POLA PENGOBATAN HIPERTENSI PADA PASIEN LANSIA DI PUSKESMAS WINDUSARI, KABUPATEN MAGELANG KABUPATEN MAGELANG

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Abstrak

Tujuan penelitian adalah untuk mengetahui pola peresepan pasien hipertensi pada pasien lanjut usia. Penelitian ini merupakan penelitian non eksperimental dengan metode deskriptif dan pengambilan data secara *retrospektif* .Subyek penelitian adalah resep pasien hipertensi lanjut usia di Puskesmas Sawangan kabupaten Magelang periode desember 2015 sampai maret 2016.. Pengambilan sampel dalam penelitian ini menggunakan metode simple random sampling. Instrumen penelitian yang digunakan adalah resep dan rekam medis pasien hipertensi lansia di Puskesmas Sawangan.

Hasil penelitian dengan menggunakan sampel sebanyak 189 sampel, berdasarkan jenis kelamin, perempuan 59.79% dan laki-laki 40.21%. Berdasarkan umur 72.49% usia 60-74 tahun, 23.28% usia 75 -84 tahun dan 4.23% usia > 85 tahun. Total resep pasien hipertensi lansia adalah 189 resep dengan jumlah item obat hipertensi 255 obat dan obat non hipertensi 353 obat. Rata – rata item per lembar resep pada pasien hipertensi lansia 3.22 item per lembar resep. Peresepan tunggal lebih banyak dari pada kombinasi yaitu sebesar 76.72%. Obat anti hipertensi paling banyak diresepkan adalah golongan ACEI 61.81%,. Golongan ACEI diresepkan paling banyak adalah captopril sebanyak 79.31%. Kombinasi obat antihipertensi yang paling banyak diresepkan adalah kombinasi ACEIdan diuretik sebanyak 84.10%.

Kata kunci : pola pengobatan – hipertensi - lansia

PATTERNS OF HYPERTENSION TREATMENT IN ELDERLY PATIENTS IN HEALTH CENTER WINDUSARI, DISTRICT MAGELANG

Abstract

The research objective was to determine the pattern of prescribing patients with hypertension in elderly patients. This study is a non-experimental study with descriptive and concurrent data retrieval is a research. Subject recipe elderly hypertensive patients in health centers Magelang regency Sawangan period of December 2015 through March 2016 . Sampling in this research using simple random sampling method. The research instrument used was a prescription and medical records of elderly hypertensive patients in health center Sawangan.

The results using a sample of 189 samples, by sex, female 59.79% and 40.21 % men. Based on 72.49% of age 60-74 years of age, 23.28% aged 75 years and 4.23 -84% age> 85 years. Total prescriptions elderly hypertensive patients is 189 recipes with the item number 255 hypertensive medication non-hypertensive drugs and drug 353. Average - Average items per prescription in elderly hypertensive patients per prescription item 3.22. Single prescribing more than the combination of 76.72%. The most widely prescribed antihypertensive drugs are ACEI 61.81% . ACEI class of the most widely prescribed is captopril as much as 79.31%. The combination of antihypertensive drugs is the most widely prescribed diuretic combination of ACEI and as much as 84.10%.

Keywords : patterns of treatment – Hypertension - elderly

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PENDAHULUAN

Hipertensi adalah kelainan heterogen yang bias muncul dari penyebab spesifik (hipertensi sekunder) atau dari mekanisme patofisiologi yang tidak diketahui penyebabnya (hipertensi primer atau esensial) [1]. Prevalensi Hipertensi di negara berkembang hampir sama dengan negara maju [2]. Gaya hidup yang tidak seimbang dapat meningkatkan faktor resiko munculnya berbagai penyakit [3]. Tekanan darah bertambah seiring bertambahnya umur. Pada populasi usia >= 55 tahun faktor resiko hipertensi 90% meskipun dulunya tekanan darahnya normal [4]. Menurut Rahajeng (2007) Prevalensi hipertensu pada kelompok resiko tinggi 34,0% adalah kelompok merokok setiap hari dan 75,4% adalah pada kelompok usia ≥ 65 tahun [5] Pada lansia yang didiagnosa hipertensi akan menggunakan obat antihipertensi. Pada penggunaan obat antihipertensi usia lanjut sedikit berbeda dengan usia dewasa karena adanya perubahan fisiologi akibat bertambahnya usia [6]

METODE

A. Desain Penelitian

Penelitian ini merupakan penelitian non eksperimental dengan metode deskriptif dan pengambilan data secara retrospektif

B. Tempat dan waktu penelitian

Penelitian ini dilakukan di Puskesmas Sawangan Kabupaten Magelang. Waktu penelitian dilakukan pada bulan Agustus 2016

C. Populasi dan Sampel

Populasi dalam penelitian ini adalah keseluruhan pasien hipertensi yang berobat di Puskesmas Windusari. Sampel yang digunakan adalah pasien hipertensi lansia yang berobat di Puskesmas Windusari periode Desember 2015 – januari 2016.

D. Instumen dan Metode Pengumpulan Data

Instrumen penelitian yang digunakan adalah resep dan rekam medis pasien hipertensi lansia di Puskesmas Windusari. Lembar rekam medis yang digunakan memuat nama pasien, jenis kelamin, umur, alamat, diagnosis dan terapi.

Pengumpulan data dimulai dengan melihat data dari rekam medis dan resep pasien lansia hipertensi.

E. Metode Pengolahan dan analisis data

Data yang diperoleh dianalisis dan diolah dalam bentuk prosentase kemudian disajikan dalam bentuk tabel. Data yang diperoleh yaitu data karakteristik pasien berdasarkan kelompok umur, jenis kelamin dan terapi yang digunakan.

HASIL DAN PEMBAHASAN

A. Karakteristik responden menurut jenis kelamin dan kriteria umur

Tabel 1. Karakteristik responden

Karakteristik	Jumlah	Prosentase
Jenis Kelamin		
Perempuan	113	59.79%
Laki-laki	76	40.21%
Kriteria umur		
60-74 tahun	137	72.49%
75-84 tahun	44	23.28%
>85 tahun	8	4.23%

Sumber : data sekunder yang telah diolah

Berdasarkan tabel 1 pasien berjensi kelamin perempuan adalah 58.82 % sedangkan pasien berjenis kelamin laki-laki sebanyak 41.18%. Perempuan penderita hipertensi lebih banyak dibandingkan laki-laki. Menurut JNC VII dihubungkan dengan penggunaan obat kontrasepsi oral dapat meningkatkan tekanan darah dan resiko hipertensi meningkat dengan lamanya penggunaan [3]. Wanita setelah menopause juga banyak yang menderita penyakit kardiovaskuler, hal ini berhubngan dengan hormon progestin [1]umur 60 – 74 tahun sebanyak 69.41%, umur 75-84 tahun sebanyak 25.88% dan umur >85 tahun sebanyak 4.71%

Prosentase pasien hipertensi berdasarkan umur yang paling tinggi adalah pada pasien umur 50-59 tahun, karena pada umumnya tekanan darah bertambah secara perlahan dengan bertambahnya umur. Resiko untuk menderita hipertensi pada populasi ≥ 55 tahun yang tadinya mempunyai tekanan darah normal adalah 90% [4].

Tekanan darah meningkat dengan bertambahnya umur karena pengerasan pembuluh darah. Pembuluh darah yang dindingnya sudah mengeras mengakibatkan tekanan darah lebih tinggi dibandingkan dinding yang lebih elastis [7]

B. Penggunaan obat hipertensi pasien lansia

Peresepan	Jumlah
Total resep	189
Total obat hipertensi	255
Total obat non hipertensi	353

Sumber : data sekunder yang telah diolah

Total resep pasien hipertensi lansia ynag adalah 189 resep dengan jumlah item obat hipertensi 255 obat dan obat non hipertensi 353 obat.

