Provider Self-Report and Practice: Reassessment and Referral of Emergency Department Patients With Elevated Blood Pressure

Brigitte M. Baumann[1], David M. Cline[2], John J. Cienki[3], Darcy Egging[4], Jill F. Lehrmann[5] and Paula Tanabe[5]

BACKGROUND
We attempted to identify patient factors associated with blood pressure (BP) reassessment and to compare health-care provider self-reported reassessment and referral to actual practice in an emergency department (ED) setting.

METHODS
Provider reassessment and referral practices were determined through systematic review of 1,250 medical records at five EDs. Medical records were included if patients were ≥18 years, nonpregnant, presented with a systolic (SBP) ≥140 or diastolic BP (DBP) ≥90 mm Hg, and discharged. A separate questionnaire obtained self-reported practice patterns of health-care providers. Multivariate logistic regression identified factors associated with patient BP reassessment and referral.

RESULTS
Of 1,250 patients, only 57% underwent BP reassessment and 9% received a referral for outpatient management. The most significant independent variables related to a reassessment were as follows: treatment of elevated BP in the ED (odds ratio (OR): 6.05; 95% confidence interval (CI): 1.80–20.31), chest pain (OR: 3.90; 95% CI: 2.37–6.42), and presence of an ED reassessment protocol (OR: 2.49; 95% CI: 1.77–3.50). The most significant factors associated with a referral included treatment of elevated BP in the ED (OR: 5.55; 95% CI: 2.72–11.32), presence of a reassessment protocol (OR: 2.58; 95% CI: 1.32–5.05), and a BP reassessment (OR: 2.56; 95% CI: 1.34–4.89). For self-reported practice patterns, 379 (72%) health-care providers completed questionnaires. Providers consistently overestimated their referral practices, yet the mean referral threshold values reported (SBP, 150 mm Hg; DBP, 93 mm Hg) were lower than the mean BP values of patients who actually received a directed referral (SBP, 170 mm Hg; DBP, 97 mm Hg, $P < 0.0001$).

CONCLUSIONS
Reassessment and referral of discharged ED patients with elevated BP was infrequent and health-care providers overestimate their reassessment and referral efforts.

Am J Hypertens 2009; **22**:604-610

Screening for asymptomatic hypertension is routinely undertaken in primary care settings and was recently advocated by the Society for Academic Emergency Medicine and the American College of Emergency Physicians to be conducted by emergency medicine providers.[1,2] These endorsements are based, in part, on the potential long-term public health benefits and the minimal effort required by emergency department (ED) staff to screen and refer patients with elevated blood pressure (BP) to outpatient management. Universal screening has the potential to improve long-term health outcomes of ED patients, particularly the at-risk patient populations. Hypertension and its associated morbidity affects higher rates of blacks, the socioeconomically disadvantaged and the elderly, groups that are disproportionately represented in national ED utilization estimates, and therefore, most likely to benefit from ED-based screening efforts.[3–8]

The available literature on ED-based hypertension screening is focused primarily on patient characteristics and demonstrates insufficient screening and referral rates (7–45%).[9–12] However, to improve screening and referral efforts, additional information is required of health-care providers. Specifically, what are health-care provider goals, how do they rate their screening and referral efforts, and how does self-report compare to actual practice? To our knowledge, no such study exists. Thus, we initiated a multicenter investigation comparing health-care provider self-reported practice patterns to actual practice and endeavored to determine whether a disconnect exists.

METHODS

Study population. A retrospective cohort of 1,250 adult ED patients with elevated BP was selected from five institutions. Patients aged ≥18 years, presenting with an initial systolic BP (SBP) ≥140 mm Hg or diastolic BP (DBP) ≥90 mm Hg, and discharged from the ED were eligible for inclusion. Patients who were pregnant, had a repeat visit during the sampling period, or were evaluated by a nonemergency medicine resident were excluded.

[1]Department of Emergency Medicine, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, Camden, New Jersey, USA; [2]Department of Emergency Medicine, Wake Forest University School of Medicine, Winston-Salem, North Carolina, USA; [3]Department of Emergency Medicine, University of Miami, Jackson Memorial Hospital, Miami, Florida, USA; [4]Department of Emergency Medicine, Delnor Community Hospital, Geneva, Illinois, USA; [5]Department of Emergency Medicine, Northwestern University Feinberg School of Medicine, Chicago, Illinois, USA. Correspondence: Brigitte M. Baumann (baumann-b@cooperhealth.edu)

Received 22 September 2008; first decision 20 October 2008; accepted 9 February 2009; advance online publication 5 March 2009. doi:10.1038/ajh.2009.44

Medical record sampling was conducted over a 6–8 week period immediately preceding the administration of the health-care provider questionnaire. This limited sampling period was instituted to minimize bias and allow comparisons in current health-care provider practices and self-report. Sampling was conducted during two calendar months, on alternating days and every other eligible patient was enrolled. This ensured a high yield in physician documentation, capturing two rotations of emergency medicine residents and a high proportion of attending physicians. A maximum of 30 records were included from each day until 250 records were reviewed and all days of the week were represented.

