



ORIGINAL ARTICLE

Unjustified Referral of Adult Patients with Hypertensive Crisis from a First Level of Care to the Emergency Department

Rodriguez-Zuñiga Jorge^{1*}, Garcia-Hernandez Jorge Alfredo² Lopez-Vilchis Lizeth Liliana³, Ruiz-Mondragon Alberto⁴ and Sanchez-Martinez Fatima Alondra⁴



¹Emergency Medicine Department, Hospital General of Zone No 50 IMSS, San Luis Potosi, Mexico

²Clinical Coordination of Education and Health Research, Hospital General of Zone No 50 IMSS, San Luis Potosi, Mexico

³Emergency Medicine Department, Hospital General of Zone No 1 IMSS, San Luis Potosi, Mexico

⁴Professor of the Residency in Emergency Medicine, Hospital General of Zone No 50 IMSS, San Luis Potosi, Mexico

*Corresponding author: Jorge Rodriguez Zuñiga, Department of Emergency Medicine, Hospital General of Zone No 50 IMSS, Av Tangamanga 205 Prados de San Vicente, San Luis Potosi, Mexico, Tel: +52-868-175-9305

Abstract

Introduction: Hypertensive crisis is one of the main complications of systemic arterial hypertension, which is defined as severe elevation of blood pressure, with figures of more than 220/130 mmHg, these in turn are divided into urgency and emergency, which occurs when there is damage to a target organ. According to the literature, the majority of hypertensive crises that occur are of an urgency type, reported in up to 80% of cases, the latter do not require a rapid decrease in blood pressure, taking up to 72 hours to control them, so they must be treated in a first-level care unit, however, a high number of referrals to the emergency department for hypertensive crisis of an urgency type have been detected, which have no justification for their referral.

Primary objective: To determine the frequency of unjustified referrals of adult patients with hypertensive crisis to the emergency department of a second-level hospital.

Methods: Observational, cross-sectional, descriptive study, non-probability sampling type, Sample size calculated based on the finite population formula. Patients referred from the first-level units in the period of August 2019 to July 2020 with a diagnosis of hypertensive crisis were included, where the reason for referral to the emergency service was determined in addition to the clinical characteristics of the patient, blood pressure figure, in addition to determine if it is a hypertensive urgency or emergency (in this case evaluating acute target organ damage).

Results: Of the 204 referrals, the majority were hypertensive urgencies with 161 (78.9%) and 43 (21.1%) were emergencies, 119 women (58.3%) and 85 men (41.7%), Regarding the referrals for hypertensive emergencies (43 referrals), which

correspond to 21.1% of the total number of patients, we observed that the most frequent was acute coronary ischemic syndrome with 13 patients (30.2%), followed by acute pulmonary edema with 12 patients (27.9%), the one with the lowest prevalence was acute kidney injury with only 4 patients, corresponding to 9.3%. Additionally, it was found that in the vast majority of cases of both urgency and hypertensive emergency, patients did not adhere to their usual treatment in a similar percentage, 131 (81.4%) for urgencies and 34 (79.1%) for emergencies.

Conclusions: In this study, referrals for hypertensive crisis from the first level units to the emergency department of our hospital were not justified in 78.9% of the cases.

The prevalence of hypertensive crisis is higher in women than in men.

Most of the patients due to urgency and hypertensive emergency (81.4% and 79.1% respectively) do not adhere to their usual treatment.

It was observed in our study that a high percentage of patients (18% for hypertensive emergency and 46% for hypertensive urgency) do not receive drug treatment at the primary care site.

Keywords

Hypertensive crisis, Hypertensive urgency, Hypertensive emergency, Unjustified referral, hypertension, Blood pressure treatment

Abbreviations

HTN: Hypertension; BP: Blood Pressure; MmHg: Millimeters of Mercury; NMR: Nuclear Magnetic Resonance; UO: Urine Output; GFR: Glomerular Filtration Rate; ACE Inhibitors: Angiotensin-Converting-Enzyme Inhibitors; Mg: Milligram;

Mcg: Microgram; IMSS: Instituto Mexicano del Seguro Social; UMF: Unidad de Medicina Familiar; ARBs: Angiotensin II Receptor Blockers

Introduction

In Mexico, a high prevalence of cases of hypertension (HTN) has been maintained due to the increase in cases of essential chronic diseases such as type 2 diabetes mellitus, dyslipidemias, obesity and metabolic syndrome [1].

The 2020 Mexican clinical practice guide for the diagnosis and treatment of hypertensive crises mentions that the incidence of hypertensive crises in the world has decreased in recent years, in part due to the easy availability and use of antihypertensive drugs [1]. Different situation in our country where the rate of hypertensive crisis as well as cerebral vascular events, diabetes mellitus, chronic renal failure, ischemic heart disease, heart failure and diabetic retinopathy are increasing because according to the national survey of the year 2000, 61% of the people who were detected with HTN were unaware of being carriers of the disease, so the patient goes to the doctor after several years, during which time there will be some degree of damage to the target organ for the most part [2]. In addition to the fact that only 50% of the patients known to have the disease are under antihypertensive drug treatment, of these 14.6% showed figures lower than 140/90 mmHg (Millimeters of mercury) [3].