C. Rata – rata item per lembar resep pada pasien hipertensi lansia 3.22 item per lembar resep.

Hasil ini sama dengan penelitian [8] pada 20 unit pelayanan kesehatan di indonesia untuk resep pasien rawat jalan dengan rata-rata 3.3. Tingginya angka rata-rata item perlembar resep kemungkinan disebabkan karena dignosa pasien >1. Rata-rata item obat per lembar resep dikategorikan baik jika untuk 1 diagnosis terdapat paling banyak 2 recipe

D. Pola penggunaan antihipertensi menurut jenis antihipertensinya

Tabel 2. Pola penggunaan antihipertensi Enrollment in local colleges, 2005

Golongan	Frekuensi	Prosentase
ACEI	156	61.18%
Diuretik	54	21.18%
CCB	45	17.64%
Total	255	

Sumber: data sekunder yang telah diolah

Berdasarkan golongan obat yang paling banyak diresepkan adalah golongan ACEI sebanyak 60.67%. Hasil ini sama dengan penelitian Primasari (2013) ACEI paling banyak diresepkan pada pasien hipertensi tingkat I [9]

ACE Inhibitor dapat diberikan untuk pengobatan tunggal maupun secara kombinasi, karena keefektifan dan keamanannya. *ACE Inhibitor* efektif untuk hipertensi ringan, sedang, maupun berat. Bahkan yang digunakan pada krisis hipertensi seperti Captopril. Obat ini efektif pada sebagian besar pasien dan kombinasi ACE inhibitor dengan diuretik memberikan efek sinergistik [3].

ACE-Inhibitor bekerja dengan menghambat perubahan angiotensin-I menjadi angiotensin-II, dimana angiotensin-II adalah vasokonstriktor poten yang juga merangsang sekresi aldosteron [3]. Selain itu, *ACE Inhibitor* menurunkan resistensi perifer tanpa diikuti refleks takikardia. Obat golongan ini tidak hanya efektif pada hipertensi dengan kadar renin yang tinggi, tetapi juga pada hipertensi dengan renin normal maupun rendah. Hal ini karena *ACE Inhibitor* menghambat degradasi bradikinin yang mempunyai efek vasodilatasi. *ACE Inhibitor* juga diduga berperan menghambat pembentukan angiotensin-II secara lokal di endotel pembuluh darah [10]. Penggunaan golongan ACE *Inhibitor* harus dimulai dengan dosis rendah dan dipantau tekanan darah, fungsi ginjal serta kadar kalium dalam darah [11]

E. Prosentase peresepan obat hipertensi tunggal dan kombinasi

Tabel 3. Peresepan tunggal atau kombinasi obat antihipertensi

Peresepan	Jumlah	Prosentase
Tunggal	145	76.72%
Kombinasi	44	23.28%
Total	189	100%

Sumber: data sekunder yang telah diolah

Berdasarkan tabel 3 sebanyak 76.72% peresepan pasien hipertensi lansia adalah tunggal dan sebanyak 23.28% peresepan kombinasi. Menurut [4] Hipertensi grade 1 sudah dapat diberikan obat antihipertensi bila dalam pemantauan 3 bulan setelah melakukan modifikasi gaya hidup, tekanan darahnya tetap tinggi. Obat yang diberikan yaitu obat tunggal. Sedangkan pada hipertensi grade 2 sangat dianjurkan untuk memberikan terapi kombinasi. Hasil penelitian ini berbeda dengan penelitian Rosita (2010) yaitu 17,64% mendapat terapi dengan 1 jenis, terapi kombinasi 2 golongan obat sebanyak 70,59% dan terapi kombinasi dengan 3 golongan obat sebesar 11,67%[12]

F. Obat anti hipertensi tunggal

Tabel 4. Pemberian obat antihipertensi tunggal

Nama Obat	Jumlah	Frekuensi
Captopril	115	79.31%
Amlodipin	24	16.55%
Nifedipin	2	1.38%
HCT	2	1.38%
Furosemid	2	1.38%
	145	100%

Sumber : data sekunder yang diolah

Berdasarkan tabel 4 obat yang paling banyak diresepkan adalah captopril sebanyak 79.31% sedangkan golongan diuretik yautu furosemid dan HCT masing- masing sebanyak 1.38%.

Menurut [4] pasien hipertensi grade 1 diberikan monoterapi golongan diuretik, ACEI, beta blocker, Angiotensin Reseptor Blocker, Calcium Chanel Blocker atau dimungkinkan kombinasi.

Prosentase penggunaan antihipertensi paling banyak adalah captopril adalah 79.31%.

Efek dari obat ini adalah vasodilatasi dan mengurangi retensi garam dan air. Walaupun Captopril memberikan efek vasodilatasi, namun berbeda dengan vasodilator lainnya, yaitu zat ini tidak menimbulkan udema atau reflek-*tachycardia*. Kemudian Captopril digunakan pada pasien hipertensi ringan sampai berat dan pada dekompensasi jantung [7]. Meskipun kadar renin dan angiotensin meningkat pada pemberian ACEI jangka panjang tidak menimbulkan toleransi dan penghentian obat ini tidak menimbulkan hipertensi *rebound* [10]

Penggunaan tiazid (HCT) pada usia lanjut mempunyai keuntungan menurunkan resiko osteoporosi sekunder akan tetapi mempunyai efek abnormalitas pada proses metabolik [6]

Penggunaan diuretik (loop dan tiazid) pada pasien lansia dengan dosis terendah yang masih memungkinkan dan harus dipantau elektrolit dan glukosanya [11]

G. Kombinasi obat anti hipertensi

Tabel 5. Pemberian kombinasi obat antihipertensi

Terapi kombinasi	Nama Obat		Frekuensi	Prosentase
2 obat	ACEI-Diuretik	Captopril-HCT	37	84.1%
		Captopril - furosemid		
	CCB + diuretik	Nifedipin + HCT	3	6.82%
		Amlodipin + HCT		
	CCB + ACEI	Nifedipin + captopril	2	4.54%
3 obat	CCB + ACEI + Diuretik	Amlodipin + captopril + furosemid	1	2.27%
	CCB + CCB + ACEI	Nifedipin + Amlodipin + captopril	1	2.27%
Total				

Sumber: data sekunder yang telah diolah

Berdasarkan tabel 5 kombinasi obat yang paling banyka diresepkan adalah kombinasi 2 obat anti hipertensi yaitu golongan diuretik (Captopril) dengan diuretik (HCT atau furosemid.

Kombinasi antihipertensi digunakan pada hipertensi stage 2 dan pada kasus hipertensi dengan penyakit penyerta [4] Kombinasi dua obat hipertensi umumnya dilakukan antara diuretik tiazid dengan obat golongan ACEI atau ARB atau beta bloker atau CCB. Pada penelitian ini diperoleh bahwa penggunaan obat hipertensi kombinasi antara ACEI dan diuretik tiazid yaitu Captopril atau Nifedipin atau Amlodipin dengan HCT. Namun terdapat kombinasi antara Captopril dengan Furosemid. Pada kombinasi tiga obat hipertensi diberikan jika pada penggunaan dua kombinasi hipertensi tidak mencapai target tekanan darah [1]. Pada penelitian ini ditemukan terdapat kombinasi tiga obat hipertensi yaitu kombinasi antara CCB, ACEI dan diuretk dan CCB, CCB dan ACEI.

KESIMPULAN DAN SARAN

Kesimpulan

Penggunaan obat anti hipertensi pada lansia di Puskesmas Windusari Periode Desember 2015 – maret 2016 adalah golongan obat yang

paling banyak diresepkan adalah golongan ACEI sebesar 61.18%. Obat ACEI yang banyak diresepkan adalah Captopril sebanyak 79.31%. Kombinasi obat antihipertensi yang paling banyak adalah kombinasi 2 obat yaitu golongan ACEI dan diuretik sebanyak 84.10 % .

Saran

P erlu dilakukan evaluasi terhadap rasionalitas penggunaan obat antihipertensi pada pasien lansia

DAFTAR PUSTAKA.

[1] T. R. L. etc Dipiro Joseph T, *Pharmacotherapy : A Patophysiologic Approach*, Seventh. Mc Graw Hill, 2008.

[2] Whitworth JA, "hypertension_guidelines. pdf," *J. Hypertens*, vol. 21, no. 11, 2003.

[3] D. Bina *et al.*, *Pharmaceutical care*. Jakarta: Direktorat Bina Farmasi Komunitas dan Klinik, Ditjen Bina Kefarmasian dan Alat Kesehatan, Departemen kesehatan, 2006.

[4] Chobanian A, *The Seventh Report of the joint National Committee on Prevention , Detection , Evaluation , and Treatment of*. National Institutes of Health, National Heart, Lung and Blood Institute, 2003.

[5] E. Rahajeng and S. Tuminah, "Prevalensi Hipertensi dan Determinannya di Indonesia," 2007.

[6] Z. Ikawati, S. Djumiani, and I. D. P. P. S, "Kajian Keamanan Pemakaian Obat Anti-Hipertensi di Poliklinik Usia Lnjut Instalasi Rawat Jalan RS DR Sardjito," vol. V, no. 3, pp. 150–169, 2008.

