Uncontrolled hypertension and hypertensive urgency: One-year single-center emergency department experience

Jakub Nowicki[1], Wojciech Siłka[1], Aleksandra Załustowicz[2], Marek Rajzer[3], Agnieszka Olszanecka[3]

[1]Students Scientific Group, 1st Department of Cardiology, Interventional Electrocardiology and Hypertension, Faculty of Medicine, Jagiellonian University Medical College, Kraków, Poland

[2]Emergency Department, University Hospital in Krakow, Kraków, Poland

[3]1st Department of Cardiology, Interventional Electrocardiology and Hypertension, Faculty of Medicine, Jagiellonian University Medical College, Kraków, Poland

Correspondence to:
Agnieszka Olszanecka, MD, PhD, 1st Department of Cardiology, Interventional Electrocardiology and Hypertension, University Hospital in Krakow, Jakubowskiego 2, 30–688 Kraków, Poland, phone: +48 12 400 21 50, e-mail: agnieszka.olszanecka@uj.edu.pl

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ABSTRACT

Background: The prevalence of uncontrolled hypertension remains a significant concern in public healthcare systems, including daily practices of emergency departments (ED).

Aim: We aimed to characterize patients admitted to an ED for elevated blood pressure (BP) and to identify factors leading to hospitalization.

Methods: This retrospective analysis included all patients admitted to an ED in a tertiary hospital in 2022 due to an acute BP rise without hypertensive emergencies.

Results: The studied group (n = 570) constituted 1.5% of all ED admissions in 2022. The median age was 67 years (Q1–Q3) (52–75), 68.9% were females. Systolic BP (200 mm Hg [180–212]) and diastolic BP (105 mm Hg [100–115]) at home were higher than during triage (173 mm Hg [160–190] and 95 mm Hg [84–103], respectively [P <0.0001]). Thirty-nine percent of the studied population had taken BP-lowering agents before ED admission (captopril in 91.8% of cases). In the ED, nitrendipine (54.2%), captopril (38.1%), furosemide (16.3%), urapidil (10.0%), and nitroglycerine (1.9%) were administered. Eventually, a median of 140/82 mm Hg BP was reached in the median time of 288 minutes (202–400). Hospitalization was necessary in 5.4% of patients. The need for furosemide or urapidil administration in the ED doubled the risk of hospitalization (OR, 2.0; P <0.01). Before ED admission, only 17.0% of patients received guidelines-recommended single-pill combination therapy, and 17.6% had already visited ED for uncontrolled hypertension (median of 388 days earlier).

Conclusions: Elevated BP is a common reason for admission to the ED. Crucially, improvements in long-term hypertension treatment and education are needed to reduce the number of patients seeking ED care for elevated BP.

Key words: uncontrolled hypertension, emergency department, hypertensive urgency

INTRODUCTION

An acute rise in blood pressure (BP) is a frequent cause of admittance to the emergency departments (EDs) although the epidemiological data are inconsistent. Depending on the adopted definitions and addressed hypertensive scenario, elevated BP accounts for between 1% to 25% of all ED admissions [1–4]. Since this group of patients is characterized by great heterogeneity, considerable efforts are put to stratify them according to medical state severity and corresponding prognosis [5]. Most importantly, patients presenting with systolic BP (SBP) >180 mm Hg and/or diastolic BP (DBP) >110 mm Hg, accompanied by acute symptomatic end-organ damage (e.g., acute stroke hemorrhagic or ischemic/thromboembolic, aortic aneurysm or dissection, acute heart failure, acute coronary syndrome, and kidney failure) constitute a cohort of high-risk patients also referred to as hypertensive emergencies. These have a significant mortality rate of 4.6% [6] and require immediate intervention to lower BP [7, 8]. On the other hand, for all remaining patients without end-organ damage, only a brief observation with oral antihypertensives is advised, as they rather do not benefit from an aggressive BP

WHAT'S NEW?

Uncontrolled hypertension is a common cause of admittance to the emergency department (ED). This analysis aimed to shed light on the current approach for managing patients who present without acute hypertensive end-organ damage. Based on the one-year single-center experience, we found significant heterogeneity in the studied group, as patients presented with a wide range of blood pressure (BP) values, diverse pre-ED medical history, and varying symptoms. Most of them had been already diagnosed with arterial hypertension, and underwent pharmacotherapy adjustment following ED admission, which indicates suboptimal long-term antihypertensive management. Our study suggests that improvements in long-term hypertension treatment, and pre-ED management, including self-administration of BP-lowering agents may decrease the number of patients seeking help for elevated BP in the ED.

reduction [7]. However, little is known about this cohort of patients, who in light of their substantial volume burden and lack of unanimous international guidelines on optimal treatment, pose a significant challenge for ED physicians [9].