Ninety-six percent of all ED health-care providers documented on at least one medical record included in the above cohort, leaving 97 attending physicians, 99 residents, and 328 nurses (n = 524) eligible to participate in a prospective cross-sectional survey on practice patterns. Eligible health-care providers were asked to complete questionnaires about their reassessment, management and referral of ED patients with elevated BP. To minimize changes in health-care provider practice patterns, questionnaires were distributed after the medical record review at each site, and all providers were blinded to the medical record review.

Of the five EDs that participated in this investigation, four were urban, academic centers with emergency medicine residents. The annual census for these four sites ranged from 49,000 to 120,000, with a total combined annual census of 327,000. The fifth ED was in a suburban setting with an annual census of 38,000 and did not have residents. Data collection was initiated in November 2005 and completed in June 2006. The retrospective portion of the study was approved by each participating site's institutional review board, and waivers of written consent for the health-care providers were granted.

Medical record abstraction. Patient demographics were obtained from the medical record, with race and ethnicity self-identified during patient registration. Presence of pain, history of hypertension, use of antihypertensive medications, and current alcohol or cocaine use were noted. Patients presenting with symptoms of chest pain, shortness of breath, or neurologic complaints, including focal weakness, sensory changes, disequilibrium, vision changes, and headache, were considered symptomatic in this review.

For each patient, the initial BP measurement and up to two subsequent reassessments, if available, were recorded. At all sites, patient's initial BP was obtained by a triage nurse using an electronic sphygmomanometer. Subsequent measurements were obtained using electronic sphygmomanometers by nurses, technicians, or physicians, per departmental policy. Although each site had protocols in place for standardized BP measurements (i.e., the use of appropriately sized cuffs and the completion of measurements in patients who were resting quietly), no attempts were made to enforce or ascertain compliance with these policies. Any attempt to do so may have led to a loss of blinding of health-care providers. Only two sites had BP reassessment protocols in place: One required a reassessment every 4 h and the second required a reassessment if a patient's BP was >140/90 mm Hg and a final reassessment of all patients at discharge.

Discharge instructions were reviewed for directed medical follow-up. All sites had discharge instructions containing generic referrals to a primary care physician or a clinic for further medical care. To meet the definition of a directed referral, follow-up instructions had to (i) specifically note that the patient had elevated BP in the ED; (ii) note the elevated BP reading(s); or (iii) state that the patient needed reassessment for high BP or hypertension. Discharge instructions were additionally reviewed for instructions in lifestyle modification and for the provision of a prescription for antihypertensive medication(s).

BP categorization. To facilitate patient categorization, we used the ranges provided by the seventh Joint National Committee on Prevention, Detection, Evaluation, and Treatment of high BP report staging for adults aged ≥18 years, with stage 1 (SBP 140–159 mm Hg or DBP 90–99 mm Hg) and stage 2 (SBP ≥ 160 mm Hg or DBP ≥100 mm Hg). This somewhat artificial categorization was necessary to facilitate presentation of the data. It was not our intention to suggest that patients with BPs falling within these ranges to have stage 1 or 2 hypertension. Furthermore, no attempt was made to use the lower BP values suggested for diabetics because this history was inconsistently recorded in the medical record, and, again, our goal was not to conduct hypertension staging.[13]

Health-care provider questionnaire. Health-care providers provided demographic information including professional degree and years of practice (attending physicians and nurses) or training (residents). To assess reassessment practices, health-care providers were asked what initial SBP and DBP would prompt them to obtain a repeat measurement and when they would "routinely refer" low acuity, asymptomatic patients for outpatient BP reassessment and management. "Low acuity" was defined as a single minor complaint (e.g., sprain or simple laceration). Physicians were also asked to note what BP reading would lead them to prescribe lifestyle and dietary modifications or an antihypertensive medication at discharge.

Outcome measures. There were two primary outcomes in this investigation: (i) the proportion of patients who underwent BP reassessment as per the medical record compared to health-care provider self-report and (ii) the proportion of asymptomatic patients who received an outpatient referral compared to health-care provider self-report. Secondary outcomes included the frequency of lifestyle modification recommendations, including low-salt diet, increased exercise, avoidance of alcohol or cocaine, and the provision of a prescription for an antihypertensive medication. For secondary outcomes, practice, as evidenced by medical record review, was compared to health-care provider self-report.

