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# Treatment of Hypertension by General Practitioners and Antihypertensive Drugs Expenditure in an Urban Environment

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## ABSTRACT

*Aim of our study was to determine the treatment habits of hypertension by general practitioners (GPs) as well as the monthly costs of prescribed antihypertensive drugs and their share in the total prescription drug expenditure approved by the Croatian Institute for Health Insurance (CIHI), the compulsory health insurance system. The study was performed in six GPs offices in Zagreb, serving 8,866 patients, in December 2005. The monthly costs of antihypertensive drugs prescribed by the GPs was obtained by summarizing the prices of all antihypertensive drugs prescribed in one month and then comparing the sum with total monthly prescription drug expenditure approved by the CIHI. The type and dosage of prescribed antihypertensive drugs were also analyzed. Hypertension was diagnosed in 2,342 (26.4%) patients. The monthly costs of prescribed antihypertensive drugs accounted for 52.33% of the total amount approved for medications by the CIHI. 945 (40.0%) hypertensive patients were taking antihypertensive monotherapy. The most frequently prescribed drugs as monotherapy were ACE inhibitors (38.3%), calcium-channel blockers (26.7%),  $\beta$  blockers (18.6%), and diuretics (10.3%).  $\alpha$  antagonists (3.6%). Angiotensin receptor blockers (2.5%) were rarely prescribed. A combination therapy, ACE inhibitors and diuretics (30.4%) were most frequently used. More than 50% of the funds allocated to GPs for medications were spent for the treatment of only one disease. The most used antihypertensive drugs were ACE inhibitors.*

**Key words:** hypertension, antihypertensive drugs, pharmacoeconomics, and family medicine

## Introduction

Hypertension is the main risk factor for cerebrovascular diseases and one of the main risk factor for cardiovascular diseases (CVD). These diseases are the leading cause of death in Europe, an important cause of disability and a big economic burden for any country. Despite abundant long-standing knowledge about hypertension and its diagnostics, treatment and consequences, hypertension is still poorly treated. In the year 2000, 927

million (26.4%) of the world population suffered from hypertension. The World Health Organization (WHO) estimates that there are 11% of undetected hypertensive patients in the developed world and 50% in the developing countries. At the same time only 34% of hypertensive patients are treated properly and are achieving recommended targets of blood pressure. By the year 2025, the number of hypertensive patients will rise by 60%, which

will seriously drain economic resources<sup>1</sup>. In 2003 the prevalence of hypertension in Europe was 44.2% (Germany 55%, Finland 49%, Spain 47%, Sweden and Italy 38%)<sup>1</sup>. In the same year, The Seventh Report of the Joint National Committee on Prevention, Evaluation and Treatment of High Blood Pressure<sup>2</sup> and the European Society of Hypertension – European Society of Cardiology (ESH/ESC)<sup>3</sup> together with World Organization of National Colleges, Academies and Academic Associations of General Practitioners/Family Physicians (WONCA)<sup>4</sup> produced new guidelines in 2007 for early diagnosis and proper management of arterial hypertension. The objectives of these guidelines were to help health professionals to reduce the occurrence of CVD through modifications of cardiovascular risk factors, and to encourage each country to find their own pathway.

The prevalence of hypertension in Croatia is 37.5%, which is similar to Italy and Sweden<sup>5</sup>. Many hypertensive patients in Croatia still remain undetected, but it is very important to stress that CVD are killer number one in Croatia, being responsible for 53% of all deaths<sup>6</sup>.

The diagnosis of patients with hypertension at an early age increases the expenditure for their treatment. However, studies show that the expenditure for early treatment of hypertension is still lower than the costs of treatment of untreated or improperly treated hypertension consequences<sup>7,8</sup>. According to European cardiovascular disease statistics, in 2005 the costs of inpatient hospital care for cardiovascular patients accounted for about 57% of all costs, and the costs of drugs accounted for about 27%<sup>9</sup>. In Croatia, like in many other countries, the costs of medication are constantly growing. In 2003, 21.3% of Croatian health budget was spent on drugs (17.4% more than in 2002)<sup>10</sup>. For medical treatment of only three diseases (hypertension, hypercholesterolemia, and diabetes mellitus) in 2005 was spent 81.2% of total prescription drugs expenditure approved by CIHI<sup>11</sup>. In Italy, annual increase of medication costs is 11%, and in the USA it is 22.8%<sup>12,13</sup>. In most countries, the use of antihypertensive drugs has increased by 60% for the last five years<sup>14</sup>.