Definition

According to the 2017 American College of Cardiology and American Heart Association guidelines, high blood pressure (BP) is considered in adult patients when the figures are 120-129 mmHg systolic and less than 80 mmHg diastolic, likewise considers Hypertension stage 1 when having figures of 130-139 mmHg for systolic or 80-89 mmHg for diastolic and stage 2 when the figures are equal to or greater than 140 mmHg for systolic or equal to or greater than 90 mmHg for diastolic [4].

In the 2018 European Society of Cardiology guidelines on hypertension, hypertension is defined as a persistent elevation taken in the office with figures greater than or equal to 140 diastolic and/or greater than or equal to 90 diastolic, which is equivalent to a 24-hour ambulatory BP monitoring with figures equal to or greater than 130/80 mmHg, or a home BP measurement greater than or equal to 135/85 mmHg [5].

Hypertensive crises are a heterogeneous group of hypertensive disorders characterized by severe hypertension and acute damage to target organs such as the brain, heart, kidney, retina, or blood vessels. BP is usually 220/130 mmHg or higher, but it can be much lower in women with preeclampsia without prior hypertension [6].

Pathophysiology

A hypertensive crisis can develop de novo or as a complication of essential or secondary arterial hypertension. To date, the triggers are unclear. The rapid rise in blood pressure figures suggests the existence of a trigger factor superimposed on the already existing arterial hypertension.

Until now, it is known that the abrupt increase in vascular resistance can be the cause of a hypertensive crisis, associated with the presence of humoral vasoconstrictors. In addition to this, endothelial injury occurs secondary to mechanical stress causing increased permeability, activation of the coagulation cascade and platelets and fibrin deposits.

The arterioles suffer fibrinoid necrosis and endothelial damage from these abrupt rises in pressure. Secondary to this, ischemia and release of vasoactive mediators occurs, causing a continuous cycle of injury. There is also activation of the renin-angiotensin system causing greater vasoconstriction as well as the release of pro-inflammatory cytokines such as interleukin-6.

As there is a volume depletion secondary to this vicious cycle of endothelial damage, there is also a release of vasoconstrictive substances from the kidney, all of this resulting in hypoperfusion of target organs, causing ischemia and dysfunction of the same, to later present the classic symptoms of hypertensive emergency depending on the organ that has suffered the greatest secondary injury [7].

The characteristic of arterial hypertension is essentially due to a dysfunction of the endothelium, which in turn is accompanied by an imbalance between the factors that relax the blood vessels, which are nitric oxide and the hyperpolarizing factor of the endothelium, and the factors that promote the vasoconstriction that are endothelin.

In addition, there is a decrease in vasodepressive prostacyclin PG-12 at the endothelium level with the consequent increase in intracellular vasoconstrictor thromboxane-TXA2 [8].

Clinical Manifestations

Hypertensive urgency

In the case of urgencies, since in these there is no damage to the target organ or, if this occurs, it is mild-moderate in nature, so these should normally be treated at the first level of care with oral treatment.

In these cases, the most frequent clinical manifestations that motivate the patient to seek medical attention are usually symptoms such as:

- Headache
- Dizziness

- Instability
- Epistaxis

Although it should be mentioned that a large percentage of these patients are asymptomatic even with high BP levels and are detected as a finding or accident.

Hypertensive emergency

The most common hypertensive emergencies according to the order of presentation frequency are: Acute left ventricular dysfunction with pulmonary edema (22%), acute coronary syndromes (18%), and aortic dissection (8%).

Another variable is when there is a hypertensive crisis secondary to the misuse of sympathomimetic drugs, imitating the clinical manifestations, the most common drug is cocaine, representing one third of all reasons for emergency visits for this cause.

In the context of symptomatology, clinical manifestations are related to target organ dysfunction.

The most frequent symptoms associated with a hypertensive emergency secondary to a coronary ischemic event is chest pain, when acute pulmonary edema occurs, dyspnea may be added, in the case of hypertensive emergencies caused by cerebral vascular events or hypertensive encephalopathy, it may occur headache, sudden neurological deterioration as well as seizures or loss of alertness [9].

Types of Hypertensive Emergency

Hypertensive encephalopathy

Condition which occurs secondary to an abrupt elevation of blood pressure with the presence of clinical manifestations such as intense and progressive headache, nausea, vomiting and visual disturbances, this due to the fact that the mechanisms of autoregulation of cerebral perfusion are not capable of regulating the blood flow.