Statistical analysis. Data were analyzed using SPSS version 15.0 (SPSS, Chicago, IL). Patient characteristics are presented

as either percentages or mean ± s.d. Univariate analysis was conducted using Student's *t*-test and χ^2 or Fisher's exact test where appropriate. Multivariable logistic regression explored the effect of patient and site characteristics on the likelihood of patients receiving a BP reassessment and an outpatient referral. A "best fit" model was developed by using forced entry and then backward elimination. Patient referral as per the medical record is presented as the percentage of patients who were given a directed referral with 95% confidence intervals (CIs). Health-care provider self-report for referral is presented as mean percentages with 95% CIs. All analyses were two-tailed and *P* values <0.05 were considered statistically significant.

RESULTS

Of the 7,293 screened ED medical records, 6,043 were excluded for the following reasons: initial BP did not meet study criteria (n = 2,995); patient <18 years (n = 1,450); patient was admitted (n = 1,423); patient care was provided by a nonemergency medicine resident (n = 132); and patient was pregnant (n = 43). The remaining 1,250 records met study criteria and were included in the final analyses.

Reassessments

Repeat BP assessments occurred in 709 (57%) and a third assessment in 419 (34%). Of patients with repeat BP measurements, 476 (67%) remained elevated with the second measurement. Sixty-six (5%) patients presented with two symptoms and five (0.4%) with three. Patient characteristics are presented in **Table 1**. To identify factors associated with a BP reassessment, multivariate analyses were performed. For patients with BPs within stage 1 values, pharmaceutical treatment of elevated BP, presentation with chest pain, and presence of a BP reassessment protocol were the three factors most highly associated with a BP reassessment. In the group with initial BPs corresponding to stage 2 values, the presence of a reassessment protocol was not as highly associated with a BP reassessment. Rather, chest pain and neurologic complaints were the two other prominent factors. These results are presented in **Table 2**.

For the health-care provider questionnaire on practice patterns, 379 (72%) of eligible providers participated, with 155 of 196 (79%) physicians and 224 of 328 (68%) nurses completing questionnaires. Reassessment practices of health-care providers are presented in **Table 3**, where provider self-reported values are compared to the initial BPs obtained from the medical record review. There were 882 (71%) asymptomatic patients in this cohort, of whom 240 (27%) had an SBP or DBP that met or exceeded the highest threshold reported by health-care providers (SBP 170 mm Hg and DBP 100 mm Hg). Of these 240 patients, only 155 (65%) underwent a reassessment (as opposed to an anticipated 100%).

Referrals

Referral practices were obtained from 215 of 224 (96%) nurses and 149 of 155 (96%) physicians. Medical record review demonstrated that only 110 (9%) patients from the entire sample received a directed referral, and of those, 45 were symptomatic. Health-care providers overestimated their referral practices: The mean referral threshold values reported (SBP, 150 mm Hg; DBP, 93 mm Hg) were lower than the mean BP values of patients who actually received a directed referral (SBP, 170 mm Hg; DBP, 97 mm Hg), $P < 0.0001$. The discrepancy between physician self-reported referral practices (in mean percent) and actual practice (proportion of patients who actually received a referral) is further delineated in **Figure 1**, and factors associated with an outpatient referral are presented in **Table 4**.

Dietary and lifestyle recommendations at discharge are presented in **Table 5**. Of the nine patients who received a prescription in the lower BP group, eight had a history of hypertension. Of the 31 patients who received a prescription in the higher BP group, 23 had a history of hypertension. Overall, patients with a history of hypertension were more likely to have been given a prescription for an antihypertensive medication than those without ($P \leq 0.005$).

DISCUSSION

To our knowledge, this is the first study to compare health-care provider self-reported reassessment and referral of patients with elevated BP to actual practice in an ED setting. In addition, our model for BP reassessment expanded on earlier investigations, incorporating previously demonstrated patient-level variables, such as BP and age, in addition to site

Table 1 | Patient characteristics

	Entire sample (n = 1,250)
Male (%)	645 (52)
Age, mean (s.d.)	46.9 (16.6)
Black (%)	434 (35)
Hispanic (%)	179 (14)
Self-pay or charity care[a]	452 (37)
Triage SBP, mean (s.d.)	156 (18)
Triage DBP, mean (s.d.)	91 (13)
Triage SBP ≥140 mm Hg (%)	1,142 (91)
Triage DBP ≥90 mm Hg (%)	684 (55)
Complaint of pain at presentation (%)	896 (72)
Symptomatic: Neurologic complaint, chest pain, and shortness of breath (%)	368 (29)
Neurologic (%)	182 (15)
Chest pain (%)	146 (12)
Shortness of breath (%)	116 (9)
Medical and social history	
History of hypertension (%)	436 (35)
Currently taking antihypertensive medication (%)	328 (26)
Current alcohol use (%)	259 (21)
Current cocaine use (%)	38 (3)

DBP, diastolic blood pressure; SBP, systolic blood pressure.
[a]Insurance status was missing for 35 medical records; percentage noted is valid percent.