Every year, the Croatian Institute for Health Insurance (CIHI), the national compulsory health insurance system, determines the amount of money that GPs are allowed to spend on prescription drugs, and that amount depends on the budget allocated for the primary health care. GPs, as independent contractors with the CIHI, sign an annual contract that stipulates the approved amount<sup>15</sup> and obliges them to keep the expenses of prescription drugs within these limits. If they overspend without justification, the CIHI first sends an official warning, then imposes a financial penalty, and eventually cancels their contract<sup>16</sup>. So, the GPs in Croatia are in an inconvenient situation, if they detected and treated their hypertensive patients according to guidelines they would spend the high amount of money and would be punished. The CIHI should be aware of growing costs of drugs and allocate a higher amount of money for prescribed medications.

Our aim was to determine the prevalence of hypertension in family medicine in an urban area (city of Zagreb) and to calculate monthly costs of antihypertensive drugs, as well as to determine their share in the total prescription drug budget allocated to GPs by the CIHI. We also wanted to investigate the type and the number of prescribed antihypertensive drugs per one patient.

## Participants and Methods

The retrospective study was performed in six GP offices in Zagreb, serving 8,866 patients, in December (01.12. to 31.12.) 2005. All six offices were equipped with PCs and kept medical records in an electronic form.

### Participants

A total of 8,866 patients were divided into 5 age groups (0–34, 35–44, 45–54, 55–64 and ≥ 65 years of age), according to which the CIHI allocates the budget for prescription drugs.

The patients with hypertension were identified, and the amount of money spent on the prescription drugs for their treatment was recorded. Patients with blood pressure ≥ 140/90 mm Hg at two consecutive measurements, and patients who had normal blood pressure but were taking antihypertensive drugs were considered to suffer from hypertension<sup>2,3</sup>. The type and the number of prescribed antihypertensive drugs were also examined.

### Cost-analysis

Monthly expenditure for antihypertensive drugs was obtained by the summation of monthly expenses on antihypertensive drugs for each patient and then compared with the total monthly prescription drug expenditure approved to GPs by the CIHI according to the following formula: number of patients x approved drug budget per one insured person in 2005/12 months.

### Statistical Analysis

Differences between patient age groups and Croatian population were tested by  $\chi^2$  test. The statistical analysis was performed with SPSS 9.0 software (SPSS Inc., Chicago, IL, USA, 1999).

## Results

The age distribution of patients included in the study corresponds with the age distribution of the whole Croatian population; 1,921 persons at the age 0 to 34; 1,507 at the age 35 to 44; 1,386 at the age 45 to 54; 1,295 at the age 55 to 64; and 2,757 older than 65.

Hypertension was diagnosed in 2,342 (26.4%) out of 8,866 patients.

Hypertension was most frequently diagnosed in the oldest group of patients, i.e., those aged over 65, not one hypertensive patient was diagnosed in the age group 0–34 years of age. The incidence of the diagnosed hyper-

**TABLE 1**  
DISTRIBUTION OF PATIENTS WITH HYPERTENSION  
ACCORDING TO AGE GROUPS

Age group	No. (%) of patients	No. of patients with hypertension (%)
0–34	1921 (21.66)	0 (0.0)
35–44	1507 (16.99)	82 (5.44)
45–54	1386 (15.63)	200 (14.43)
55–64	1295 (14.60)	457 (35.29)
≥ 65	2575 (29.04)	1603 (58.14)
Total	8866 (100.00)	2342 (26.40)

tension was lowest in patients between 35 and 44 years of age, and increased with age (Table 1).

The prescription drug expenses per insured person approved by the Croatian Institute for Health Insurance in 2005 increased with age. The monthly amount that the six GPs spent on investigated prescription of antihypertensive drugs for the patients included in this study was 32 080.93€ or 52.33% of the total amount approved by the CIHI, which was 61 299.30€ for one month. The highest expenditure for the investigated drugs were found in the oldest group of patients (aged ≥65). The prescription drug expenses rise from 16.2% to 64.6% according to age groups. The correlation between these two variables is high ( $r=0.998$ ) (Table 2).