To address this knowledge gap, we aimed to characterize patients who visited the ED for elevated BP and to evaluate factors associated with hospitalization following ED management.

METHODS

Study design and population

This retrospective study was conducted based on "real-world" data obtained from the ED at the University Hospital in Kraków. The study was approved by the Bioethics Committee of the Jagiellonian University (1072.6129.14.2023). All admissions due to uncontrolled hypertension between January 2022 and December 2022 were analyzed. Patients who reported high BP as a cause of ED admissions, with SBP exceeding 140 mm Hg in triage or before were included in the study. Patients with confirmed hypertensive emergency, i.e. end-organ damage, such as myocardial infarction and stroke, were excluded. Patient inclusion in terms of BP level is shown in Figure 1.

Data collection

We collected data from electronic medical records. The collected information included demographic characteristics, pre-hospital care, reported symptoms, use of anti-hyper-

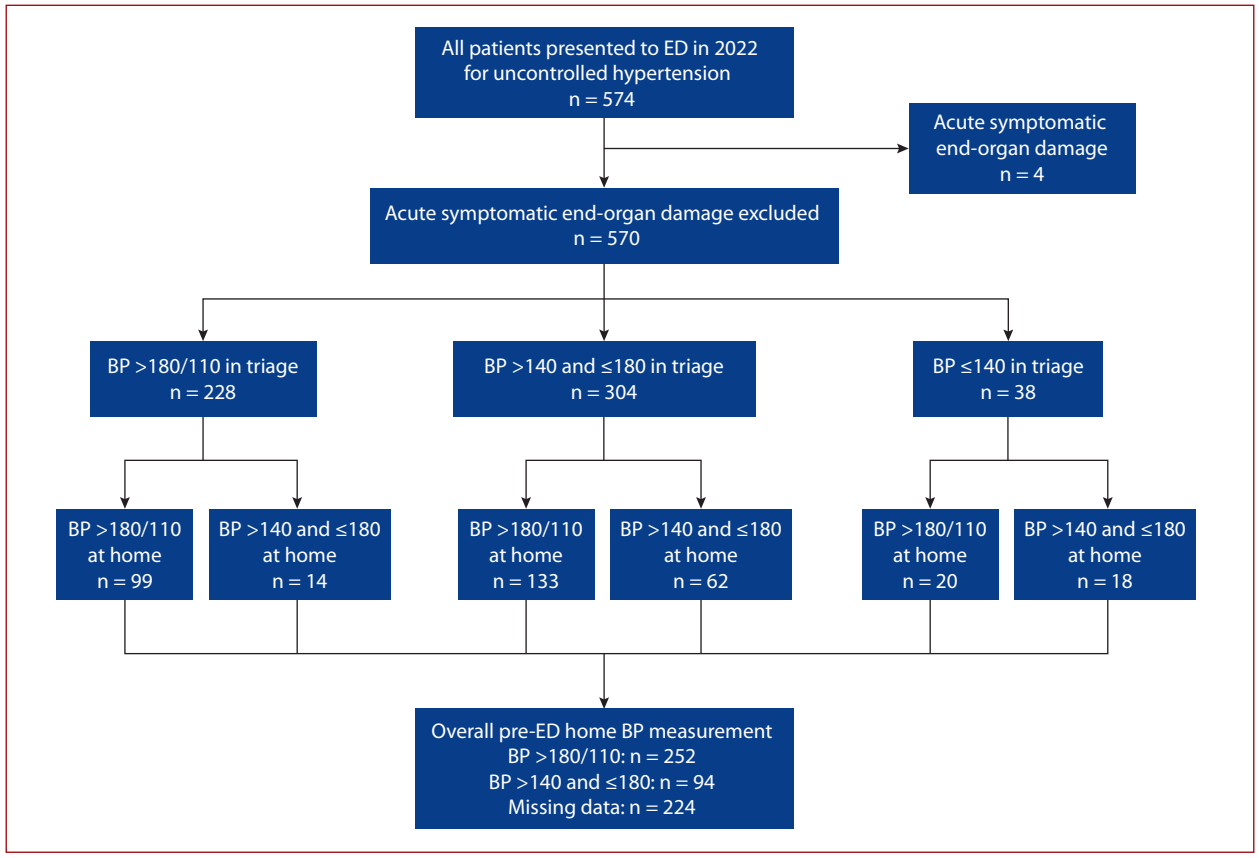

Figure 1. Flowchart of patients' inclusion and their BP measured at home and during triage. All BP measures are presented as mm Hg
*Patients with systolic BP >140 mm Hg in triage or at home