Table 2 | Factors associated with a blood pressure reassessment

	All patients ($n = 1,250$)		SBP 140–159 mm Hg or DBP 90–99 mm Hg ($n = 747$)		SBP ≥160 mm Hg or DBP ≥100 mm Hg ($n = 503$)	
Variable	Adjusted odds ratio (95% CI)	*P* value	Adjusted odds ratio (95% CI)	*P* value	Adjusted odds ratio (95% CI)	*P* value
Demographic factors						
Female sex	1.04 (0.79–1.36)	0.45	1.12 (0.78–1.60)	0.55	1.01 (0.62–1.63)	0.99
Age, per 10 years	1.32 (1.21–1.45)	<0.0001	1.24 (1.10–1.41)	0.001	1.42 (1.20–1.67)	<0.0001
Black[a]	0.52 (0.38–0.72)	<0.0001	0.40 (0.26–0.61)	<0.0001	0.78 (0.46–1.31)	0.35
Hispanic ethnicity	0.86 (0.56–1.32)	0.49	0.64 (0.37–1.10)	0.10	2.22 (0.92–5.35)	0.08
History of hypertension	0.61 (0.05–7.05)	0.69	0.81 (0.05–9.43)	0.71	0.85 (0.06–11.76)	0.91
Currently taking antihypertensive medication	1.00 (0.97–1.02)	0.67	0.82 (0.35–1.88)	0.63	1.00 (0.97–1.03)	0.85
Alcohol use	1.00 (0.99–1.00)	0.32	0.99 (0.99–1.01)	0.16	1.00 (0.99–1.01)	0.78
Cocaine use	1.00 (0.99–1.00)	0.59	1.00 (0.99–1.00)	0.93	0.99 (0.99–1.01)	0.42
Symptoms[b]						
Chest pain	3.90 (2.37–6.42)	<0.0001	4.37 (2.28–8.40)	<0.0001	4.29 (1.69–10.92)	0.002
Shortness of breath	1.28 (0.79–2.09)	0.23	1.05 (0.57–1.96)	0.87	1.88 (0.75–4.71)	0.18
Neurologic complaint	1.97 (1.32–2.94)	0.002	1.65 (0.97–2.85)	0.07	2.42 (1.22–4.81)	0.01
Triage SBP (per 10 mm Hg)	1.14 (1.04–1.26)	0.002	0.89 (0.69–1.14)	0.34	1.19 (1.01–1.39)	0.04
Triage DBP (per 10 mm Hg)	1.09 (0.97–1.23)	0.08	0.85 (0.70–1.04)	0.11	1.30 (1.08–1.57)	0.007
Pharmaceutical treatment of blood pressure in ED	6.05 (1.80–20.31)	0.003	3.53 (0.40–31.0)	0.26	11.00 (1.43–84.40)	0.02
Reassessment protocol in ED	2.49 (1.77–3.50)	<0.0001	4.11 (2.55–6.58)	<0.0001	1.93 (1.08–3.41)	0.03
Care provided by attending only (vs. attending and medical student/resident)	1.77 (1.29–2.42)	0.001	2.03 (1.36–3.05)	0.001	1.26 (0.71–2.24)	0.41

CI, confidence interval; DBP, diastolic blood pressure; ED, emergency department; SBP, systolic blood pressure.
[a]Blacks were compared to whites only. There were 434 self-identified blacks and 773 self-identified whites. The 10 Asian and 33 "other race" subjects were not included in the logistic regression. [b]Patients with chest pain, shortness of breath, and neurologic complaints were considered symptomatic and were compared to those without these symptoms (considered asymptomatic). A neurologic complaint was defined a priori as focal weakness, sensory changes, disequilibrium, vision changes, and headache.

and provider-level characteristics, which have not been sufficiently addressed.[9–12,14–16]