Headache may appear initially, which has been reported as intense and progressive, sometimes accompanied by nausea, vomiting, visual disturbances, the latter may or may not have retinal complications, sudden onset confusion, alterations in the consciousness, as well as seizures.

An important characteristic is that these symptoms appear progressively in the first 24-48 hours, this allows to differentiate a picture of hypertensive encephalopathy from an intracranial hemorrhage. These symptoms disappear when there is a drop in blood pressure, however, if this sudden rise in pressure is not treated, the patient can progress to coma, with subsequent increased chances of death.

By means of nuclear magnetic resonance (NMR), posterior leukoencephalopathy can be observed, pre-

dominantly in the parietal occipital region, this can be reversible by having an effective and rapid management of the elevation of pressure [9].

Ischemic stroke in acute phase

In hypertensive patients with stroke, there is a sudden rise in blood pressure and subsequently a drop within 90 minutes after the onset of symptoms. This elevation and maintenance of blood pressure also influences the maintenance of perfusion in the area known as the penumbra area, which is adjacent to the lesion, it is believed that it occurs as a physiological response to preserve blood flow.

It is recommended in stroke in case of systolic BP figures greater than or equal to 220 mmHg and/or diastolic blood pressure equal to or greater than 120 mmHg, the figures should be reduced by 10-15% within the first 24 hours, If the patient is also a candidate for fibrinolytic treatment, antihypertensive treatment should be indicated to keep the BP below 185/110 mmHg, the intravenous antihypertensive recommended in case of having a figure greater than 220 mmHg of the systolic or 121-140 mmHg of the diastolic is labetalol, and in case of maintaining a diastolic blood pressure greater than 140 mmHg sodium nitroprusside [9].

Intracranial hemorrhage in acute phase

In these cases, bleeding should be reduced based on antihypertensive treatment, but always trying to preserve blood perfusion, whether it is a brain hematoma or a subarachnoid hemorrhage.

It is known that perfusion in the brain depends on intracranial pressure (ICP) and mean arterial pressure (MAP), so when ICP increases secondary to hemorrhage, the way to preserve perfusion is to keep MAP in numbers equal to or greater than 60 mmHg. A progressive decrease in pressure should be carried out when BP figures are above 180 mmHg for systolic and above 105 mmHg for diastolic or MAP greater than 130-150 mmHg. In this type of hypertensive emergency, the antihypertensive treatment of choice is Labetalol as the first option, followed by sodium nitroprusside [9].

Acute coronary ischemic syndrome

Often a hypertensive emergency and a cardiac ischemia can present together, this is believed to be associated with the stress that is presented by the intense precordial pain that is generated.

The main objective in acute coronary syndrome is a decrease in the work done by the heart muscle to improve blood perfusion, these can be affected by changes in afterload, so there is a resulting ischemia secondary to the alteration of this balance of the supply and demand of oxygen.

The most common clinical finding that occurs in this

variant is chest pain, lasting more than 20 minutes of the oppressive, transfixive type, which occurs at rest or when performing some physical activity, sometimes this pain radiates to the limb left thoracic, mandibular region, epigastrium, left scapula, in addition to being accompanied by diaphoresis, nausea and/or vomiting and syncope.

Anginal Equivalents/Atypical Pain:

- Dyspnea
- Asthenia and adynamia
- Chest discomfort
- Shooting pain in chest
- Pleuritic pain
- Syncope
- Nausea
- Feeling of anxiety or impending death

The electrocardiogram is the most important tool in the diagnosis of ST-segment elevation infarction.

The criteria for diagnosing an ST segment elevation infarction should be presented:

- ST segment elevation > 1 mm (0.1 mV) in 2 contiguous leads (except V2-V3 Men > 0.2 mV in > 40 years and > 0.25 in 40 years and in women > 0.15 mV).
- Elevation of the ST segment in posterior leads > 0.5 mV.

Another useful method in acute myocardial infarction is the use of cardiac biomarkers. It is important to mention that although these must be carried out systematically in the acute phase, they should not be a reason for delaying reperfusion treatment [10] (Table 1).

Malignant arterial hypertension with hypertensive retinopathy

Malignant arterial hypertension is actually an underdiagnosed pathology due to the lack of exploration of the fundus, however, it is of great clinical importance when hypertensive retinopathy occurs, this is secondary to the abrupt elevation of blood pressure in approximately 5-10% of the cases, it is detected when performing the ophthalmological examination finding hemorrhages and/or exudates which represent the ischemic or hemorrhagic lesion, papillary edema can also be observed [11].

Aortic dissection

It is the damage at the level of the aorta artery secondary to the excessive elevation of blood pressure, in this condition intense chest pain is usually presented which can radiate to the back, commonly characterized as acute tear-type pain, migrating towards the posterior chest in a in 90% of cases, radiation to the epigastrium can also occur in approximately 21% of cases, and this is related to compromise of vascularity at the mesentery level. Other clinical characteristics are the presence of weak or absent peripheral pulses, also finding a significant variation in the systolic blood pressure in both arms of approximately 20 mmHg, they can present to the emergency department with neurological deterioration, hypotensive or in a coma [12].