Abbreviations: BP, blood pressure; ED, emergency department

Table 1. Patient characteristics at baseline, based on data from patient history

Variable	Overall group n = 570	Patients not taking chronic antihypertensive medication n = 168	Patients taking chronic antihypertensive medication n = 402	*P*-value
Median age, years (Q1–Q3)	67 (52–75)	53.5 (45.0–71.0)	69.5 (61.0–76.0)	<0.001
Sex, males/females, n (%)	177 (31.1)/393 (68.9)	76 (45.2)/92 (54.8)	101 (25.1)/301 (75.9)	<0.001
Arterial hypertension, n (%)	454 (79.6)	58 (35.6)	396 (98.5)	<0.001
Diabetes mellitus, n (%)	98 (17.2)	15 (8.9)	83 (20.7)	<0.001
Dyslipidemia, n (%)	79 (13.9)	8 (4.8)	71 (17.7)	<0.001
Coronary artery disease, n (%)	86 (15.1)	9 (5.4)	77 (19.2)	<0.001
Prior MI, n (%)	28 (4.9)	2 (1.2)	26 (6.5)	<0.01
Atrial fibrillation, n (%)]	51 (8.9)	4 (2.4)	47 (11.7)	<0.001
Prior stroke/TIA, n (%)	23 (4.0)	1 (0.6)	22 (5.5)	<0.01
Hypothyroidism, n (%)	74 (13.0)	11 (6.6)	62 (15.4)	<0.01
Chronic kidney failure, n (%)	23 (4.0)	2 (1.2)	21 (5.2)	0.03
Respiratory disease, n (%)	37 (6.5)	9 (5.4)	28 (7.0)	0.48
Chronic heart failure, n (%)	39 (6.8)	7 (4.2)	32 (8.0)	0.10
PAD, n (%)	16 (2.8)	0 (0.0)	16 (4.0)	<0.01

Abbreviations: MI, myocardial infarction; PAD, peripheral artery disease; TIA, transient ischemic attack

tensive medication, comorbidities, laboratory test results, and proceedings in the ED.

Laboratory test results included venous blood gas testing (performed using Radiometer ABL800 FLEX analyzer), as well as C-reactive protein, troponin I, CK-MB, and N-terminal pro B-type natriuretic peptide (performed using Radiometer AQT90 FLEX immunoassay analyzer). Data about electrocardiogram abnormalities were obtained using the description of electrocardiogram included in medical records, previously evaluated by an attending physician. Based on the available data, patients were assigned into two groups according to their reported daily intake of antihypertensive medications. To analyze the factors predisposing patients to hospitalization, a separate group was formed comprising subjects admitted to the hospital from the ED.

Statistical analysis

Continuous variables were expressed as medians (first quartile, third quartile) due to their non-normal distribution as assessed by the Shapiro–Wilk test. Intergroup differences were compared using the Mann–Whitney U test. Categorical variables were presented as counts and percentages. They were compared with Pearson's χ^2 or Fisher's exact test if 20% of cells had an expected count of less than 5. Moreover, to compare dependent variables, McNemar and Wilcoxon tests were introduced.

All factors that may have been associated with patient hospitalization were included in univariate regression models. Variables with at least 10 observations per parameter in both groups (hospitalized vs. non-hospitalized patients) that reached statistical significance of $P < 0.2$ or were clinically important, were consecutively adopted in the multivariable logistic regression model. Overall, 15 independent variables met the aforementioned criteria. Risk estimates were presented as odds ratios (ORs) with 95% confidence intervals (CIs). All statistical tests were two-sided and a *P*-value lower than 0.05 was considered statistically significant. The analysis was carried out with the use of Statistica version 13.3 (TIBCO Software, CA, US).

RESULTS

A total of 570 patients were analyzed in this study. Therefore, the prevalence of elevated BP as a cause of admittance to ED equaled 1.5%, considering the overall number of 38 684 patients admitted to ED in 2022.

Baseline demographic and clinical characteristics, and prior long-term hypertension treatment

The median age was 67 years, and most of the patients were female (68.9%). The majority of patients had a prior diagnosis of arterial hypertension (79.6%). Furthermore, 168 patients did not report long-term intake of BP-lowering agents. Among the untreated population, one-third had a prior diagnosis of hypertension (n = 58), while the remainder received a *de novo* diagnosis. Treatment-naive patients were significantly younger and there were fewer women among them. The baseline patient characteristics are shown in Table 1.

