)
140–159/90–99	7,252	224 (3.1)	48 (0.7)	266 (3.7)	19 (0.3)	29 (0.4)	305 (4.2)	0.87 (0.75–1.02)
160–179/100–109	2,583	94 (3.6)	20 (0.8)	111 (4.3)	12 (0.5)	20 (0.8)	133 (5.1)	0.78 (0.64–0.96)
≥180/110	897	40 (4.5)	25 (2.8)	62 (6.9)	5 (0.6)	11 (1.2)	72 (8.0)	1.01 (0.78–1.30)
Patients with diagnosis of hypertension before ED visit								
120–139/80–89	1,519	269 (17.7)	44 (2.9)	307 (20.2)	24 (1.6)	96 (6.3)	390 (25.7)	1 (Ref)
140–159/90–99	1,971	201 (10.2)	65 (3.3)	254 (12.9)	33 (1.7)	82 (4.2)	318 (16.1)	0.70 (0.60–0.81)
160–179/100–109	1,310	138 (10.5)	29 (2.2)	159 (12.1)	25 (1.9)	45 (3.4)	209 (16.0)	0.69 (0.58–0.82)
≥180/110	704	67 (9.5)	29 (4.1)	90 (12.8)	17 (2.4)	44 (6.3)	129 (18.3)	0.78 (0.64–0.95)

Ref, Reference value.
A total of 4,827 patients with BP less than 120/80 mm Hg at ED presentation were excluded.
*Heart failure event was defined as hospitalization or ED visit with heart failure as the diagnosis most responsible.
†Adjusted for age, sex, diabetes, atrial fibrillation, prior coronary disease, prior heart failure, and prior stroke or transient ischemic attack.

their risk was not significantly elevated (adjusted HR 0.84; 95% CI 0.71 to 1.004 during 2 years) (Table 2). In patients without a history of hypertension, those with an ED BP greater than or equal to 160/100 mm Hg were not at higher risk in the next 2 years of the composite outcome often used in hypertension trials of death, stroke, or transient ischemic attack (5.0% versus 3.5%; adjusted HR 0.79; 95% CI 0.65 to 0.95) compared with those with ED BPs 120 to 139/80 to 89 mm Hg. All covariates adjusted for, and their adjusted HR, are included in Table E3, available online at http://www.annemergmed.com).

Patients with a history of hypertension and elevated BPs at ED triage exhibited higher rates of death, stroke, acute coronary syndrome, and heart failure in all BP strata (Table 2) than patients without a prior diagnosis of hypertension who presented with the same BPs in the ED. Adjustment for age, sex, and comorbidities demonstrated that there was no excess cardiovascular risk in the subsequent 2 years for patients with a history of hypertension and an elevated BP at their index ED visit (Table 2). In patients with a history of hypertension, those with the lowest ED BPs exhibited the poorest outcomes (Figure 3).

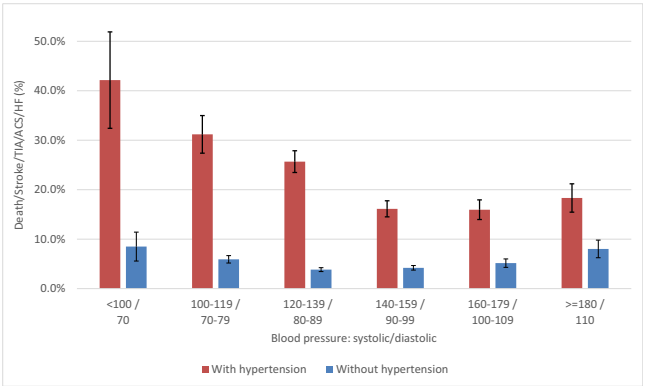

Figure 3. Outcomes in the subsequent 2 years by ED triage BP in patients without and with a history of hypertension. Error bars represent 95% CIs.