Acute left ventricular dysfunction with acute pulmonary edema

It is characterized by the presence of sudden dyspnea, polypnea, tachycardia, a characteristic cough which is referred to as salmonella, orthopnea, in addition to anxiety due to respiratory distress, when evaluating the patient, elevated blood pressure levels are detected in addition to arterial hypoxemia, Sometimes this condition is related to acute myocardial infarction, left valve insufficiency, valve dysfunction, a rapid diagnostic and therapeutic approach must be carried out to rule out the associated pathologies mentioned and reduce respiratory distress [13].

Table 1: Serum biomarkes [10].

BIOMARKERS	TIME OF APPEARANCE	MAXIMUM ELEVATION PEAK	TIME OF RETURN TO NORMALITY
CKMB	2-3 hours	20-24 hours	48-72 hours
Troponin I	3-12 hours	24 hours	5-10 days
Troponin T	3-12 hours	12 hours-2 days	5-14 days
Myoglobin	1-2 hours	5-7 hours	24 hours

Table 2: AKIN Classification [14].

STAGE	CREATININE (MG/DL)	URINE OUTPUT (UO) (ML/KG/HR)	CATEGORY
I	Cr × 1.5 or Cr equal to or greater than 0.3 over < 48 hours	< 0.5 for 6 hours	Risk
II	Cr increased 2-3 times or GFR	< 0.5 for 12 hours	Injury
III	Cr × 3 or Cr equal to or greater than 4 with an increase equal to or greater than 0.5 or patients with renal replacement therapy	< 0.3 ml for 24 hours Anuria for 12 hours	Failure

Acute kidney injury

It is detected after the admission of the patient with high levels of blood pressure, this can present concomitantly with other variants of hypertensive emergency, and it is detected once laboratory tests are performed or when evaluating the urinary index, detecting elevation of the nitrogen compounds or oliguria [14].

Different classifications can be used for acute kidney injury, among which is AKIN (Table 2).

Diagnosis

Initially, it is clinical, since the patient presents to the emergency department or outpatient clinic for subsequent evaluation or for presenting symptoms, it is necessary to inquire whether he has a history of arterial hypertension, the time of evolution, the treatment in case of already having one, adherence to it, as well as the use of other types of substances that can trigger hypertensive crises such as amphetamines, cocaine, monoamine oxidase inhibitors, etc.

A complete physical examination should be carried out directed towards the diagnostic suspicion, considering damage to the target organ from verifying peripheral pulses, data of pulmonary congestion, heart murmurs or gallop rhythm, murmurs in the renal fossae, perform a neurological examination in which it should include a review of the fundus, if hypertensive encephalopathy is suspected, data of headache and altered neurological status should be sought, data suggestive of a cerebrovascular event are neurological targeting or signs of lateralization, if aortic dissection is suspected when pain is present thoracic, asymmetric pulses, widened mediastinum, etc. An urgent computerized axial tomography or magnetic resonance imaging of the chest should be performed, in patients with acute pulmonary edema, an echocardiogram should be performed once the patient is stabilized [15].

Treatment

If figures are detected in the BP levels associated with damage to the target organ, a rapid initial evaluation should be carried out aimed at the suspicion of the type of hypertensive crisis that the patient presents, once the damage to the target organ is detected it should be carried out an aggressive reduction of the BP, this due to the high risk that the patient presents in terms of complications and the high risk of death, hypertensive emergencies should be treated in a hospital setting to achieve a rapid reduction of BP figures and limit damage, these patients should be kept under continuous monitoring in an intensive care unit.

The indicated treatment is with parenteral antihypertensive drugs, these must be administered in an intensive care unit to reduce the risk of hypoperfusion of the cerebral, coronary and renal beds, as well as to control organic damage [15] (Table 3).

Initial management will depend on the type of hypertensive crisis that occurs, if systolic pressure figures of 160 mmHg or diastolic pressure of 110 mmHg are detected without presenting any symptoms, it is determined as a hypertensive urgency, the ideal management of these patients is with antihypertensive oral with a decrease in the figures in a period of 24 to 48 hours, these patients should be treated at the first level of care with an initial monitoring of the patient and subsequently, outpatient treatment with an appointment for subsequent evaluation. In the event of a rapid reduction in BP, it may be associated with an increase in patient morbidity, secondary to the deviation to the right of the pressure/flow autoregulation curve in critical arterial beds such as the cerebral, coronary and renal beds. Therefore, the figures should be reduced in a slow and controlled manner to avoid the presence of organic hypoperfusion [16] (Table 4).

Table 3: Drugs used in the treatment of hypertensive emergency [15].