Although self-referral was most common, a relatively large number of patients (39.8%) were brought in by the emergency medical service.

Almost one-fifth of the studied group had already visited ED for uncontrolled hypertension (17.6%) with a median of 388 days from the last ED admittance (based on available 82 cases, Table 2). Recurrent ED patients were older (71 [63–79] vs. 66 [51–75] years; $P = 0.001$]. They were also more commonly diagnosed with chronic hypertension (97.6% vs. 77.2%; $P < 0.0001$), as well as comorbidities such as coronary artery disease (23.2% vs. 13.7%; $P = 0.03$), a history of stroke (8.5% vs. 3.3%; $P = 0.03$), chronic obstructive pulmonary disease (12.2% vs. 5.5%; $P = 0.02$), and peripheral artery disease (7.3% vs. 2.1%; $P = 0.008$).

In terms of long-term antihypertensive treatment, beta-blockers (BB, 50.9%), angiotensin-converting enzyme

Table 2. Clinical presentation at the time of admission to the emergency department and at home

Variable	Overall group n = 570	Patients not taking chronic antihypertensive medication n = 168	Patients taking chronic antihypertensive medication n = 402	*P*-value
Measures in ED (n = 570)				
Median SBP, mm Hg (Q1–Q3)	173 (160–190)	174 (60–189)	173 (160–190)	0.77
Median DBP, mm Hg (Q1–Q3)	95 (84–103)	100 (90–110)	92 (82–100)	<0.001
Median MAP, mm Hg (Q1–Q3)	121 (111–131)	124 (114–134)	120 (109–129)	<0.001
BP >180/110, mm Hg, n (%)	228 (40.0)	75 (44.6)	153 (38.1)	0.14
Median heart rate, BPM (Q1–Q3)	81 (73–90)	82 (76–94)	80 (71–90)	<0.01
Median SpO_2 (Q1–Q3)	98 (97–98)	98 (97–99)	98 (97–98)	0.24
Median temperature, Celsius (Q1–Q3)	36.5 (36.4–36.7)	36.5 (36.4–36.7)	36.5 (36.4–36.7)	0.36
ESI, n (%)				
1	1 (0.2)	0 (0.0)	1 (0.3)	0.89
2	11 (1.9)	3 (1.8)	8 (2.0)	
3	209 (36.7)	64 (38.3)	145 (36.1)	
4	346 (60.8)	99 (59.3)	247 (61.4)	
5	2 (0.4)	1 (0.6)	1 (0.3)	
BP measures at home[a] (n = 345)				
Median SBP, mm Hg (Q1–Q3)	200 (180–212)	190 (180–210)	200 (180–213)	0.054
Median DBP, mm Hg (Q1–Q3)	105 (100–115)	104 (100–115)	105 (100–114)	0.74
BP >180/110, mm Hg, n (%)	251 (72.5)	63 (66.3)	189 (75.0)	0.11
Symptoms at the admission time in ED				
Shortness of breath, n (%)	66 (11.6)	18 (10.7)	48 (11.9)	0.68
Chest pain, n (%)	152 (26.7)	44 (26.2)	107 (26.6)	0.92
Heart palpitations, n (%)	46 (8.1)	14 (8.3)	31 (7.7)	0.80
Neurological deficit[b], n (%)	62 (10.9)	24 (14.3)	38 (9.5)	0.09
Headache/vertigo, n (%)	205 (36.0)	66 (39.3)	139 (34.6)	0.29
Tinnitus, n (%)	16 (2.8)	5 (3.0)	11 (2.7)	0.87
Visual impairment, n (%)	19 (3.3)	8 (4.8)	11 (2.7)	0.22
Vomiting, n (%)	22 (3.9)	9 (5.4)	13 (3.2)	0.23
Nausea, n (%)	17 (3.0)	3 (1.8)	14 (3.5)	0.28
Malaise, n (%)	45 (7.9)	11 (6.6)	34 (8.5)	0.44
Syncope, n (%)	16 (2.8)	6 (3.6)	10 (2.5)	0.48
Epistaxis, n (%)	11 (1.9)	5 (3.0)	6 (1.5)	0.24
Peripheral edema, n (%)	25 (4.4)	9 (5.4)	16 (4.0)	0.46
Abdominal pain, n (%)	12 (2.1)	4 (2.4)	8 (2.0)	0.77
Anxiety, n (%)	15 (2.6)	6 (3.6)	9 (2.2)	0.36
Asymptomatic patients, n (%)	130 (22.8)	35 (20.8)	95 (23.8)	0.43