The prescription habits of GPs including antihypertensive monotherapy or combination therapy for hypertensive patients did not depend on patients age ( $\chi^2=6.581$ ,  $df=3$ ,  $p=0.087$ ). The GPs equally prescribed monotherapy and polytherapy to the youngest group of patients as well as to the oldest (Table 3).

The most frequent drugs used as monotherapy were ACE inhibitors in all age groups followed by calcium channel blockers in older age groups (55 and older). In the youngest group of hypertensive patients the most prescribed antihypertensive drugs were  $\beta$  blockers. The AR antagonist were most frequently prescribed to age group from 55 to 64. The kind and frequency of prescribed antihypertensive drugs according to age groups of patients taking monotherapy is shown on Table 4.

**TABLE 2**  
EXPENDITURE FOR ANTIHYPERTENSIVE DRUGS IN COMPARISON WITH TOTAL PRESCRIPTION DRUGS EXPENDITURE AND APPROVED DRUGS EXPENDITURE BY CROATIAN INSTITUTE FOR HEALTH INSURANCE IN 2005 ACCORDING TO AGE GROUPS

Age groups (years)	No. of patients	Approved drug expenditure per patient		Monthly prescription drugs expenditure (€)	
		Year/month (€)	Total (€)	Spent on antihypertensive drugs € (%)	
0–34	1921	130.79 / 10.89	2 842.35	0.00 (0.00)	
35–44	1507	229.08 / 19.09	3 908.78	633.82 (16.22)	
45–54	1386	434.49 / 36.90	6 817.01	2 384.52 (34.98)	
55–64	1295	825.54 / 68.79	12 103.68	6 038.32 (49.89)	
≥ 65	2575	1141.30 / 95.11	35 627.48	23 024.27 (64.63)	
Total	8866		61 299.30	32 080.93 (52.33)	

**TABLE 3**  
DISTRIBUTION OF PATIENTS WITH HYPERTENSION ON MONOTHERAPY AND POLYTHErapy ACCORDING TO AGE GROUPS

Age group	Total No. of patients	No. of patients on monotherapy	No. of patients on polytherapy
0–34	0	0	0
35–44	81	44	37
45–54	188	81	107
55–64	434	199	235
≥65	1487	621	866
Total	2190	945	1245

( $\chi^2=6.581$ ,  $df=3$ ,  $p=0.087$ )

1 245 (53.2%) of patients with arterial high blood pressure were treated with a combination of two antihypertensive drugs. The combination of two prescribed antihypertensive drugs was the highest in the age group older than 65 and in the age group from 45 to 54. The most often prescribed combination of antihypertensive drugs was ACE inhibitors with diuretics in all age groups. Other drugs combinations were prescribed equally (Table 5).

152 (6.4%) hypertensive patients were prescribed a combination of three and more antihypertensive drugs by the GPs.

## Discussion

We found that the expenditure for antihypertensive drugs for all age groups of patients amounted to 52.3% of the total amount allocated by the Croatian Institute for Health Insurance (CIHI) to the GPs for prescription drugs in 2005. Antihypertensive drugs in Croatia accounted for more than half of the prescription drug expenditure in this study like in the similar study a few years ago<sup>17</sup>, although only 22.6% of patients had diagnosed hypertension and the prevalence of hypertension in Croatia is 37.5%<sup>5</sup>. In the USA, antihypertensive drugs for 27.8% of all patients with hypertension accounted for 45% of drug expenditure<sup>18</sup>. So, it was shown from the

**TABLE 4**  
THE KIND OF ANTIHYPERTENSIVE DRUGS AS MONOTHERAPY ACCORDING TO AGE GROUPS.(N-945)

Age group	No.	Diuretics	ACE inhibitors	Antihypertensive drugs (% of patients)			
				$\beta$ blockers	Calcium- channel blockers	$\alpha$ blockers	Antagonists AR
0–34	0	0.0	0.0	0.0	0.0	0.0	0.0
35–44	44	7.4	27.3	45.5	9.1	2.3	2.27
45–54	81	8.5	40.7	33.3	13.6	2.5	2.47
55–64	199	8.5	32.2	23.6	28.1	2.0	5.52
$\geq 65$	621	0.9	40.7	13.2	29.1	4.4	1.61
Total	945	10.2	38.3	18.6	26.7	3.6	2.54