Our screening of 7,293 medical records yielded 1,250 patients with elevated BP. This number is likely an underestimate for the prevalence of elevated BP in the ED patient population because we did not collect BP data on patients who were admitted, seen by a nonemergency medicine resident, or those who were under 18 years of age. Nevertheless, our findings are consistent with previous investigations, where the proportion of ED patients with elevated BP ranged from 3 to 45%.[10–12,16–20] We are well aware that these proportions cannot be construed as prevalence estimates of hypertension because compliance with standardized measurements is infrequently enforced and serial measurements are inconsistently obtained.[13,21–28] In spite of these limitations, a growing body of literature suggests that a significant proportion of ED patients with elevated BP (SBP ≥140 or DBP ≥90 mm Hg) are indeed hypertensive, with between 26 and 77% remaining hypertensive at outpatient follow-up.[13,15–18,29] Based on these estimates, the prevalence of hypertension in ED patients falls between 1 and 35%. With an estimated 119 million annual ED visits, a prevalence as low as 1% would account for over one million uncontrolled hypertensive patients who could potentially benefit from outpatient intervention. A conservative estimate of 10% would yield nearly 12 million.[8]

Our logistic regression analysis revealed several patient characteristics associated with a BP reassessment. Two factors, increasing age and BP elevation, have been associated with repeat assessments in previous studies.[9–12,14–16,30] In the BP group corresponding to stage 1 values, chest pain and presence of a reassessment protocol were also positively associated with a BP reassessment. An unexpected finding, however, was that patients in the lower BP ranges who were primarily cared for by an attending physician also had higher odds of a repeat assessment. This is somewhat counterintuitive because physical examination documentation by trainees tends to be more comprehensive than the documentation by attending physicians alone.[31–33] In the group corresponding to stage 2 BP values, chest pain and presence of a reassessment protocol remained positively associated with a reassessment. Unlike the lower BP group, however, neurologic complaints, increasing SBP and DBP values, and pharmacologic treatment in the ED also demonstrated a positive association with reassessments. These differing associations between BP groups suggest

Table 3 | Minimum mean blood pressure reassessment thresholds for asymptomatic patients

BP (mm Hg)[a]	Nurses ($n = 224$)	Physicians ($n = 155$)	Medical record ($n = 434$)[b]	*P* value
All sites				
Systolic (95% CI)	162 (159–165)	169 (166–172)	159 (157–161)	<0.0001
Diastolic (95% CI)	95 (94–96)	100 (99–101)	92 (91–93)	<0.0001
Sites without a reassessment protocol				
Systolic (95% CI)	162 (158–166)	168 (164–172)	156 (154–159)	<0.0001
Diastolic (95% CI)	95 (93–97)	99 (98–101)	92 (90–93)	<0.0001
Sites with a reassessment protocol				
Systolic (95% CI)	162 (158–166)	170 (166–174)	162 (160–165)	0.04
Diastolic (95% CI)	95 (94–97)	100 (98–102)	91 (90–93)	<0.0001

BP, blood pressure; CI, confidence interval.
[a]Nurse and physician BP thresholds are presented as mean self-reported values. The medical record threshold value is the mean of the initial BP documented in the medical records of patients who actually underwent a BP reassessment. [b]Only asymptomatic patients were included.

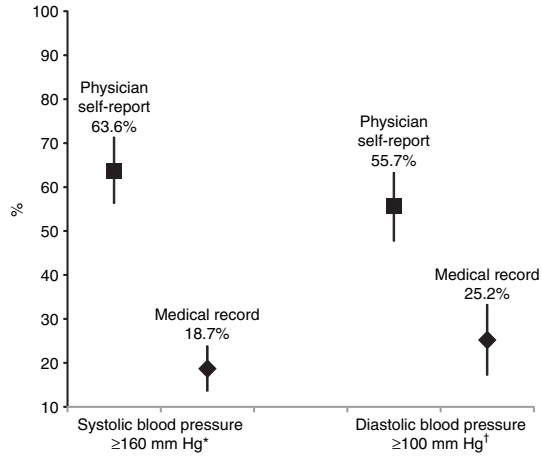

Figure 1 | Proportion of asymptomatic patients (mean SBP ≥160 or DBP ≥100 mm Hg) receiving a directed referral: physician self-report vs. practice. Physicians were asked what percentage of the time they refer an asymptomatic patient with the stated BP values. Medical record review obtained the proportion of patients with SBP ≥160 mm Hg or DBP ≥100 mm Hg who received an outpatient referral. DBP, diastolic blood pressure; SBP, systolic blood pressure. *219 patients had an SBP ≥160 mm Hg. †111 patients had a DBP ≥100 mm Hg.

that health-care providers may rely on different factors when deciding to conduct a BP reassessment.