DRUG	DOSE
Sodium nitroprusside	Infusion of 0.25 mg/kg/minute up to 10 mcg/kg/minute, or until reaching the appropriate BP figure.
Nicardipine	5 mg/hour, increase by 1-2.5 mg/hour every 15 min, maximum dose 10 mg/hour
Labetalol	1 to 2 mg/min, or 20 to 80 mg IV bolus every 5 to 10 min, increase to 300 mg of total dose
Esmolol	0.5 to 1 mg/kg loading dose over 1 minute, followed by infusion starting at 50-300 mcg/kg/min
Nitroglycerin	Infusion 5 a 200 mcg/min

Table 4: First-line drugs in the treatment of hypertensive urgency [16].

DRUG	DOSE
Loop Diuretic	
Furosemide	20 to 80 mg each 24 hours
ACE inhibitor	-25 to 50 mg every 8 to 12 hours
-Captopril	-10 mg per day and adjust according to response
-Enalapril	
Lisinopril	
Ramipril	
Angiotensin II receptor antagonists	
Losartan	50 to 100 mg each 24 hours
Irbesartan	150 to 300 mg each 24 hours
Calcium antagonists	
Amlodipine	5 to 10 mg each 24 hours
Nifedipine	30 to 90 mg each 24 hours
Beta blockers	
Metoprolol	100 to 400 mg each 8 a 12 hours

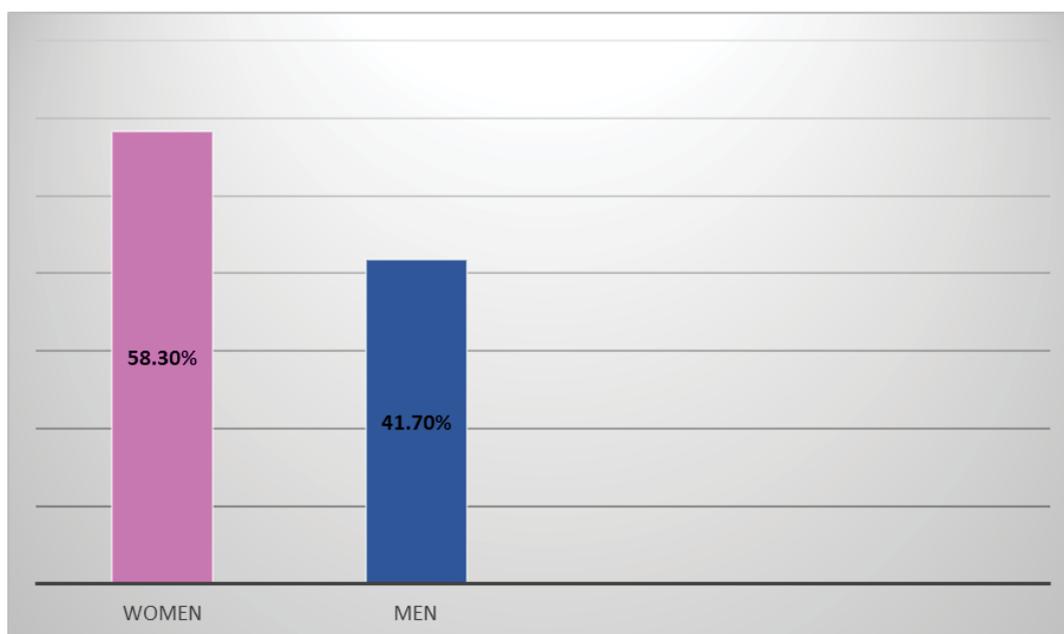


Figure 1: Frequency of patients with hypertensive crisis according to gender.

Referral Criteria

Patients with hypertensive emergencies require rapid stabilization in the emergency room and later admission to the intensive care unit to continue antihypertensive management and other alterations that have to be resolved, for example in the case of intracerebral hemorrhages that require surgical intervention, or in the case of an ischemic cerebrovascular event that warrants fibrinolysis, among others.

In the case of hypertensive urgency, once it is identified, it warrants medical attention, however, in this case, the time range for BP control is 24 to 48 hours, so it can be performed on an outpatient basis, with careful follow-up in your first-level health care unit.

The patient who goes for evaluation to a first level of care with a diagnosis of emergency-type hypertensive crisis will be referred to a second or third level of care, if possible, channel a peripheral line, administer oxygen therapy in the period in which it is referred to a hospitalable area. Oral treatment can be started if the patient's condition allows it.

Similarly, the patient should be referred in case of suspicion of malignant hypertension, as well as if a hypertensive urgency occurs in which, after managing in primary care and after 2-3 hours, values above 200/100 mmHg persistent.

The transfer of the patient in suitable conditions must be guaranteed. Transfer by ambulance to the nearest hospital service and have a medical team trained in advanced cardiovascular life support [17].