[7] K. Tjay, T.H., dan Rahardja, *Obat-obat Penting (Khasiat Penggunaan dan Efek-Efek Sampingnya)*, 4th ed. Jakarta: PT. Elex Media Komputindo Kolompok Kompas-Gramedia, 2007.

[8] D. . Quick, *Managing Drug Suppy*, 2nd ed. Kumarin Press, 1997.

[9] I. G. A. A. Putu Yunita Primasari, "Gambaran Deskriptif Pola Penatalaksanaan Hipertensi Di Instalasi Rawat Jalan Rumah Sakit Umum Daerah Kabupaten Bueleleng Tahun 2013," *skripsi*, 2013.

[10] Nafrialdi, *Farmakologi dan Terapi*, 5th ed. Jakarta: Gaya Baru, 2007.

[11] D. Jenderal, B. Kefarmasian, D. A. N. Alat, and D. K. Ri, "Pedoman Pelayanan farmasi (Tata Laksana Terapi Obat) Untuk Pasien Geriatri," 2006.

[12] C.A.Rosita Indah Apriyanti, "Evaluasi pola pengobatan dan ketaatan dengan Home Visit Pada Pasien Hipertensi di Pili Lansia Puskesmas Gondokusuman I Yogyakarta Periode Februari - Maret 2010," *skripsi*, 2010.

POLA PENGGUNAAN OBAT ANTIHIPERTENSI PADA PASIEN HIPERTENSI RAWAT JALAN BPJS DI RSUD KRT SETJONEGORO WONOSOBO

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Abstrak

Hipertensi dilaporkan terjadi pada ± 50 juta penduduk di Amerika Serikat dan ± 1 milyar di seluruh dunia. Hipertensi merupakan faktor resiko utama gangguan jantung. Berdasarkan Riskesdas 2013 hipertensi merupakan penyakit tidak menular yang menempati peringkat 6 dimana prevalensi hipertensi berdasarkan hasil pengukuran dengan penderita usia ≥18 tahun sebesar 25,8%. Tujuan dari penelitian ini adalah untuk mengetahui pola penggunaan obat hipertensi di RSUD KRT Setjonegoro pada pasien pengguna jaminan kesehatan BPJS. Penelitian ini menggunakan rancangan diskriptif dimana data dikumpulkan secara retrospektif. Data yang digunakan berasal dari data rekam medik pasien hipertensi rawat jalan BPJS RSUD KRT Setjonegoro bulan Maret 2015 – Maret 2016. Penelitian menunjukkan hasil yaitu golongan obat terbanyak adalah golongan penghambat kanal kalsium sebesar 35,38% dan jenis obat hipertensi yang paling banyak digunakan adalah amlodipin yaitu sebesar 22,17%.

Kata Kunci : hipertensi, pola penggunaan obat

MEDICATION USAGE ON BPJS OF HYPERTENSION PATIENT IN THE OUTPATIENT DEPARTMENT OF KRT SETJONEGORO HOSPITAL WONOSOBO

Abstract

Hypertension has been reported about ± 50 million people in the USA and ± 1 billion around the world. Hypertension is the risk factor of cardiovascular disease. According to Riskesdas 2013, hypertension is non-infectious disease that placing at rank 6th which its about 25,8% at people above 18 years. This research has a purposed to know the pattern in using the hypertension drugs at KRT Setjonegoro Hospital Wonosobo patient's with BPJS. The research using a descriptive-retrospective method to collect the data from medical record of patients. We used data from March 2015 until March 2016. The results of this research shows Calcium Cannel Blocker and amlodipin is type drug that mostly used, about 35,38% and 22,17%.

Keywords : hypertesion, pattern of drug using

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PENDAHULUAN

Hipertensi didefinisikan sebagai kenaikan tekanan darah arterial yang persisten [1]. Sekitar 31% dari populasi mempunyai tekanan darah >140/90 mmHg. Jumlah penderita laki-laki lebih besar daripada perempuan pada usia di bawah 45 tahun, namun pada usia 45-54 penderita perempuan sedikit lebih banyak. Pada usia >54 tahun penderita perempuan lebih banyak daripada laki-laki [2]. Tekanan darah meningkat seiring bertambahnya usia, dan hipertensi umum terjadi pada orang tua. Peluang seseorang menderita hipertensi pada usia ≥ 55 tahun, walaupun mempunyai tekanan darah normal, adalah 90%. Kebanyakan orang menderita pre-hipertensi sebelum akhirnya didiagnosa menderita hipertensi dimana diagnosa terjadi pada dekade ketiga sampai kelima dalam kehidupan [2].

Tujuan terapi : tujuan keseluruhan adalah untuk mengurangi kesakitan dan kematian. JNC 7 merekomendasikan target TD < 140/90 mmHg untuk keseluruhan pasien, kurang dari 130/80 mmHg pada pasien hipertensi dan diabetes atau gangguan ginjal [3].

Penatalaksanaan terapi hipertensi yaitu secara farmakologi dan nonfarmakologi. Terapi nonfarmakologi dilakukan dengan melakukan modifikasi gaya hidup yang dapat dilakukan dengan cara mengurangi berat badan jika overweight, menggunakan *Dietary Approaches to Stop Hypertension* sebagai diet, diet intake Natrium (ideal = 1,5 g/hari atau NaCl 3,8 g/hari), olahraga aerobik, konsumsi alkohol dalam jumlah sedang (2 gelas atau kurang dalam sehari), berhenti merokok [1].

Rumah sakit merupakan tempat pelayanan kesehatan yang mengadakan pelayanan kesehatan perorangan secara paripurna dan mengadakan pelayanan rawat inap, rawat jalan dan gawat darurat [4].

METODE

A. Desain Penelitian

Menggunakan rancangan diskriptif dimana data dikumpulkan secara retrospektif. Data yang digunakan berasal dari data rekam medik pasien hipertensi rawat jalan BPJS RSUD KRT Setjonegoro.

B. Tempat dan Waktu Penelitian

Tempat penelitian yaitu di RSUD KRT Setjonegoro Wonosobo. Waktu penelitian dilakukan pada bulan Juni tahun 2016.

C. Jenis dan Sumber Data

Data yang digunakan merupakan data sekunder yang diambil dari data rekam medik pasien hipertensi rawat jalan BPJS RSUD KRT Setjonegoro Wonosobo. Data yang diambil berupa kelompok umur, jenis kelamin, item obat dan golongan obat.

D. Kriteria Inklusi dan Eksklusi

1. Kriteria Inklusi
   a. Pasien dengan diagnosa hipertensi
   b. Pasien hipertensi dengan jaminan kesehatan BPJS
   c. Pasien dengan umur di atas 18 tahun
   d. Pasien dengan diagnosa hipertensi minimal 3 bulan
   e. Pasien hipertensi stage 1 dan 2
2. Kriteria Eksklusi
   a. Pasien dengan umur di bawah 18 tahun
   b. Pasien hipertensi yang tidak menggunakan jaminan BPJS
   c. Pasien dengan diagnosa hipertensi kurang dari 3 bulan

E. Sampel

Sampel merupakan sebagian dari populasi yang karakternya hendak diselidiki. Pengambilan responden secara *purposive sampling* yaitu cara pengambilan sampel berdasarkan sifat-sifat populasi yang sudah diketahui sebelumnya. Karena jumlah populasi kurang dari 1000 maka penetuan sampel menggunakan rumus :

$$\mathbf{n = \frac{N}{1 + N\,(d^2)}}$$

Keterangan:
n : besar sampel
N : besar populasi
d^2 : penyimpangan terhadap populasi yang dikehendaki sebesar 5% atau 0,05.

Sehingga apabila jumlah populasi adalah 750 orang, maka jumlah sampel menurut rumus Slovin (5)(Umar, 2007) adalah:

$$n = \frac{750}{1 + 750\ (0,1)^2}$$

n = 88 responden

Maka data yang dibutuhkan adalah 88 responden

F. Instrumen dan Metode Pengumpulan Data

1. Instrumen Penelitian

   Instrumen penelitian yang digunakan dalam penelitian berupa rekam medik yang berisi informasi pasien yaitu nama pasien, jenis keamin, usia pasien, diagnosa dan terapi yang diperoleh.