**TABLE 5**  
THE MOST FREQUENT DUAL COMBINATIONS OF ANTIHYPERTENSIVE DRUGS ACCORDING TO AGE GROUPS (N=1245)

Age group	No. (%) of patients	Antihypertensive drugs (% of patients)				Ca-channel blockers + diuretic
		ACE inhib. + diuretics	ACE inhib + Ca-channel blockers	ACE inhib + $\beta$ blok	Ca-channel blockers + $\beta$ blok	
0–34	0.0	0.0	0.0	0.0	0.0	0.0
35–44	37 (45.1)	13.5	5.4	16.2	10.8	5.4
45–54	107 (53.5)	23.4	15.9	18.7	16.8	4.7
55–64	235 (51.4)	24.7	21.3	18.7	10.6	5.5
$\geq 65$	866 (54.0)	38.5	23.4	9.1	7.9	7.0
Total	1245 (53.2)	30.4	21.8	12.0	9.3	6.5

data that GPs were spent more money for prescribed antihypertensive drugs for fewer detected hypertensive patients. The highest expenditure (64.6%) was in the oldest age group (patients older than 65). This means that only about 35% of the allowed total prescription drugs budget is available for the treatment of all the other chronic diseases. This is particularly worrying since most of the hypertensive patients have at the same time hyperlipidemia, diabetes etc. The GPs, who diagnose and treat hypertension more frequently, will induce higher drug expenditure. The prevalence of diagnosed hypertension – 26.4% of all subjects in this study was almost half of the European average (44.2% for those older than 35), and the Croatian average as well (37.5%)<sup>5</sup>. Although differences in the prevalence of hypertension between different European countries do exist<sup>1</sup>, Croatia is very similar to Sweden and Italy<sup>19</sup>. Low prevalence of diagnosed hypertension in this study could perhaps be explained by the fact that GPs are not obliged and motivated to follow professional guidelines for the detection and treatment of hypertension. If GPs followed the guidelines, it would increase the number of patients with hypertension and cause increased expenditure for prescription antihypertensive drugs. Consequently, GPs who actively participate in diagnosing patients with hypertension, may, due to exceeding the budget allocated for prescription drugs, be penalized by the CIHI. Resources allocated by the CIHI are obviously insufficient when more than 50% of the budget is spent on the treatment of only one disease. However, high expenditure for antihypertensive drugs is

a problem not only in Croatia, but in other European countries, as well. Various programs to ensure low costs and adequate treatments at the same time are being designed.

Results of this study indicating that no cases of hypertension were diagnosed in the age group 0–34, while only 12% were diagnosed in the age group 35–54, are worrying. In the Netherlands, for example, 18.2% of hypertensive patients were recorded in the age group 35–54 and it was concluded that hypertension in this age group was insufficiently diagnosed<sup>20</sup>. Numerous studies show that aging is associated with an increased number of hypertensive patients, 70% of them being older than 65<sup>21</sup>. Although in our study in this age group the prevalence of diagnosed hypertension was highest (58.1%), most of them, probably, still remained undetected.

According to new guidelines, when GPs choose a type of antihypertensive drug for their patient, they should consider patients total cardiovascular risk factors and subclinical organs damage<sup>3,4</sup>. Also, numerous studies show that for achieving of recommended blood pressure targets, many more hypertensive patients should take two or more antihypertensives<sup>22–24</sup>. Results of our study show that 43.1% were taking one antihypertensive drug which is a lot. The most frequently prescribed drugs as monotherapy in our study were ACE inhibitors. Similar results were obtained by other surveys<sup>22–24</sup>. Only 10.3% of our patients with hypertension were taking diuretics, as compared with the USA where 38% patients on monotherapy are taking diuretics, and only 32% ACE inhibi-

tors. In the UK 54% of patients are treated with diuretics and  $\beta$  blockers<sup>25,26</sup>. The percentage of our patients on monotherapy as well as of our patients on combination therapy with two or more antihypertensive drugs was similar to those in other studies<sup>24</sup>.