Methods

Observational, cross-sectional, descriptive study, non-probability sampling type, Sample size calculated

based on the finite population formula. Patients referred from the first-level units in the period of august 2019 to July 2020 with a diagnosis of hypertensive crisis were included, where the reason for referral to the emergency service was determined in addition to the clinical characteristics of the patient, blood pressure figure, in addition to determine if it is a hypertensive urgency or emergency (in this case evaluating acute target organ damage).

Study universe

Emergency service of the Hospital General de Zona # 50 of the IMSS of San Luis Potosí, Mexico.

Study population

Adult patients with a diagnosis of hypertensive crisis referred from a first level care unit to the emergency service of the Hospital General de Zona # 50 of the IMSS of San Luis Potosí, Mexico.

Results

In our study, a total of 204 referrals were obtained from patients with a diagnosis of hypertensive crisis, of which 119 women (58.3%) and 85 men (41.7%) were obtained (Figure 1).

The mean age of the patients was 53.8 years in general, with a minimum age of 19 years and a maximum age of 95 years.

Of the 204 referrals, the majority were hypertensive urgencies with 161 (78.9%) and 43 (21.1%) were emergencies.

It was found that in the vast majority of cases of both urgency and hypertensive emergency, patients did not adhere to their usual treatment in a similar percentage, 131 (81.4%) for urgencies and 34 (79.1%) for emergen-

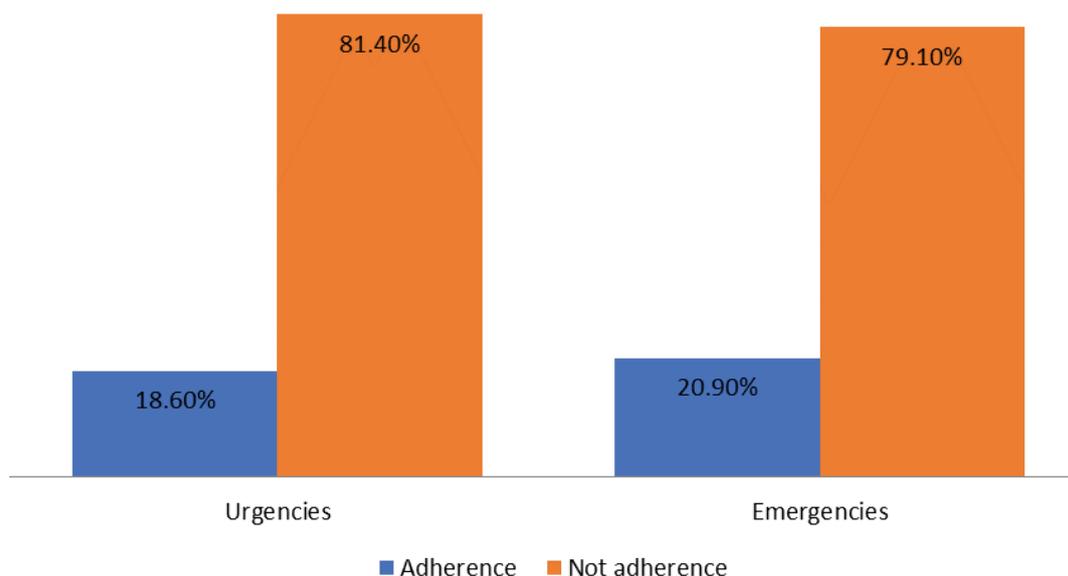


Figure 2: Adherence to habitual antihypertensive treatment in urgency and hypertensive emergency.