[a]These measures were taken at home, i.e. just prior to admittance to the ED. [b]Consists of paresthesia, slurred speech, dysarthria, memory loss, sensory disturbances

Abbreviations: BPM, beats per minute; DBP, diastolic blood pressure; ESI, emergency severity index; MAP, mean arterial pressure; SBP, systolic blood pressure

inhibitors (ACEIs, 48.5%) were most frequently reported, followed by calcium-channel blockers (CCB, 28.0%), thiazides (25.3%), and angiotensin receptor blockers (23.6%). Other drugs (loop, and potassium-sparing diuretics, methyldopa, and alpha-blockers) were taken in fewer than 15% of cases. Single-pill combinations were used in 17.0 % of patients. The antihypertensive pharmacotherapy is described in detail in Supplementary material, *Tables S1* and *S2*.

Clinical presentation on admission

Median SBP and DBP on admission were 173 mm Hg (Q1–Q3; 160–190) and 95 mm Hg (Q1–Q3; 84–103), respectively; 40% of patients had BP over 180/110 mm Hg (Table 2). BP measures were higher at home although such data were available only for 60% of cases (P <0.0001, Table 3). Patients not receiving chronic antihypertensive medication presented in the ED with higher diastolic BP and higher heart rates. Detailed information on BP range distribution is shown in Figure 1.

Considering symptomatology, headache and/or vertigo (36.0%), chest pain (26.7%), shortness of breath (11.6%), and neurological deficits (10.9%) were the most common signs symptoms. What is more, every fifth patient was asymptomatic (22.8%, Table 2).

Management before ED admission

Fewer than half of the studied population (38.6%) had taken an additional dose of short-acting BP-lowering agents before admission to ED. Captopril was a drug of choice in almost all of the cases (91.8%); however, it was less commonly used in the treatment-naive group. More detailed data are shown in Table 4.

Table 3. Blood pressure measurements at home and during triage comparison

Variable	Home measurement n = 345	ED triage measurement n = 570	*P*-value
Median SBP, mm Hg (Q1–Q3)	200 (180–212)	173 (160–190)	<0.0001
Median DBP, mm Hg (Q1–Q3)	105 (100–115)	95 (84–103)	<0.0001
BP >180/110, mm Hg, n (%)	251 (72.5)	228 (40.0)	<0.0001

Abbreviations: BP, blood pressure; ED, emergency department; other — see Table 2

Table 4. Medications taken prior to admission at the emergency department

Variable	Overall group n = 570	Patients not taking chronic antihypertensive medication n = 168	Patients taking chronic antihypertensive medication n = 402	*P*-value
Administrated BP-lowering agents, n (%)	220 (38.6)	52 (31.0)	168 (41.8)	0.02
Captopril, *s.l.*, n (%)	202 (35.4)	48 (28.6)	154 (38.3)	0.03
Nitrendipine, *p.o.*, n (%)	19 (3.3)	8 (4.8)	11 (2.7)	0.22
Urapidil, *i.v.*, n (%)	21 (3.7)	5 (3.0)	16 (4.0)	0.56
Hydroxyzine, *p.o.*, n (%)	35 (6.1)	7 (4.2)	28 (7.0)	0.2
Furosemide, *i.v.*, *i.m.* or *p.o.*, n (%)	27 (4.7)	9 (5.4)	18 (4.5)	0.65
BB, *p.o.*, or *i.v.*, n (%)	11 (1.9)	6 (3.6)	5 (1.2)	0.07
Nitroglycerine, s.l., n (%)	28 (4.9)	6 (3.6)	23 (5.7)	0.29

All data are expressed as absolute numbers (percentages)

Abbreviations: BB, beta-blockers; *i.m*, *intramuscular*; *i.v.*, intravenous; *p.o.*, *per os*; s.l., *sub linguam*; other — see Table 3