The main limitation of our study was that we did not calculate a cost-benefit or cost-utility analysis for anti-hypertensive treatment but only analysed global costs. We also did not analyse in how many of hypertensive patients GPs achieved the recommended targets of hypertension according to prescribed number and type of anti-hypertensive drugs. Only urban population was included in this study, so that conclusions could not be made generally for total drug expenditure of all GPs in whole Croatia.

Having a lot of patients with hypertension in Croatia undetected (the prevalence in Europe is higher and the WHO estimates about 50% of undetected hypertensive patients in the developing countries<sup>1</sup>), we can expect a further increase of prescription antihypertensive drugs expenditure. This significant economic burden has resulted in designing numerous programs to reduce the expenditure<sup>27</sup>.

Adequate education of GPs about the importance of implementing guidelines in the diagnosing and treatment of hypertension is most important. It has been shown that only 40% of GPs implement these guidelines in their everyday work and that proper application of the

guidelines in prescribing antihypertensive drugs might save at least 11.6 million dollars<sup>28</sup>.

Numerous procedures have been designed and carried out aiming at decreasing treatment costs for chronic diseases<sup>29,30</sup>. Apart from GPs, specialists in hospitals should also be warned against the adopted practice that only 9.5% of hospital releases get prescribed generic drugs and that they should take the price of drugs into account as well<sup>31</sup>.

## Conclusions

The expenditure for prescribed antihypertensive drugs in Croatia amounted to more than 50% of the total amount allocated by the Croatian Institute for Health Insurance, the compulsory health insurance system. The hypertension is not sufficiently diagnosed, especially in younger age groups of patients. The GPs prescription habits should be influenced by the recommended professional guidelines. The society and the health insurance system should be aware of the trend in the whole world that indicate the existence of an increased number of diagnosed hypertensive patients which is followed by increased antihypertensive drugs expenditure. However, it should be emphasized that, according to numerous studies, early diagnosis and proper treatment prevents the consequences of hypertension and decrease the total burden on the health budget.

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## **LIJEČENJE HIPERTENZIJE OD STRANE LIJEČNIKA OBITELJSKE MEDICINE I POTROŠNJA ZA ANTIHIPERTENZIVNE LIJEKOVE U GRADSKOJ SREDINI**

### **S A Ž E T A K**

Cilj ovog istraživanja bio je ispitati navike liječnika obiteljske medicine u liječenju hipertenzije i izračunati udio mjesečne potrošnje za antihipertenzivne lijekove u ukupnoj dozvoljenoj potrošnji za lijekove. Istraživanje je provedeno na populaciji (N = 8.866) iz šest ordinacija obiteljske medicine u Zagrebu, liječenih tijekom prosinca 2005. Mjesečna potrošnja za antihipertenzivne lijekove propisane od strane liječnika obiteljske medicine je uspoređena sa dozvoljenom ukupnom potrošnjom za lijekove odobrene od strane Hrvatskog zavoda za zdravstveno osiguranje (HZZO). Analizirane su također vrsta i broj propisanih antihipertenzivnih lijekova svakom hipertoničaru. Dijagnosticiranu hipertenziju imalo je 26,4% promatrane populacije, a mjesečna potrošnja njima propisanih antihipertenzivnih lijekova iznosila je 52,33% ukupno dozvoljene potrošnje za lijekove. Monoterapiju je koristilo 945 (40,0%) bolesnika. Najpropisivaniji antihipertenzivni lijekovi u monoterapiji su bili ACE inhibitori (38,3%), blokatori kalcijevih kanala (26,7%),  $\beta$  blokatori (18,6%) i diuretici (10,3%).  $\alpha$  antagonisti (3,6%), blokatori angiotenzinskih receptora (2,5%) su rijetko propisivani. Najčešće kombinirani antihipertenzivi kod hipertoničara kojima su bila propisana dva antihipertenziva bili su ACE inhibitori i diuretici (30,4%). Preko 50% dozvoljenih ukupnih sredstava za propisivanje lijekova liječnicima obiteljske medicine potrošeno je za samo jednu bolest. Najčešće propisivan antihipertenzivni lijek je bio ACE inhibitor.