Our data additionally demonstrated a disconnect between health-care provider self-report and practice, with an exaggerated self-reported threshold for BP reassessment by providers. Overall, the mean BP values obtained from providers were higher than those obtained from the medical record review. Given that only 57% of patients actually had a BP reassessment, however, these findings are less encouraging than they initially appear.

Table 4 | Factors associated with a referral for outpatient blood pressure follow-up

Variable	All patients ($n = 1,250$) Adjusted odds ratio (95% CI)	*P* value
Demographic factors		
Female sex	0.90 (0.55–1.48)	0.66
Age, per 10 years	1.00 (0.84–1.19)	0.99
Black[a]	1.92 (1.11–3.34)	0.02
Hispanic	1.75 (0.87–3.54)	0.12
History of hypertension	1.19 (0.59–2.40)	0.63
Currently taking antihypertensive medication	0.70 (0.34–1.43)	0.33
Alcohol use	1.00 (0.98–1.01)	0.36
Cocaine use	1.00 (0.99–1.01)	0.50
Symptoms[b]		
Chest pain	1.64 (0.83–3.22)	0.16
Shortness of breath	0.44 (0.17–1.17)	0.10
Neurologic complaint	1.30 (0.71–2.38)	0.40
Mean SBP (per 10 mm Hg)	1.28 (1.08–1.51)	0.004
Mean DBP (per 10 mm Hg)	1.24 (0.96–1.59)	0.10
Pharmaceutical treatment of blood pressure in ED	5.55 (2.72–11.32)	<0.0001
Reassessment protocol in ED	2.58 (1.32–5.05)	0.006
BP repeated during ED visit	2.56 (1.34–4.89)	0.004
Care provided by attending only (vs. attending and medical student/resident)	1.50 (0.88–2.55)	0.08

DBP, diastolic blood pressure; ED, emergency department; SBP, systolic blood pressure. [a]Blacks were compared to whites only. There were 434 self-identified blacks and 773 self-identified whites. The 10 Asian and "33" other race subjects were not included in the logistic regression. [b]Patients with chest pain, shortness of breath, and neurologic complaints were considered symptomatic and were compared to those without these symptoms (considered asymptomatic). A neurologic complaint was defined a priori as focal weakness, sensory changes, disequilibrium, vision changes, and headache.

Physicians also overestimated their referral practices. Of the 1,066 patients with an initial or mean SBP ≥140 mm Hg or DBP ≥90 mm Hg, only 10% were provided a directed referral at discharge, with the majority of referrals occurring in patients with higher BP values. Factors most highly associated with outpatient referral included pharmaceutical treatment of elevated BP during the ED visit, the presence of an ED-based BP reassessment protocol and completion of a BP reassessment. These findings suggest that active interventions, be they physician-initiated or protocol-driven, may be the most effective in prompting health-care providers to recommend outpatient follow-up.

Aside from outpatient referral, the provision of a prescription for antihypertensive medications was the most common discharge intervention and occurred most frequently in patients with higher BP elevations as well as those with a prior history of hypertension. Providing a prescription renewal for known hypertensive patients may be appropriate, however, the initiation of an antihypertensive medication in "newly diagnosed"

Table 5 | Patients receiving a directed referral, instructions in dietary and lifestyle modifications, and an antihypertensive prescription

	Mean SBP 140–159 mm Hg or DBP 90–99 mm Hg ($n = 704$)	Mean SBP ≥160 mm Hg or DBP ≥100 mm Hg ($n = 362$)	*P* value
Directed referral (%)[a]	40 (5.7)	70 (19.3)	<0.0001
Salt restriction	8 (1.1)	22 (6.1)	<0.0001
Weight loss	2 (0.3)	3 (0.8)	0.34
Increase exercise	1 (0.1)	4 (1.1)	0.048
Reduce alcohol use	5 (0.7)	3 (0.8)	1
Do not use drugs	2 (0.3)	1 (0.3)	1
Prescribed antihypertensive	9 (1.2)	31 (8.5)	<0.0001

DBP, diastolic blood pressure; SBP, systolic blood pressure.
[a]Values are frequencies, with percentages.

patients is not supported by established or American College of Emergency Physicians guidelines.[2,13] Until more data exist, the initiation of any antihypertensive medication from the ED remains controversial, particularly when not accompanied by dietary and lifestyle modification recommendations.[13]

Limitations

The exclusion of patients who were admitted to the hospital may have altered our prevalence estimates of patients with elevated BP. This exclusion was necessary because one of our secondary end points was the provision of a directed referral to patients at discharge. An additional limitation was the categorization of symptomatic patients. In this investigation, patients presenting with chest pain, shortness of breath, or a neurologic complaint were categorized as symptomatic. These symptoms may or may not have been related to patients' elevated BPs, which would have led to a misclassification error.