2. Metode Pengumpulan Data

   Data dikumpulkan dengan cara melakukan seleksi terhadap rekam medik pasien rawat jalan yang mempunyai diagnosa hipertensi dan menggunakan BPJS sebagai jaminan kesehatan pasien. Selanjutnya dari rekam medik yang diperoleh dilakukan seleksi kembali untuk memperoleh sampel yang sesuai dengan kriteria inklusi yang sudah ditetapkan. Pencatatan identitas pasien antara lain meliputi jenis kelamin, usia pasien, diagnosa dan terapi yang diberikan.

G. Metode Pengolahan dan Analisa Data

Data penelitian kemudian dilakukan analisa dan diolah dalam bentuk presentase dan ditanpilkan dalam bentuk tabel.

Rumus presentase [6]:

$$P = \frac{f}{n} \times 100\%$$

Keterangan : P = presentase (%)
f = frekuensi
n = jumlah sampel

HASIL DAN PEMBAHASAN

A. Karakteristik Pasien

1. Distribusi Jenis Kelamin Pasien

   Penelitian ini menggunakan data yang diambil dari rekam medik pasien bulan Maret 2015 – Maret 2016 dan digunakan sampel sebesar 80 rekam medik. Hasil pengelompokan pasien berdasarkan jenis kelamin yaitu sebesar 54 pasien perempuan dan 28 pasien laki-laki.

Tabel 1. Distribusi Jenis Kelamin Pasien

JENIS KELAMIN	JUMLAH	PERSENTASE
LAKI LAKI	28	34,15%
PEREMPUAN	54	65,85%

Sumber : data sekunder pasien hipertensi RSUD KRT Setjonegoro Wonosobo

Data tersebut menujukkan bahwa jumlah pasien perempuan yang menderita hipertensi lebih besar daripada laki-laki. Data yang dikeluarkan oleh Pusat Data dan Informasi Kementrian Kesehatan RI menyebutkan bahwa prevalensi hipertensi pada tahun 2007 dan 2013 menunjukkan bahwa jumlah pasien hipertensi perempuan lebih tinggi dari laki-laki, sehingga hal ini memperkuat hasil yang diperoleh dalam penelitian. Data yang diperoleh dari Riskesdas 2013 juga diperoleh bahwa prevalensi hipertensi lebih tinggi pada perempuan dibandingkan laki-laki [7].

2. Distribusi Umur Pasien

   Karakteristik umur pada penelitian ini dibagi menjadi 3 kelompok umur yaitu kurang dari 40 tahun, 41-65 tahun dan lebih dari 65 tahun. Pasien dengan usia dibawah 40 berjumlah 2 orang (2,44%), usia 41-65tahun sebesar 53 orang (64,63%), dan usiadi atas 65 tahun sebesar 27 orang (32,93%).

Tabel 2. Distribusi Umur Pasien

UMUR	JUMLAH	PRESENTASE
< 40 TAHUN	2	2,44%
41-65 TAHUN	53	64,63%
> 65 TAHUN	27	32,93%

Sumber : data sekunder pasien hipertensi RSUD KRT Setjonegoro Wonosobo

Penelitian yang dilakukan oleh Rahajeng. dan Tuminah, S. [8] (2009), kelompok usia 25-34 tahun memiliki resiko hipertensi 1,56 kali dibandingkan usia 18-24 tahun. Resiko hipertensi juga meningkat sejalan dengan bertambahnya umur. Hasil ini mendukung

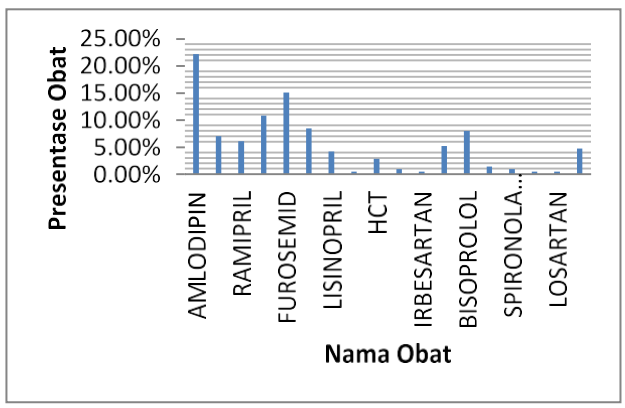
hasil penelitian dimana pada penelitian ini diperoleh hasil bahwa pada usia 41-65 tahun jumlah penderita lebih banyak daripada kelompok umur di bawahnya.

Namun terdapat perbedaan hasil dengan penelitian yang dilakukan oleh Setiawan [9] (2004), dimana pada kelompok umur > 65 tahun menunjukkan hasil lebih besar dibandingkan kelompok umur di bawahnya, berbeda dengan hasil yang peneliti dapatkan yaitu pada usia > 65 tahu diperoleh data penderita sebesar 32,93% dibandingkan dengan kelompok umur 41-65 tahun yaitu sebesar 64,63%.

B. Karakteristik Obat

1. Pola Penggunaan Obat

Obat yang digunakan pasien hipertensi di RSUD KRT Setjonegoro Wonosobo dapat dilihat pada tabel 3 dibawah ini.



Gambar 1. Distribusi Jenis Obat Hipertensi

Sumber : data sekunder pasien hipertensi RSUD KRT Setjonegoro Wonosobo

Berdasarkan data di atas, rata-rata penggunaan obat hipertensi menunjukkan jumlah yang hampir sama dari tiap jenis obat hipertensi. Jenis obat yang paling banyak digunakan adalah amlodipin diikuti dengan furosemid.

2. Pola Penggunaan Obat Berdasarkan Golongan Obat

Tabel 3. Distribusi Golongan Obat Hipertensi

GOLONGAN OBAT	JUMLAH	PRESENTASE
PENGHAMBAT KANAL KALSIUM	75	35,38%
PENGHAMBAT RESEPTOR ANGIOTENSIN	51	24,06%
PENGHAMBAT ACE	27	12,74%
DIURETIK KUAT	32	15,09%
DIURETIK TIAZID	6	2,83%
NITRAT	1	0,47%
PENGHAMBAT RESEPTOR ADRENERGIK BETA	18	8,49%
ANTAGONIS ALDOSTERON	2	0,94%

Sumber : data sekunder pasien hipertensi RSUD KRT Setjonegoro Wonosobo

Data tersebut menunjukkan bahwa golongan obat hipertensi terbanyak adalah golongan penghambat kanal kalsium yaitu Amlodipin, Nifedipin, Diltiazem diikuti oleh golongan Penghambat reseptor angiotensin yaitu losartan, irbesartan, telmisartan, valsartan, dan kandesartan.

Pasien yang menjadi subyek penelitian merupakan pasien hipertensi dengan penyakit penyerta seperti diabetes melitus, gangguan ginjal, dan berdasarkan JNC VII pada pasien hipertensi dengan penyakit penyerta pilihan terapi anti hipertensi adalah golongan penghambat kanal kalsium,penghambat reseptor angiotensin, penghambat ACE, Beta- bloker dan diuretik [7]. Pemilihan obat pada pasien di RSUD KRT Setjonegoro Wonosobo sudah sesuai dengan JNC VII.

KESIMPULAN DAN SARAN

Kesimpulan

Obat yang diresepkan untuk pasien hipertensi di RSUD KRT Setjonegoro Wonosobo adalah golongan penghambat kanal kalsium, penghambat reseptor angiotensin, penghambat ACE, diuretik, bitrat, penghambat reseptor adrenergik beta, antagonis aldosteron. Obat anti hipertensi terbanyak adalah golongan

penghambat kanal kalsium yaitu sebesar 35,38%. Obat golongan penghambat kanal kalium yang banyak digunakan adalah amlodipin sebesar 22,17%

Saran

Perlu dilakukan penelitian lanjutan mengenai evaluasi penggunaan obat hipertensi yang meliputi tepat indikasi, tepat obat, tepat pasien dan tepat dosis

DAFTAR PUSTAKA

[1] Wells,B.G., DiPiro,J.T., Schwinghammer,T.L., DiPiro,C.V., 2015, *Pharmacotherapy Handbook. Ninth Edition*, McGraw-Hill Education

[2] DiPiro,J.T., Talbert,R.L., Yee,G.C., Matzke,G.R., Wells,B.G., Posey,L.M., 2005, *Pharmacotherapy A Pathophysiologic Approach Sixth Edition*, McGraw-Hill Education

[3] Anonim, 2003, *JNC 7 Express, The Seventh Report of The Joint National Committe on Prevention, Detection, Evaluation and Treatment of High Blood Pressure*, U.S department of Health and Human Service