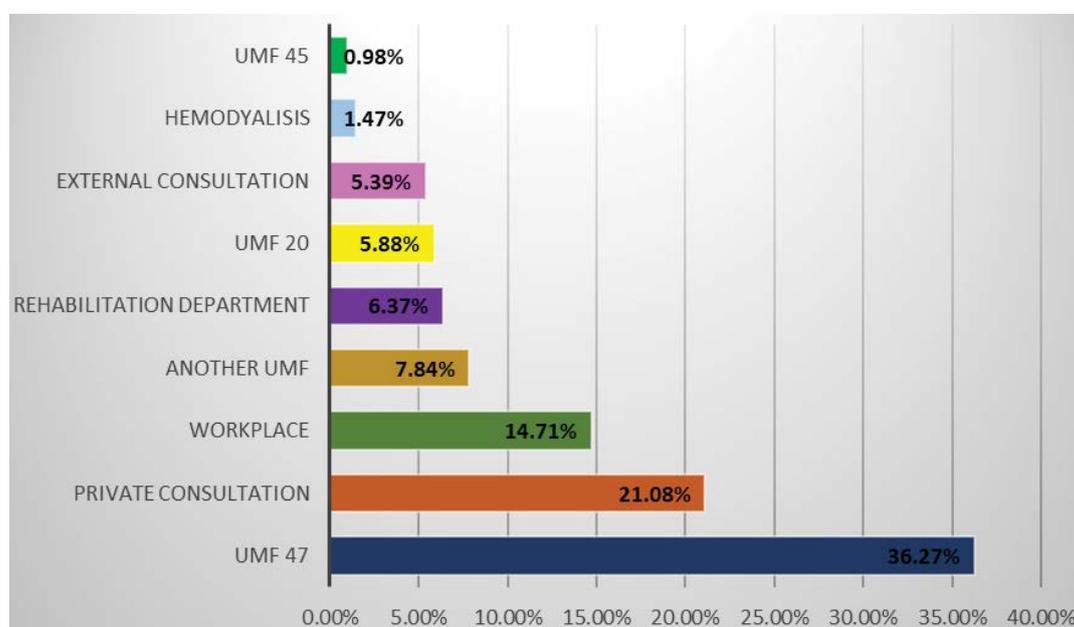


Figure 3: Frequency per referral site.

Table 5: Frequency by type of hypertensive emergency.

EMERGENCY TYPE	FREQUENCY	PERCENTAGE
Acute coronary syndrome	13	30.2%
Acute pulmonary edema	12	27.9%
Cerebrovascular accident	8	18.6%
Hypertensive encephalopathy	6	14%
Acute kidney injury	4	9.3%
TOTAL	43	100%

cies (Figure 2).

Regarding the referrals for hypertensive emergencies (43 referrals), which correspond to 21.1% of the total number of patients, we observed that the most frequent was acute coronary syndrome with 13 patients (30.2%), followed by acute pulmonary edema with 12

patients (27.9%), the one with the lowest prevalence was acute kidney injury with only 4 patients, corresponding to 9.3% (Table 5).

The reference sites in general were registered, where we observed that the highest number of references are from the Unidad de Medicina Familiar (UMF) 47 with 74

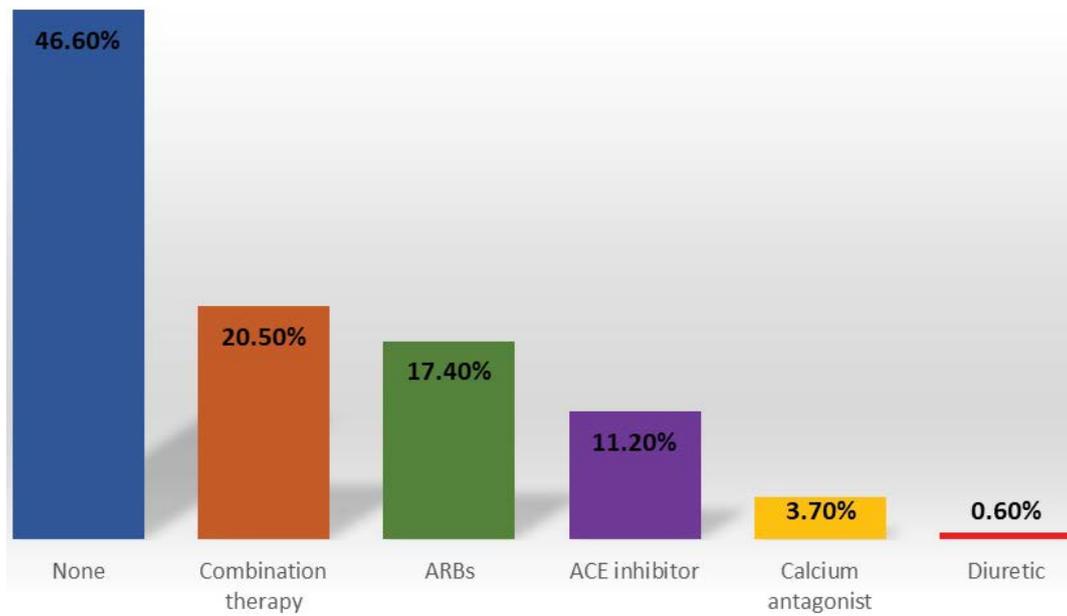


Figure 4: Treatment given at the referral site in cases of hypertensive urgency.