LIMITATIONS

Although we have access to the triage BP measurements only, an analysis of 43,232 visits to Veterans Administration EDs confirmed that in 81% of cases the only BP measured was at triage,[13] and studies[6,14] that did examine serial BPs in the ED demonstrated that changes were minimal during the ED stay. In fact, the National Hospital Ambulatory Medical Care Survey data demonstrated that in patients not treated with antihypertensive drugs, 96% of those with BP greater than or equal to 160/100 mm Hg still had BP in the hypertensive range at discharge from the ED.[6] We do not have data on specialist consultations conducted in the ED to address hypertension or cardiovascular risk and cannot tell whether the post-ED outpatient visits were specifically for hypertension monitoring or for other causes. Moreover, we did not adjust for antihypertensive medications in our

outcome models; however, inclusion of medication data would likely bias toward the null and thus even further negate any potential association between ED BP values and subsequent cardiovascular events. Our finding that patients with a history of hypertension who had the lowest ED BPs exhibited the poorest outcomes is not unexpected and is commonly observed for continuous risk factors such as BP, cholesterol level, weight, and glucose level, in which unmeasured confounders (such as sepsis, cachexia, dehydration, or frailty) that cause low levels of the biomarkers also cause adverse outcomes. Our results arise from an urban, tertiary care ED, which may limit generalizability of the data to other settings, although a fuller description of ED diagnoses in this cohort (pooled into 123 episode diagnostic categories) is provided in Table E4 (available online at http://www.annemergmed.com). Management of hypertension is likely underestimated in this study, especially in patients with preexisting hypertension, because medication adherence assessment, lifestyle modification recommendations, and other advice are not recorded. Finally, ambulatory BP monitoring or home measurements are more accurate for making a diagnosis and following patients with hypertension than single measurements,[15] even when done with automated devices such as in our ED.

DISCUSSION

In this cohort, nearly half of patients presenting to the ED for any reason had elevated BP readings. Although nearly three quarters of the patients with elevated BP had no documented prior diagnosis of hypertension, one quarter of those without a history of hypertension but with BP greater than or equal to 160/100 mm Hg subsequently received a diagnosis of chronic hypertension and began receiving antihypertensive therapy within 2 years of their ED visit. It is likely that these values underrepresent the true proportion of patients with chronic hypertension because only two thirds of them had outpatient follow-up after ED discharge.

Although patients with elevated BP at ED triage had more cardiovascular events in the subsequent 2 years, the excess risk appeared to be due to their age, sex, and comorbidities and there was no independent association with the ED BP. Thus, although detection of an elevated BP in the ED is a potentially important finding—in patients without a history it may represent initial disease detection, and in patients with known hypertension it may indicate suboptimal control—our data support the ACEP recommendation to refer patients with elevated ED BPs for follow-up after the ED visit rather than rush to initiate treatment. Our finding that emergency physicians initiated antihypertensive therapy in the ED infrequently, even for patients with BP greater than or equal to 180/110 mm Hg, mirrors reports from the National Hospital Ambulatory Medical Care Survey,[8] in which less than 6% of adults with a triage BP greater than or equal to 160/100 mm Hg were prescribed antihypertensive agents by the emergency physician; this appears to be a safe approach, given our results.

Although few adult ED visits were assigned a primary diagnosis of hypertension in our study or other audits,[8,16] for some patients the ED serves as their primary site for health care, especially in Canada, where all patients can receive ED care without incurring direct out-of-pocket expenses. Moreover, awareness of the importance of self-monitoring of BP is increasing, especially with home BP measurements, pharmacy readings, and electronic applications such as Fitbits and "smart" watches: patients with elevated BPs who use self-monitoring devices often present to the ED for assessment, although only 3% are admitted to the hospital.[17] Thus, it is likely that isolated asymptomatic BP elevations will become a more frequent presenting complaint in EDs. Although patients who receive prompt follow-up after an ED visit for hypertension are twice as likely to receive evidence-based antihypertensive therapy as those who do not,[18] future research should focus on developing and evaluating strategies to communicate ED BP measurements to each patient's regular physician(s) and enhancing timely outpatient follow-up.

In conclusion, elevated BP readings in the ED are common and are often the first time hypertension is detected. Although elevated BP at ED triage is associated with poorer cardiovascular outcomes in the subsequent 2 years, that excess risk appears to be due to patients' age, sex, and comorbidities, and there is no independent association between ED BP readings and short-term prognosis. Our findings support the ACEP position that the finding of elevated BPs in the ED should generate a prompt referral for outpatient follow-up.

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