[4] Anonim, 2014, *Infodatin,* Pusat Data dan Informasi Kementrian Kesehatan RI

[5] Umar, H., 2007., *Metode Penelitian Untuk Skripsi dan Tesis Bisnis*, PT. Raja Grafindo Persada, Jakarta

[6] Sibagariang, E.E., 2010, *Metodologi Penelitian Untuk Mahasiswa Diploma Kesehatan*, CV. Trans Info Media, Jakarta

[7] Anonim, 2013, *Riset Kesehatan dasar 2013*, Badan Penelitian dan Pengembangan Kesehatan Kementrian Kesehatan RI

[8] Rahajeng, E., Tuminah, S., 2009, *Prevalensi Hipertensi dan Determinasinya di Indonesia*, Pusat Penelitian Biomedis dan Farmasi Badan Penelitian Kesehatan Departemen Kesehatan RI, Maj Kedokt Indon, Volum :59, Nomor : 12, Desember 2009

[9] Set iawan, Z., 2006, Karak terist ik Sosiodemografi Sebagai Faktor Resiko Hipertensi Studi Ekologi di Pulau Jawa Tahun 2004, *Tesis,* Jakarta: Program Studi Epidemiologi Program Pasca Sarjana FKM-UI

ORIGINAL ARTICLE

Current Trends of Hypertension Treatment in the United States

Shreya J. Shah[1] and Randall S. Stafford[1]

Hypertension (HTN) affects over 70 million individuals in the United States and is one of the major risk factors for cardiovascular disease (CVD).[1,2] From 2011 to 2014, the prevalence of HTN was 30.0% among adult men and 28.1%among adult women, and the prevalence of HTN from 1999to 2014 has remained stable over time.[3–5] Annual cost of HTN is over $42.9 billion, with over $20.4 billion spent on prescription medications.[6]

Blood pressure (BP) increases the risk of CVD events independent of other risk factors, and higher BPs lead to greater risk of myocardial infarction, heart failure, stroke, and kidney disease.[1] CVD is currently the leading cause of death in the United States and accounts for 17% of overall national health expenditures.[7] HTN is present in 51.0% of adults with CVD, and 40.6% of CVD mortality has been attributable to HTN.[8]

BP-lowering treatments significantly reduce the risk of CVD and death in various patient populations—a 10 mm Hg reduction in systolic BP (SBP) has been shown to reducethe risk of major CVD events by 20%, coronary heart diseaseby 17%, stroke by 27%, heart failure by 28%, and all-causemortality by 13%.[9,10] While treatment rates for HTN have increased from 65% (2003–2004) to 75% (2011–2012), and adequate BP control has improved from 40% to 52%, detec-tion, treatment, and control of HTN remains suboptimal.[11] Healthy People 2020 goals include controlling 62% of all adults with HTN.[12]

Thiazide-like diuretics are the recommended initial ther-apy for most patients, either alone or in combination withone of the other classes.[6] All classes of BP-lowering drugshave a similar effect in reducing coronary heart disease andstroke for a given reduction in BP, with the exception of theextra protective effect of beta-blockers shortly after a myo-cardial infarction, the effect of calcium-channel blockers(CCBs) in preventing stroke, and the effect of thiazides inpreventing heart failure.[13,14] Past estimates indicate that themedications prescribed for HTN in the United States havechanged over time. From 1997 to 2012, angiotensin receptorblocker (ARB) use has increased from 3% to 18%, CCB usehas decreased from 27% to 18%, diuretic use has been stableat 24–30%, and beta-blocker use has been stable at 14–16%.[15]We used nationally representative audit data from U.S. office-based physicians to examine patterns of HTN treatment in 2014. These national data describe the popula-tion treated for HTN, define the medications used in treat- ment, and assess the adequacy of BP control.

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Initially submitted February 8, 2017; date of first revision March 29, 2017; accepted for publication April 29, 2017; online publication May 22, 2017.

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METHODS

Data collection

Data were extracted from the National Disease and Therapeutic Index (NDTI), an ongoing nationally representative physician survey produced by QuintilesIMS (Plymouth Meeting, PA; formerly IMS Health). The NDTI is a quarterly audit of approximately 4,800 office-based physicians that provide information regarding patterns and treatment of disease in the United States. The physicians are selected from master lists of the American Medical Association and the American Osteopathic Association through random sampling stratified by specialty and geographic area. The universe of physicians from which samples are drawn includes physicians who are directly involved in office-based care, and therefore excludes specialties such as pathology, anesthesiology, and radiology. Participating physicians are surveyed for a 2-day period during each calendar quarter, and they complete an encounter form for each patient seen. For each encounter form, drug therapies are linked to the diagnosis specific 6-digit taxonomic codes representing diagnostic information (similar to ICD-9). The encounter form captures information on both newly prescribed and continued medications as well as nonprescription medications. In addition to diagnostic and drug information, the NDTI also provides information regarding patient characteristics (age, gender, race, insurance type, SBP, diastolic BP, etc.) as well as information regarding physician characteristics (specialty, region, etc.).

Information from this sample is then used to calculate representative national projections by assigning weights to each sample encounter. These weights account an independent estimate of total national encounters, the representativeness of specialties, and the number of visits sample by each physician. For example, visits to physicians who collect fewer visits would receive a larger weight compared to physicians who collect more visits.[16–21]

Using the data available within the NDTI, the ICD-9 code used to select for patients within our study with a diagnosis of HTN were 401.0 (malignant essential HTN), 401.1 (benign essential HTN), and 401.9 (unspecified essential HTN).[22,23] These ICD-9 codes have been used in previous studies to define a diagnosis of HTN.[24,25] Since the focus of the study involved national trends in the management of all severities of primary HTN, no clinical exclusion criteria were applied. Among the patients identified to have one of the above diagnoses of HTN from January 2014 through December 2014, prescribed antihypertensive therapies were identified using the 5-digit Uniform System of Classification (USC). For patients prescribed 2 or 3-drug combination medications, each chemical component was counted once as if they were separate. Data were stratified by different patient, provider, and visit characteristic groups.

Analysis

The percentage of each antihypertensive class prescribed was calculated by dividing the total number of each drug class prescribed by the total number of treatment visits

for HTN. Patients taking a particular class were defined as the weighted national projection of the number of visits to patients with a diagnosis of HTN and treatment with that particular medication class. Total patients were defined as the national weighted projection of the number of visits by patients with a diagnosis of HTN and treatment with at least one antihypertensive medications.

Because many patients are taking more than one medication, the sum of these percentages is greater than 100%. To compare medication selection among different patient and physician strata, we calculated the proportional use by agent within each subpopulation (i.e., females prescribed angiotensin-converting enzyme inhibitors [ACEIs] divided by total number of females treated for HTN). To account for the small percentage of data reported as "N/A" or "unspecified", these groups were redistributed into the other data groups based on weighted percentages. Ninety-five percent confidence intervals (CIs) were calculated using available tables of relative standard errors that account for the complex, multistage NDTI sampling design of each annual audit. Descriptive statistics were used to examine the prescribed antihypertensive agents and drug classes, as well as the patient and physician characteristics associated with particular antihypertensive agents. *P* values were calculatedusing a 2-tailed *t*-test.

RESULTS

The total number of visits by patients with HTN in 2014 associated with antihypertensive treatment was 95.1 million (95% CI, 94.7–95.5). Among those treated for HTN, there were more patients age ≥ 60 (62%) vs. age <60 (38%), more White patients (68%) compared to Black (19%), Hispanic (6%), or Asian patients (5%) and more patients covered by Medicare (38%) and 3rd party insurance (32%) compared to HMO (17%) and Medicaid (5%) (Table 1). Most patients were treated by primary care physicians (75%) with 10% treated by cardiologists and 15% by a variety of other specialties. BP control widely varied among this medication-treated group of patients: SBP ≥160 (15%) vs. SBP 150–159 (9%) vs. SBP 140–149 (19%) vs. SBP 130–139 (26%) vs. SBP <130 (32%) (Figure 1).