Table 5. Management at the emergency department and outcomes

Variable	Overall group N = 570	Patients not taking chronic antihypertensive medication n = 168	Patients taking chronic antihypertensive medication n = 402	*P*-value
Median time spent at ED, min (Q1–Q3)	288 (202–400)	283 (200–419)	292 (203–395)	0.89
Median SBP at discharge, mm Hg (Q1–Q3) (n = 232)	140 (130–150)	144 (135–150)	140 (130–150)	0.16
Median DBP at discharge, mm Hg (Q1–Q3) (n = 230)	82 (77–90)	86 (80–90)	80 (75–90)	0.02
SBP >140 mm Hg at discharge, n (%)	112 (19.6)	34 (20.2)	78 (19.4)	0.82
Urapidil administration, *i.v.* [n (%)]	57 (10.0)	23 (13.7)	34 (8.5)	0.06
Hydroxyzine administration, *p.o.*, n (%)	160 (28.1)	42 (25.0)	118 (29.4)	0.29
Furosemide administration, *i.v.* or *i.m.*, n (%)	93 (16.3)	23 (13.7)	70 (17.4)	0.27
0.4 mg NTG administration, *s.l.*, n (%)	11 (1.9)	7 (4.2)	4 (1.0)	0.01
Captopril administration, *s.l.*, n (%)	217 (38.1)	76 (45.2)	141 (35.1)	0.02
Nitrendipine administration, *p.o.*, n (%)	309 (54.2)	89 (53.0)	220 (54.7)	0.7
BB administration, *p.o.* or *i.v.*, n (%)	33 (5.8)	12 (7.1)	21 (5.2)	0.37
Hospitalization, n (%)	31 (5.4)	11 (6.6)	20 (5.0)	0.45

Abbreviations: MBP, mean blood pressure; NTG, nitroglycerine; other — see Tables 2–4

Management in the ED

Various diagnostic tests and medications were implemented to achieve the optimal BP reduction. Almost all patients had undergone venous gas blood testing (90.4%). Abnormal potassium (13.4%) and sodium levels (13.6%) were common. Patients with hyponatremia were older (72 [64–79] vs. 66 [52–75]; $P = 0.002$) and were taking loop diuretics more frequently (48.33% vs. 30.2%; $P = 0.004$), compared to the rest of the group (Supplementary material, *Table S3*).

Considering BP-lowering agents used in the ED, nitrendipine was administered to more than half of admitted patients (54.2%) (Table 5). Moreover, captopril was administered often (38.1%), whereas furosemide (16.3%), urapidil (10.0%), and nitroglycerine (1.9%) were less likely to be used. In 39.5%, tranquilizers were administered, with use of hydroxyzine (28.1%) and a valerian-based mixture prepared by the hospital's pharmacy *Mixtura sedativa* (21.4%). Detailed data on used medications are presented in Table 5. Eventually, a median SBP/DBP of 140/82 mm Hg was reached in the median time of 288 minutes that patients spent in the ED (approximately 5 hours).

Hospitalization and antihypertensive treatment adjustment

Only 31 patients (5.4%) were further hospitalized, whereas 247 (43.3%) patients underwent antihypertensive treatment modification (Table 6). Among patients previously treated for hypertension, 40.2% had their pharmacological treatment adjusted by either adding (37.6%) or switching