The medical record review provided three additional limitations. First, we were unable to compare directly individual health-care provider self-report of reassessment or referral to his/her actual practice, limiting our ability to formally test our data. Second, we were unable to determine who obtained BP reassessments and why: A physician's verbal order for a repeat BP assessment may have been documented only in the nursing notes. Alternatively, a repeat BP assessment may have been initiated by a nurse, yet documented only by the physician. Finally, we were unable to capture any verbal recommendations that were in addition to those documented in patients' discharge instructions. The only means to improve data quality would have been to conduct a prospective investigation, with study personnel recording individual health-care provider behaviors in real time. This alternative is less satisfactory than our original research plan because provider behavior would likely have been influenced by the Hawthorne effect: With time, providers would have realized that their reassessment and referral practices were being recorded, and we suspect that this realization would have led to an artificial increase in such practices.

In conclusion, our results demonstrate infrequent reassessment and referral of ED patients with elevated BP. We further demonstrated that health-care providers overestimate their reassessment and referral efforts. Given our sample characteristics, ED screening has great potential to capture at-risk patients, the relatively young, socioeconomically disadvantaged, and minorities. For current preventative and emergency medicine hypertension screening recommendations to be implemented in the ED setting, this disconnect between provider self-report and practice requires further investigation.[1,2,13,34]

Disclosure: The authors declared no conflict of interest.

1. Babcock IC, Wyer PC, Gerson LW. Preventive care in the emergency department, Part II: clinical preventive series—an emergency medicine evidence-based review. Society for Academic Emergency Medicine Public Health and Education Task Force Preventive Services Work Group. *Acad Emerg Med* 2000; 7:1042–1054.
2. Decker WW, Godwin SA, Hess EP, Lenamond CC, Jagoda AS; American College of Emergency Physicians Clinical Policies Subcommittee (Writing Committee) on Asymptomatic Hypertension in the ED. Clinical policy: critical issues in the evaluation and management of adult patients with asymptomatic hypertension in the emergency department. *Ann Emerg Med* 2006; 47:237–249.
3. Balu S, Thomas J III. Incremental expenditure of treating hypertension in the United States. *Am J Hypertens* 2006; 19:810–816.
4. Giles T, Aranda JM Jr, Suh DC, Choi IS, Preblick R, Rocha R, Frech-Tamas F. Ethnic/racial variations in blood pressure awareness, treatment, and control. *J Clin Hypertens (Greenwich)* 2007; 9:345–354.
5. Kramer H, Han C, Post W, Goff D, Diez-Roux A, Cooper R, Jinagouda S, Shea S. Racial/ethnic differences in hypertension and hypertension treatment and control in the multi-ethnic study of atherosclerosis (MESA). *Am J Hypertens* 2004; 17:963–970.
6. Sharma S, Malarcher AM, Giles WH, Myers G. Racial, ethnic and socioeconomic disparities in the clustering of cardiovascular disease risk factors. *Ethn Dis* 2004; 14:43–48.
7. Qureshi AI, Suri MF, Kirmani JF, Divani AA. Prevalence and trends of prehypertension and hypertension in United States: National Health and Nutrition Examination Surveys 1976 to 2000. *Med Sci Monit* 2005; 11:CR403–409.
8. National Hospital Ambulatory Medical Care Survey: 2006 micro-data file documentation. <http://www.cdc.gov/nchs/about/major/ahcd/ahcd1.htm>. Accessed 30 August 2008.
9. Umscheid CA, Maguire MG, Pines JM, Everett WW, Baren JM, Townsend RR, Mines D, Szyld D, Gross R. Untreated hypertension and the emergency department: a chance to intervene? *Acad Emerg Med* 2008; 15:529–536.
10. Tilman K, DeLashaw M, Lowe S, Springer S, Hundley S, Counselman FL. Recognizing asymptomatic elevated blood pressure in ED patients: how good (bad) are we? *Am J Emerg Med* 2007; 25:313–317.
11. Tanabe P, Steinmann R, Kippenhan M, Stehman C, Beach C. Undiagnosed hypertension in the ED setting—an unrecognized opportunity by emergency nurses. *J Emerg Nurs* 2004; 30:225–229.
12. Glass RI, Mirel R, Hollander G, Krakoff LR, Karlin R, Failor RA. Screening for hypertension in the emergency department. *JAMA* 1978; 240:1973–1974.
13. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, Jones DW, Materson BJ, Oparil S, Wright JT Jr, Roccella EJ; National Heart Lung, and Blood Institute Joint National Committee on Prevention Detection, Evaluation, and Treatment of High Blood Pressure; National High Blood Pressure Education Program Coordinating Committee. The seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure: the JNC 7 report. *JAMA* 2003; 289:2560–2572.
14. Chiang WK, Jamshahi B. Asymptomatic hypertension in the ED. *Am J Emerg Med* 1998; 16:701–704.
15. Chernow SM, Iserson KV, Criss E. Use of the emergency department for hypertension screening: a prospective study. *Ann Emerg Med* 1987; 16:180–182.
16. Backer HD, Decker L, Ackerson L. Reproducibility of increased blood pressure during an emergency department or urgent care visit. *Ann Emerg Med* 2003; 41:507–512.
17. Fleming J, Meredith C, Henry J. Detection of hypertension in the emergency department. *Emerg Med J* 2005; 22:636–640.
18. Karras DJ, Ufberg JW, Heilpern KL, Cienki JJ, Chiang WK, Wald MM, Harrigan RA, Wald DA, Shayne P, Gaughan J, Kruus LK. Elevated blood pressure in urban emergency department patients. *Acad Emerg Med* 2005; 12:835–843.
19. Baumann BM, Abate NL, Cowan RM, Chansky ME, Rosa K, Boudreaux ED. Characteristics and referral of emergency department patients with elevated blood pressure. *Acad Emerg Med* 2007; 14:779–784.