Of those treated for HTN, ACEIs were used in 28.5% (95% CI, 28.3–28.6%) followed by thiazide diuretics at 24.2% (95% CI, 24.0–24.4%), ARBs at 21.5% (95% CI, 21.3–21.6%), CCBs at 21.1% (95% CI, 21.0–21.3%), and beta-blockers at 18.7% (95% CI, 18.6–18.9%). Lisinopril was the most commonly prescribed ACEI (21.9% of all patients), followed by benazepril (2.9%), enalapril (1.4%), and ramipril (1.0%). Hydrochlorothiazide was the most commonly prescribed thiazide (22.2%), followed by chlorthalidone (1.1%). Losartan was the most commonly prescribed ARB (9.4%), followed by olmesartan (5.1%), and valsartan (4.3%). Amlodipine was the most commonly prescribed CCB (17.7%), followed by diltiazem (1.6%). Metoprolol was the most common beta-blocker (8.3%), followed by atenolol (4.1%), nebivolol (2.2%), and carvedilol (2.1%) (Table 2). The most commonly prescribed antihypertensive agents were approved over 2 decades ago. All antihypertensive agents prescribed to more

Table 1. Patient characteristics

	National projection in millions	Percentage among those treated for hypertension
Age < 60	36.5	38.4%
Age ≥ 60	58.6	61.6%
Gender		
Female	48.1	50.5%
Male	47.0	49.5%
Race		
White	64.8	68.2%
Asian	4.6	4.8%
Black	17.7	18.6%
Hispanic	5.7	6.0%
Other/unspecified	2.3	2.4%
Insurance		
3rd party	30.2	31.8%
HMO	16.5	17.4%
Medicare	35.8	37.6%
Medicaid	5.2	5.4%
Other	7.4	7.8%
Patient SBP		
SBP < 130	30.4	32.3%
SBP 130–139	24.0	25.5%
SBP 140–149	17.4	18.5%
SBP 150–159	8.1	8.6%
SBP ≥ 160	14.2	15.1%
Prescriber specialty		
Cardiology	9.9	10.4%
Primary care[a]	71.5	75.2%
Other	13.7	14.4%
Prescriber region		
East	22.7	23.9%
Midwest	19.6	20.6%
South	35.5	37.4%
West	17.3	18.2%

[a]Primary care includes family practice, general practice, internal medicine, geriatrics.
Abbreviation: SBP, systolic blood pressure.
Source: QuintilesIMS, NDTI, 2014.

than 5% of patients had an approval date of 2002 or earlier[26] (Figure 2).

Selection of agents varied modestly among different patient groups. The proportional use of ACEIs was higher among those age <60 vs. age ≥60 (34% vs. 27%, $P < 0.001$), and use of thiazides was also higher (27% vs. 24%, $P < 0.001$). Use of ACEIs was higher among men vs. women (32% vs. 26%, $P < 0.001$) and use of beta-blockers was lower (18% vs. 21%, $P < 0.001$). Use of CCBs was higher among Blacks vs. Whites (27% vs. 20%, $P < 0.001$) and use of thiazides was also higher

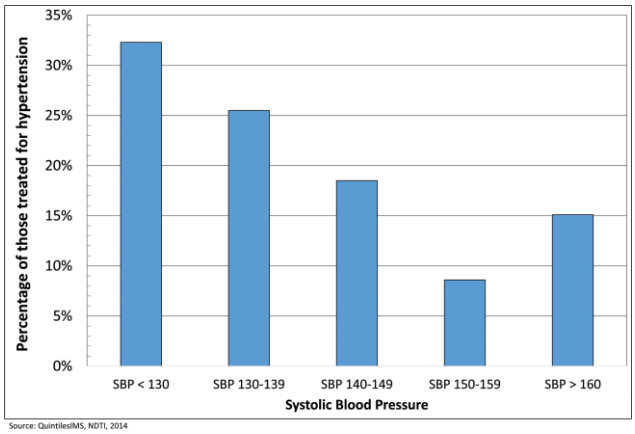

Figure 1. Systolic blood pressure among those treated for hypertension. (Adapted from QuintilesIMS, NDTI, 2014.)

(28% vs. 23%, $P < 0.001$) whereas use of ACEIs was lower (24% vs. 30%, $P < 0.001$). Use of ARBs was higher among Asians vs. Whites (30% vs. 21%, $P < 0.001$). Use of ARBs was lower among those with Medicaid vs. those with 3rd party and PPO insurance (12% vs. 24%, $P < 0.001$), and use of thiazides was also lower (23% vs. 28%, $P < 0.001$) (Table 3). Primary care providers were more likely to prescribe ACEIs compared to cardiologists (29% vs. 20%, $P < 0.001$) as well as thiazides (25% vs. 18%, $P < 0.001$), whereas primary care providers were less likely to prescribe beta-blockers compared to cardiologists (18% vs. 26%, $P < 0.001$) (Figure 3).

ACEI use was significantly more likely in patients with SBP <130 (31.1%) compared with those with BP ≥160 (25.4%). In contrast, the use of CCBs was less likely among those with SBP <130 (20.0%), but more likely among those with SBP ≥160 (26.0%) (Table 3).

DISCUSSION

Nationally representative data of office-based physicians from the NDTI was used to identify prescribing patterns for HTN in 2014. Compared to the U.S. general population, those treated for HTN in 2014 tended to be older (62% age ≥60 among those with treated HTN vs. 18% in the general population),[27] were less likely to be White (68% among those with treated HTN vs. 77% in the general population), were more likely to be Black (19% among those treated with HTN vs. 13% in the general population).[28] The majority of prescribers were primary care physicians (75.2%), and from the southern United States. Although 58% of patients being treated had SBP <140, many had SBP ≥140, including 9% with SBP 150–159 and 15% with SBP ≥160. Inadequate BP control in this setting is particularly concerning. All were accessing outpatient services and were reported to be on antihypertensive medications, thereby surmounting 2 common barriers to adequate HTN control.

The treatment of HTN in 2014 predominantly involved 5 major classes of drugs: ACEIs, thiazide diuretics, ARBs, CCBs, and beta-blockers. Selection of antihypertensive agents was generally consistent across patient subpopulations, but

Table 2. Drug class details among top 5 classes of antihypertensive drugs prescribed in 2014

Drug name	National projection in millions	Percentage of treated patients on this medication
ACEIs	27.1	28.5%
Lisinopril	20.8	21.9%
Benazepril	2.8	2.9%
Enalapril	1.3	1.4%
Ramipril	1.0	1.0%
Quinapril	0.7	0.7%
Other	0.5	0.5%
Thiazides	23.0	24.2%
Hydrochlorothiazide	21.1	22.2%
Chlorthalidone	1.0	1.1%
Other	0.9	0.9%
ARBs	20.4	21.5%
Losartan	9.0	9.4%
Olmesartan	4.9	5.1%
Valsartan	4.1	4.3%
Irbesartan	0.8	0.9%
Telmisartan	0.7	0.7%
Other	1.0	1.0%
CCBs	20.1	21.1%
Amlodipine	16.8	17.7%
Diltiazem	1.5	1.6%
Verapamil	0.8	0.8%
Nifedipine	0.8	0.8%
Other	0.2	0.2%
Beta blockers	17.8	18.7%
Metoprolol	7.9	8.3%
Atenolol	3.9	4.1%
Nebivolol	2.1	2.2%
Carvedilol	2.0	2.1%
Bisoprolol	0.7	0.8%
Labetalol	0.5	0.5%
Other	0.6	0.7%
Nonthiazide diuretics	4.1	4.3%
Triamterene	2.0	2.1%
Furosemide	1.0	1.0%
Other	0.6	0.6%
Central acting agents	1.4	1.5%
Clonidine	1.3	1.4%
Other	0.1	0.1%
Vasodilators	0.7	0.7%
Hydralazine	0.6	0.6%
Other	0.0	0.1%

Abbreviations: ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; CCB, calcium-channel blockers.
Source: QuintilesIMS, NDTI, 2014.