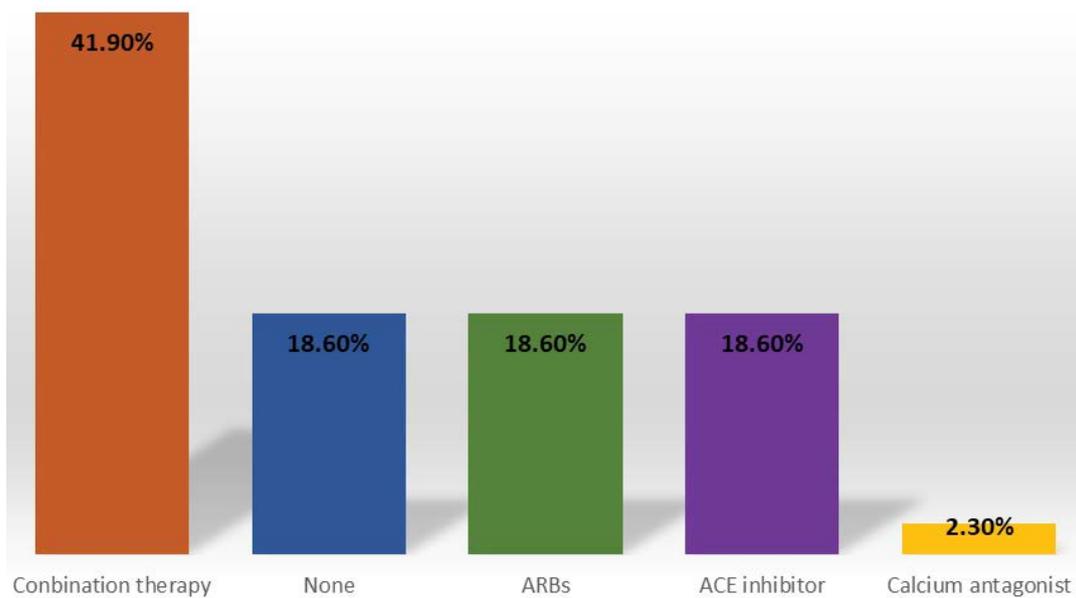


Figure 5: Treatment given at the referral site in cases of hypertensive emergency.



Figure 6: Justified and unjustified referrals of patients with hypertensive crisis.

(36.27%), followed by the private medical service with 43 (21.08%), the one with the lowest number of references was UMF 45 with 2 (1%) (Figure 3).

The antihypertensive treatment given at the referral site for both urgencies and hypertensive emergencies was highly variable, in most hypertensive urgencies no antihypertensive treatment was administered prior to referral to the emergency service, reporting 75 patients (46.6%), in the case of emergencies, the most frequent treatment was antihypertensive therapy combined with 18 patients (41.9%) (Figure 4 and Figure 5).

Therefore, and as the main objective of our study, we obtain that the majority of referrals for hypertensive crisis in first-level units are not justified, since 78.9% of urgencies are registered and only 21.1% are emergencies (Figure 6).

Discussions

The hypertensive crisis, being a complication of HTN, a prevalent pathology in our country and that can cause a state of severity, disability or even death, requires an adequate diagnosis, classification and management depending on the level of care it deserves, it is essential that each doctor from the first to the third level of care knows the fundamental aspects of the hypertension such as its pathophysiology, epidemiology and complications in order to offer an appropriate treatment and avoid damage to any target organ.

In our study, we observed that the majority of referrals from the first-level units with a diagnosis of hypertensive crisis are not justified as they are hypertensive urgency, since of the 204 registered referrals, only 21.1% (43 referrals) were justified as Hypertensive emergencies in its different variants, the rest, 78.9% (161 references) were hypertensive urgencies, which were treated in our service being classified as blue or green triage (without urgency or minor urgency) since they did not suffer any type of organ damage target that warranted immediate stabilization, these 161 patients could have been adequately cared for in the first level units from which the referral was made, thus reducing the overload of patients in our service. The relationship of presentation of the types of hypertensive crisis in our study is similar to that mentioned in the national literature.

Adherence to habitual antihypertensive treatment was bad for both groups of patients, with around 80% of whom did not adhere to treatment for urgencies and emergencies, so this could be one of the main factors causing the crisis hypertensive, in addition to being a situation which prevents an adequate estimate of the effective coverage of the treatment of arterial hypertension in Mexico according to national statistics. It would also be valuable to know the treatment scheme granted in your medical unit to determine if another the triggering factor for hypertensive crisis is a suboptimal dose

or antihypertensive drug that is inappropriate for each patient, this being a potential field of research.

The management of patients prior to arrival at the emergency room was inadequate, mainly in the case of hypertensive urgencies, since in most cases (46.6%) no type of antihypertensive was administered, so it would be important to adhere to the National and international management guidelines currently available. It would be important to determine the reason why this happens, since it could be due to a lack of supplies or medicines in the medical units or if the treating doctor, he does not know the care protocol that must be carried out at present.

There is poor management of the hypertensive crisis in our region, this being a complication of one of the most prevalent diseases in the country and the world, it is necessary to carry out actions such as constant training on the subject of acute and chronic complications of HTN that help reduce this situation, mainly at the first level, which is where patients initially go for medical attention and where their usual antihypertensive treatment is also taken, this in addition to being a benefit for the beneficiary, would help reduce the number of patients who come to a second level emergency room without requiring immediate attention, thus reducing costs and supplies for the institute and improving the time of attention in the service.

Sources of Support

Funding information is not applicable/no funding was received.

Statement of Equal Author's Contribution

All the authors in this manuscript made an equivalent contribution to its development.

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