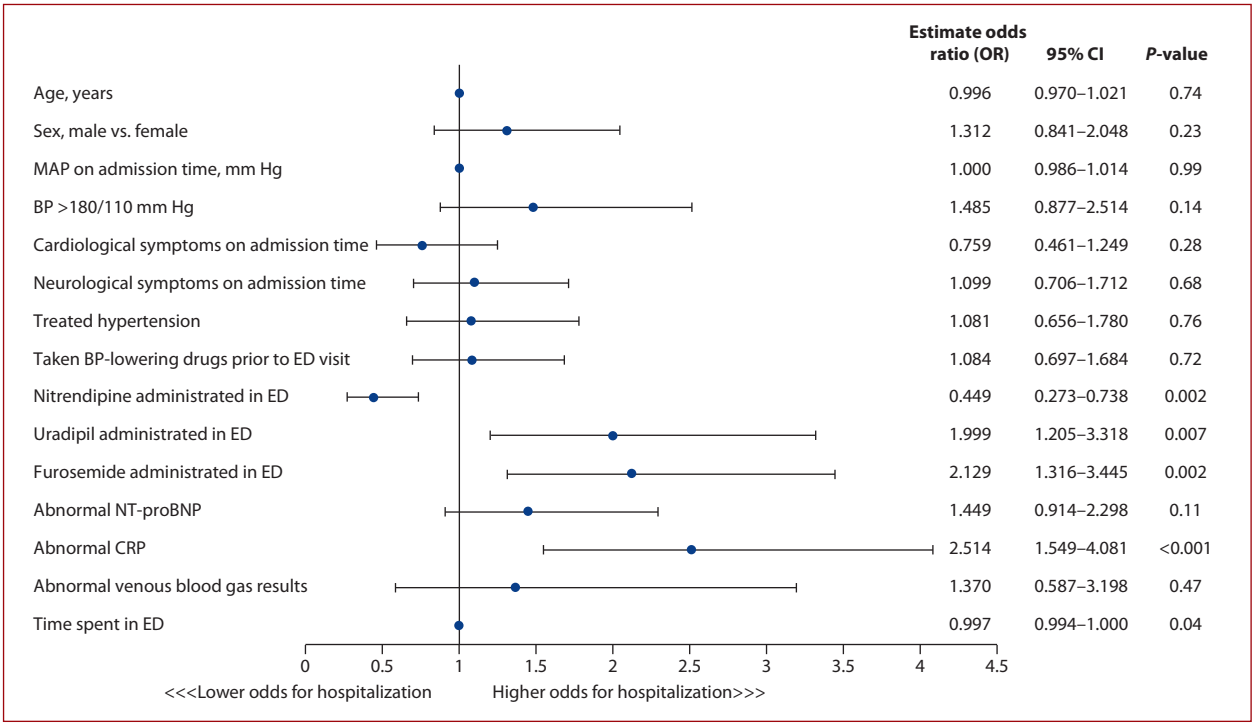

Figure 2. Factors associated with hospitalization — multivariable regression model

Abbreviations: CRP, C-reactive protein; MAP, mean arterial pressure; NT-proBNP, N-terminal pro-B-type natriuretic peptide; other — see Figure 1

Table 6. Pharmacotherapy adjustment among patients treated previously for HA

Variable	Overall group n = 396
Treatment adjustment, n (%)	159 (40.2)
Added drug overall, n (%)	149 (37.6)
Added ACEI, n (%)	71 (18.0)
Added ARB, n (%)	3 (0.8)
Added CBB, n (%)	71 (17.9)
Added DIU, n (%)	52 (13.1)
Added AB, n (%)	2 (0.5)
Added BB, n (%)	15 (3.8)
Added SPC, n (%)	19 (4.8)
Medication switching, n (%)	26 (6.6)
Medication switching with SPC, n (%)	16 (4.0)

Abbreviations: AB, alpha-blockers; ACEI, angiotensin-converting enzyme inhibitors; ARB, angiotensin receptor blockers; CCB, calcium channel blockers; DIU, diuretics; ED, emergency department; SPC, single pill combination; other — see Table 3 and 4

BP-lowering drugs (6.6%). Considering the former, ACEIs and CCBs were most likely to be added (18.0% and 17.9%, respectively), whereas angiotensin receptor blockers and alpha-blockers were prescribed rarely (0.8% and 0.5%, respectively). Lastly, single-pill combination drugs were added (4.8%) to optimize pharmacotherapy or were implemented as a part of the medication-switching strategy (4.0%) in almost equal proportion (Table 6).

Risk factors associated with hospitalization

The multivariable logistic regression model showed that mean arterial pressure on admission was not associated with hospitalization (Figure 2). However, patients treated parenterally with furosemide (OR, 2.2; 95% CI, 1.34–3.45; P <0.01) or urapidil (OR, 1.999; 95% CI, 1.21–3.32; P <0.01) should be considered as having a higher risk of hospitalization following ED admittance. Furthermore, increased C-reactive protein level was linked to an elevated risk of hospitalization (OR, 2.5; 95% CI: 1.55–4.08; P <0.001). On the other hand, patients to whom nitrendipine was administered were 55% less likely to be hospitalized (OR, 0.45; 95% CI: 0.27–0.74; P <0.01).

DISCUSSION

Despite the considerable volume burden of patients presenting with elevated BP to EDs without end-organ damage, most of the studies did not charactere this group. Therefore, our analysis sought to provide a real-world data-based analysis with an insight into patients' medical history, prior antihypertensive treatment, and management conducted before and during ED stay. Our study suggests that this cohort of patients should not be neglected, as they accounted for 1.5% of all ED admissions in 2022, and over one-twentieth of them needed hospitalization. Moreover, almost 20% visited the ED for the same reason in the past.

The term "hypertensive urgency" has been used to describe patients characterized by severely elevated BP (>180/110 mm Hg) without evidence of acute end-organ damage. However, its use is nowadays advised against by the Task Force to avoid confusing management of such patients with real "urgencies", i.e. cases with end-organ damage [8]. The assumption here is that an acute rise of

BP itself does not pose enough threat to apply aggressive BP-lowering treatment, which is associated with a substantial risk of adverse reactions [10–12]. Multiple studies reported that high BP levels alone do not reliably reflect the presence of organ damage [1, 13, 14]. Our study somewhat underpins this finding, as in our case, mean arterial pressure measure on admission was not linked to a higher risk of hospitalization.