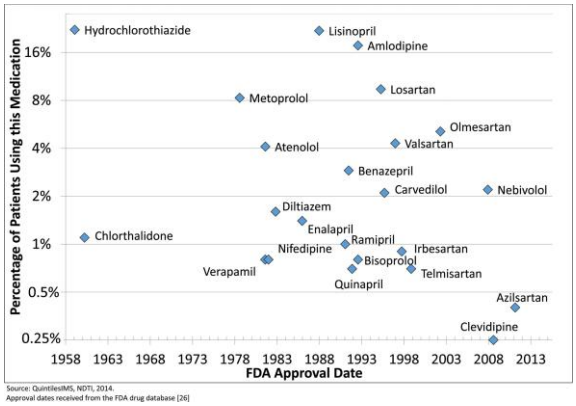

Figure 2. Original approval date of the antihypertensive drugs by prescribing prevalence. (Adapted from QuintilesIMS, NDTI, 2014. Approval dates received from the FDA drug database [26].)

varied occasionally between age, gender, race, and insurance type. JNC 7 Guideline recommended use of thiazide-type diuretics for most patients as first-line therapy; however, thiazide diuretics were not the most prevalent drug class in 2014. This may reflect JNC 8 guideline equally emphasis on of thiazide, CCB, ACEI, or ARB as first-line agents in non-Black populations. An analysis of baseline data from SPRINT also found that thiazide prescription below expected levels—while 43% of the cohort was on a thiazide at baseline, the prevalence of thiazide prescription was only 16% among participants treated with a single agent, and over one third of patients taking ≥3 agents did not receive a thiazide.[29]

Use of ARBs was lower among those with Medicaid vs. all other insurance types, which may reflect the higher cost of most ARBs. Losartan, which became available as a generic in 2010, is the most commonly prescribed ARBs. Beta-blockers were more likely to be prescribed by cardiologists vs. primary care providers likely resulting from other cardiovascular indications that coexist with HTN, including atrial fibrillation, coronary artery disease, and congestive heart failure.

The predominance of ACEI, BB, CCB, thiazide-type diuretic, and ARB, also indicates that newer drugs with novel mechanisms of action, such as aliskiren and eplerenone, have been minimally adopted into practice. All prominently used medications were more than 12 years old.

We observed an association of ACEI use with better BP control and CCB with worse control. Although differences in drug effectiveness may contribute to these findings, other explanations may be possible, including the sequence by which drugs are selected and differences in the populations treated with these 2 drug classes (e.g., use of CCBs is more common in African Americans, who generally had worse control than other subpopulations).

There are several limitations that exist within our study. The sample analyzed may differ from the general population of Americans with HTN. Patient and physician characteristics collected on the survey are also limited. Additionally, patients making multiple visits in 2014 could have contributed more data to the national weighted projections, a potential bias that could have been reflected in our study

Table 3. Percentage of patients in each stratum taking a particular drug class

	ACEI	Thiazide	CCB	ARB	Beta blocker	Alpha blocker	Nonthiazide diuretics	Other	Total
Total	28.5%	24.2%	21.1%	21.5%	18.7%	0.6%	3.7%	2.4%	120.7%
Age									
Age < 60	33.9%	27.2%	20.2%	22.7%	16.7%	0.3%	3.2%	2.5%	126.7%
Age ≥ 60	26.5%	23.5%	22.8%	21.8%	20.9%	0.8%	4.2%	2.5%	123.0%
Gender									
Female	26.0%	25.5%	20.9%	21.7%	20.5%	0.4%	4.6%	2.9%	122.5%
Male	31.9%	23.7%	22.1%	22.0%	17.5%	0.8%	3.0%	2.0%	122.9%
Race									
White	29.6%	23.4%	19.6%	21.2%	19.9%	0.5%	3.7%	2.1%	120.0%
Black	24.3%	27.8%	27.4%	19.8%	15.5%	0.7%	4.7%	4.1%	124.2%
Hispanic	30.5%	27.6%	16.5%	22.3%	16.8%	1.2%	2.0%	2.6%	119.6%
Asian	23.9%	19.9%	25.2%	29.5%	17.9%	0.4%	2.5%	1.9%	121.2%
Other/unspecified	31.3%	19.2%	20.4%	24.2%	17.7%	0.5%	2.9%	1.1%	117.3%
Insurance									
3rd party and PPO	29.7%	27.5%	19.9%	24.4%	17.2%	0.5%	3.6%	2.1%	124.9%
HMO	30.6%	24.5%	20.3%	23.1%	17.1%	0.7%	3.1%	1.4%	120.8%
Medicare	25.2%	21.3%	22.9%	20.6%	21.0%	0.6%	4.2%	2.9%	118.6%
Medicaid	32.4%	22.9%	20.8%	12.4%	16.8%	0.4%	3.9%	4.6%	114.1%
Other	31.6%	25.1%	19.9%	16.3%	19.0%	0.6%	3.0%	3.0%	118.6%
Old vs. new prescription									
Continued therapy	31.1%	26.1%	22.7%	22.8%	20.5%	0.5%	4.0%	2.2%	129.9%
New therapy	27.3%	25.0%	22.5%	24.0%	17.8%	1.2%	4.1%	4.7%	126.6%
Prescriber specialty									
Primary care[a]	29.4%	25.3%	21.1%	21.9%	17.6%	0.5%	3.9%	2.0%	121.7%
Cardiology	20.4%	18.0%	23.1%	22.1%	26.1%	0.9%	3.7%	2.9%	117.2%
Other	29.2%	23.1%	20.0%	19.1%	19.2%	0.5%	2.9%	4.5%	118.4%
Prescriber region									
East	24.8%	23.9%	22.9%	24.6%	19.9%	0.4%	5.9%	2.2%	124.5%
Midwest	32.5%	25.8%	19.2%	17.7%	19.4%	0.7%	7.1%	2.0%	124.4%
South	27.9%	24.4%	22.1%	21.8%	18.6%	0.7%	9.3%	2.9%	127.6%
West	29.9%	22.4%	19.1%	20.9%	16.7%	0.5%	7.1%	2.4%	119.0%
SBP									
SBP < 130[a]	31.1%	25.1%	20.0%	21.1%	20.4%	0.3%	3.8%	2.0%	123.9%
SBP 130–139[a]	29.7%	27.8%	23.1%	22.3%	17.2%	0.4%	4.3%	3.0%	127.8%
SBP 140–149[a]	27.7%	24.7%	23.7%	22.5%	17.8%	1.0%	4.0%	3.1%	124.5%
SBP 150–159[a]	25.6%	25.4%	24.9%	23.0%	17.9%	0.6%	2.4%	5.3%	125.2%
SBP ≥ 160[a]	25.4%	26.0%	26.0%	20.5%	20.6%	0.8%	3.2%	9.4%	131.8%

Abbreviations: ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; CCB, calcium-channel blockers; SBP,systolic blood pressure.
[a]Primary care includes family practice, general practice, internal medicine, geriatrics.Source: QuintilesIMS, NDTI, 2014.

results. We are also not able to identify other concomitant indications for antihypertensive medications such as chronickidney disease, coronary heart disease, congestive heartfailure, and atrial fibrillation, which could affect treatment indication and selection of drug class. The NDTI does not account patient adherence to medications, but representsthe prescription orders generated by physicians. While morecomplicated patients may be over-represented among those

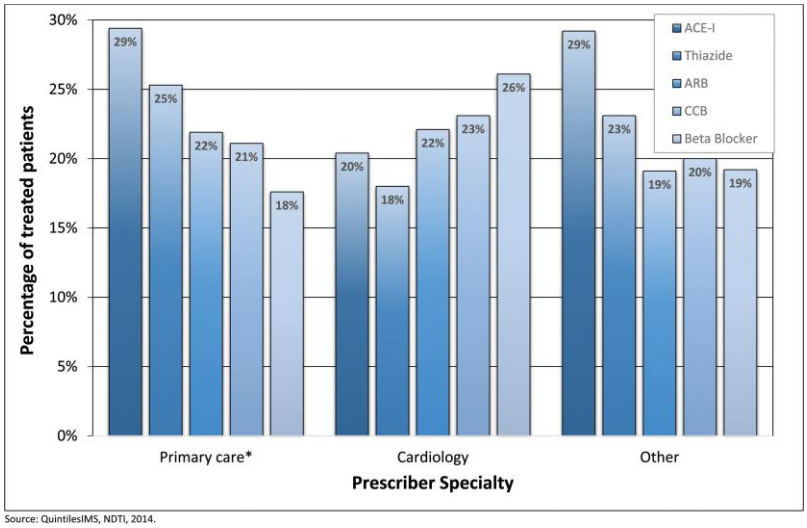

Figure 3. Prescribing patterns of antihypertensive therapy stratified by specialty—primary care, cardiology, and other. (Adapted from QuintilesIMS, NDTI, 2014.)

seen in doctors' offices, patients in this audit may show better BP control given their access to prescription medications and outpatient care.

In conclusions, the treatment of HTN in 2014 predominantly involved 5 major classes of drugs: ACEIs, thiazide diuretics, ARBs, CCBs, and beta-blockers with overwhelming use of older agents. Given the studied patients' access to outpatient care and medications, observed BP control was suboptimal. Our findings indicate a need for focused efforts to improve BP control, particularly in the 24% of treated patients with SBP ≥150.