20. Kaszuba AL, Matanoski G, Gibson G. Evaluation of the emergency department as a site for hypertension screening. *JACEP* 1978; 7:51–55.
21. Dieterle T, Schuurmans MM, Strobel W, Battegay EJ, Martina B. Moderate-to-severe blood pressure elevation at ED entry: hypertension or normotension? *Am J Emerg Med* 2005; 23:474–479.
22. Pitts SR, Adams RP. Emergency department hypertension and regression to the mean. *Ann Emerg Med* 1998; 31:214–218.
23. Cienki JJ, DeLuca LA, Daniel N. The validity of emergency department triage blood pressure measurements. *Acad Emerg Med* 2004; 11:237–243.
24. Lebby T, Paloucek F, Dela Cruz F, Leikin JB. Blood pressure decrease prior to initiating pharmacological therapy in nonemergent hypertension. *Am J Emerg Med* 1990; 8:27–29.
25. Floras JS, Jones JV, Hassan MO, Osikowska B, Sever PS, Sleight P. Cuff and ambulatory blood pressure in subjects with essential hypertension. *Lancet* 1981; 2:107–109.
26. Kleinert HD, Harshfield GA, Pickering TG, Devereux RB, Sullivan PA, Marion RM, Mallory WK, Laragh JH. What is the value of home blood pressure measurement in patients with mild hypertension? *Hypertension* 1984; 6:574–578.
27. White WB. Assessment of patients with office hypertension by 24-hour noninvasive ambulatory blood pressure monitoring. *Arch Intern Med* 1986; 146:2196–2199.
28. Jones DW, Appel LJ, Sheps SG, Roccella EJ, Lenfant C. Measuring blood pressure accurately: new and persistent challenges. *JAMA* 2003; 289: 1027–1030.
29. Tanabe P, Persell SD, Adams JG, McCormick JC, Martinovich Z, Baker DW. Increased blood pressure in the emergency department: pain, anxiety, or undiagnosed hypertension? *Ann Emerg Med* 2008; 51:221–229.
30. Karras DJ, Kruus LK, Cienki JJ, Wald MM, Ufberg JW, Shayne P, Wald DA, Heilpern KL. Utility of routine testing for patients with asymptomatic severe blood pressure elevation in the emergency department. *Ann Emerg Med* 2008; 51:231–239.
31. Szauter KM, Ainsworth MA, Holden MD, Mercado AC. Do students do what they write and write what they do? The match between the patient encounter and patient note. *Acad Med* 2006; 81(10 Suppl):S44–S47.
32. Howell J, Chisholm C, Clark A, Spillane L. Emergency medicine resident documentation: results of the 1999 American Board of Emergency Medicine in-training examination survey. *Acad Emerg Med* 2000; 7:1135–1138.
33. Schwartz RJ, Boisoneau D, Jacobs LM. The quantity of cause-of-injury information documented on the medical record: an appeal for injury prevention. *Acad Emerg Med* 1995; 2:98–103.
34. U.S. Preventive Services Task Force. Screening for high blood pressure: U.S. Preventive Services Task Force reaffirmation recommendation statement. *Ann Intern Med* 2007; 147:783–786.