At the triage stage, only 40% of the population had BP greater than 180/110 mm Hg, whereas as many as three-quarters of patients who had measured BP at home, met the latter criteria. This was most likely caused by the self-administration of anti-hypertensive agents, such as captopril. It may imply that patients are often rushed to the ED without giving their medication proper time to act. Another potential explanation for lower blood pressure on admission is that the availability of professional medical care associated with admission to the ED alone might reduce patients' anxiety, resulting in a decrease in blood pressure [15].

On the contrary, for patients who had their blood pressure measured in the doctor's office before admission to the ED, the white-coat effect could have contributed to this result [16].

Furthermore, ED patients comprised predominantly females and older patients. While the latter might be simply explained by the fact that uncontrolled hypertension correlates with older age [17, 18], such sex difference was likely driven by higher reporting tendencies in females [19, 20]. Interestingly, among patients visiting the ED with primary high blood pressure values, one-third did not report long-term antihypertensive treatment, and for 19% of the study population, hypertension was diagnosed for the first time. Patients naive to treatment were significantly younger and included fewer women. They presented with higher diastolic blood pressure and heart rate; however, they did not differ significantly in symptomology and biochemical characteristics.

Among patients receiving chronic antihypertensive medication before their ED admission, only 17.0% received single-pill combination therapy recommended by guidelines. When analyzing combination therapy, only half of the population treated with two antihypertensive drugs received recommended combinations (54%), while only one-fifth were treated with recommended combinations while receiving three or more medications. Moreover, the most frequently taken medications in our study group were beta-blockers. Even though beta-blockers are recommended for many coexisting conditions [21–23], the proportion of patients in the study population in whom they were used appears to be higher than the indications would suggest.

What is more, of all patients treated for chronic hypertension, almost 20% have already visited an ED due to uncontrolled hypertension. Thus, targeting patients' compliance might contribute to the reduction of ED overcrowding with low-risk cases [24]. Actions aimed at regimen simplification, e.g. introducing single-pill combination therapy are beneficial in that context, as it significantly improves compliance when compared to free-equivalent combination therapy [25, 26].

Considering treatment of hypertensive urgency, international guidelines based on clinical trials are lacking. It is, however, well-recognized and widely accepted to avoid rapid BP reduction among patients without end-organ damage [5, 7, 27]. The relative safety of patients without end-organ damage is emphasized by both American and European guidelines, which recommend only weekly BP checking in case of "hypertensive urgencies" in daily-care centers instead of EDs [7, 28]. However, a higher risk of mortality due to cardiovascular events in this population at the selected follow-up was also reported in the literature [29, 30].

In our analysis, nitrendipine was the most commonly used medication in the ED. The reason for that may be the use of captopril among our patients before admission.

In total, only one in every twenty patients was hospitalized. Patients treated parenterally with furosemide and urapidil were at a higher risk of hospitalization, while those receiving nitrendipine were less likely to be hospitalized. The first two medications were likely to be reserved for patients in worse clinical conditions and with features of volume overload, occurring, for instance, in heart failure decompensation and bearing a higher risk of organ damage [31].

The large majority of patients were discharged home from the ED. Our results are similar to those obtained by Atzema et al. [32] who also observed that despite markedly abnormal BP while presenting to the ED, only 7% of patients required admission. Interestingly, half of the group presented to ED as asymptomatic, after elevated readings on self-measurement devices, and 11% of participants had another ED admission for hypertension within a year.

Taking into consideration that the most common forms of treatment were oral medications, which can be prescribed to the patient, we suggest that more education about short-acting medications and sudden elevations of blood pressure is needed to both save patients' time and lower the number of patients admitted to the ED. That would result in freeing more time of the medical personnel, a better standard of care, and shorter waiting time for patients.

Limitations

The results of this analysis have to be considered with appropriate caution due to several limitations. First, this study is limited by its retrospective design. Moreover, data on patients' prior treatment and clinical characteristics may have been incomplete due to the risk of underreporting, as medical records were compiled in the ED. Furthermore, certain data were not available, including time that had passed since the occurrence of symptoms, or the precise time of reaching optimal BP after administering medications.

CONCLUSIONS

Uncontrolled hypertension and acute blood pressure elevation are common reasons for ED admissions. Hospital admissions are necessary only in a minority of cases and are not associated with BP at triage. Extensive efforts should be put into optimizing long-term hypertension treatment as well as educating patients on self-administering BP-lowering agents and improving pre-hospital management as it may substantially decrease the number of patients without end-organ damage seeking help in the ED for elevated BP.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/polish_heart_journal.

Article information

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