DISCLOSURE

Dr. Stafford was supported by a mid-career mentoring award (NIH K24 HL086703) and serves as an unpaid member of a QuintilesIMS scientific advisory committee. The other author declared no conflict of interest.

REFERENCES

1. 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.
2. Rosamond W, Flegal K, Furie K, Go A, Greenlund K, Haase N, Hailpern SM, Ho M, Howard V, Kissela B, Kittner S, Lloyd-Jones D, McDermott M, Meigs J, Moy C, Nichol G, O'Donnell C, Roger V, Sorlie P, Steinberger J, Thom T, Wilson M, Hong Y. *Heart disease and stroke statistics: 2008 update at-a-glance*. Dallas: American Heart Association, 2008.
3. Vasan RS, Beiser A, Seshadri S, Larson MG, Kannel WB, D'Agostino RB, Levy D. Residual lifetime risk for developing hypertension in middle-aged women and men: The Framingham Heart Study. *JAMA* 2002; 287:1003–1010.

4. Egan BM, Li J, Hutchison FN, Ferdinand KC. Hypertension in the United States, 1999 to 2012: progress toward Healthy People 2020 goals. *Circulation* 2014; 130:1692–1699.
5. Yoon SS, Carroll MD, Fryar CD. Hypertension Prevalence and Control Among Adults: United States, 2011–2014. *NCHS Data Brief*. 2015;(220):1–8.
6. Davis K; Agency for Healthcare Research and Quality Medical Expenditure Panel Survey. Expenditures for Hypertension among Adults Age 18 and Older, 2010: Estimates for the U.S. Civilian Noninstitutionalized Population. <http://meps.ahrq.gov/mepsweb/data_files/publications/st404/stat404.shtml> 2013. Accessed 27 March 2016.
7. Heidenreich PA, Trogdon JG, Khavjou OA, Butler J, Dracup K, Ezekowitz MD, Finkelstein EA, Hong Y, Johnston SC, Khera A, Lloyd-Jones DM, Nelson SA, Nichol G, Orenstein D, Wilson PW, Woo YJ; American Heart Association Advocacy Coordinating Committee; Stroke Council; Council on Cardiovascular Radiology and Intervention; Council on Clinical Cardiology; Council on Epidemiology and Prevention; Council on Arteriosclerosis; Thrombosis and Vascular Biology; Council on Cardiopulmonary; Critical Care; Perioperative and Resuscitation; Council on Cardiovascular Nursing; Council on the Kidney in Cardiovascular Disease; Council on Cardiovascular Surgery and Anesthesia, and Interdisciplinary Council on Quality of Care and Outcomes Research. Forecasting the future of cardiovascular disease in the United States: a policy statement from the American Heart Association. *Circulation* 2011; 123:933–944.
8. Go AS, Mozaffarian D, Roger VL, Benjamin EJ, Berry JD, Blaha MJ, Dai S, Ford ES, Fox CS, Franco S, Fullerton HJ, Gillespie C, Hailpern SM, Heit JA, Howard VJ, Huffman MD, Judd SE, Kissela BM, Kittner SJ, Lackland DT, Lichtman JH, Lisabeth LD, Mackey RH, Magid DJ, Marcus GM, Marelli A, Matchar DB, McGuire DK, Mohler ER 3rd, Moy CS, Mussolino ME, Neumar RW, Nichol G, Pandey DK, Paynter NP, Reeves MJ, Sorlie PD, Stein J, Towfighi A, Turan TN, Virani SS, Wong ND, Woo D, Turner MB; American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics–2014 update: a report from the American Heart Association. *Circulation* 2014; 129:e28–e292.
9. Ettehad D, Emdin CA, Kiran A, Anderson SG, Callender T, Emberson J, Chalmers J, Rodgers A, Rahimi K. Blood pressure lowering for prevention of cardiovascular disease and death: a systematic review and meta-analysis. *Lancet* 2016; 387:957–967.
10. Neal B, MacMahon S, Chapman N; Blood Pressure Lowering Treatment Trialists' Collaboration. Effects of ACE inhibitors, cal- cium antagonists, and other blood-pressure-lowering drugs: results of prospectively designed overviews of randomised trials. Blood Pressure Lowering Treatment Trialists' Collaboration. *Lancet* 2000; 356:1955–1964.

11. Yoon SS, Gu Q, Nwankwo T, Wright JD, Hong Y, Burt V. Trends in blood pressure among adults with hypertension: United States, 2003 to 2012. *Hypertension* 2015; 65:54–61.
12. Egan BM, Li J, Hutchison FN, Ferdinand KC. Hypertension in the United States, 1999 to 2012: progress toward Healthy People 2020 goals. *Circulation* 2014; 130:1692–1699.
13. Law MR, Morris JK, Wald NJ. Use of blood pressure lowering drugs in the prevention of cardiovascular disease: meta-analysis of 147 randomised trials in the context of expectations from prospective epidemiological studies. *BMJ* 2009; 338:b1665.
14. Rodeheffer RJ. Hypertension and heart failure: the ALLHAT imperative. *Circulation* 2011; 124:1803–1805.
15. Zhou M, Daubresse M, Stafford RS, Alexander GC. National trends in the ambulatory treatment of hypertension in the United States, 1997–2012. *PLoS ONE* 2015; 10:e0119292.
16. IMS Health. *NDTI Diagnosis Reference File, 2000 to 2014*. Plymouth Meeting, PA: IMS Health, 2000 to 2014.
17. Zell ER, McCaig LF, Kupronis BA, Besser RE, Schuchat A. A comparison of the National Disease and Therapeutic Index and the National Ambulatory Medical Care Survey to evaluate antibiotic usage. Proceedings of the section on survey research methods, American Statistical Association. Alexandria, VA: American Statistical Association. 2000; 840–845.
18. Stafford RS, Radley DC. National trends in ambulatory asthma treatment, 1997–2009. *J Gen Intern Med* 2011; 26:1465–1470.
19. Stafford R, Radley D. The underutilization of cardiac medications of proven benefit, 1990 to 2002. *J Am Coll Cardiol* 2003; 41:56–61.
20. Kirley K, Qato DM, Kornfield R, Stafford RS, Alexander GC. National trends in oral anticoagulant use in the United States, 2007 to 2011. *Circ Cardiovasc Qual Outcomes* 2012; 5:615–621.
21. IMS Health Incorporated. *National Disease and Therapeutic Index*. Plymouth Meeting, PA: IMS Health Incorporated, 2004.
22. Beckman KD. How to document and code for hypertensive diseases in ICD-10. *Fam Pract Manag* 2014; 21:5–9.
23. ICD-9-CM Official Guidelines for Coding and Reporting. Baltimore, MD: Centers for Medicare & Medicaid Services and National Center for Health Statistics. <https://www.cdc.gov/nchs/data/icd/icd9cm_guidelines_2011.pdf> 2011. Accessed 21 September 2016
24. Ashman JJ, Rui P, Schappert SM. *Age Differences in Visits to Office-Based Physicians by Adults With Hypertension: United States, 2013. NCHS Data Brief, No 263*. Hyattsville, MD: National Center for Health Statistics, 2016.
25. Garrison GM, Oberhelman S. Screening for hypertension annually compared with current practice. *Ann Fam Med* 2013; 11:116–121.
26. Drugs@FDA: FDA Approved Drug Products. Drugs@FDA: FDA Approved Drug Products. <http://www.accessdata.fda.gov/scripts/cder/drugsatfda/index.cfm> 2016. Accessed 21 September 2016.
27. U.S Department of Health and Human Services—Administration for Community Living. *U.S. Population Totals by Age Group and Sex in the 2010 and 2000 Censuses*. U.S. Administration on Aging, 2010.
28. US Census Bureau. United States 2010 Census. <https://www.census.gov/2010census/about> 2011. Washington, DC. Accessed 20 October 2016.
29. Chang TI, Evans G, Cheung AK, Cushman WC, Diamond MJ, Dwyer JP, Huan Y, Kitzman D, Kostis JB, Oparil S, Rastogi A, Roumie CL, Sahay R, Stafford RS, Taylor AA, Wright JT Jr, Chertow GM; SPRINT Study Research Group. Patterns and correlates of baseline thiazide-type diuretic prescription in the Systolic Blood Pressure Intervention Trial. *Hypertension* 2016; 67:550–555.