EVALUATION OF ANTIHYPERTENSIVE DRUGS UTILIZATION IN HOSPITALIZED HYPERTENSION PATIENS (ICD I.15-2) AT X HOSPITAL BANTUL YOGVYAKARTA IN 2010 AND 2011 BY ATC/DDD METHOD

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Abstract

Background. *Hypertension is the most prevalent cardiovascular disease in the world. Hypertension is now often compelled with Diabetes Mellitus because of changing in life style.*

Objectives. *This study was aimed to know the description of the use of drugs that includes the classification of drugs, the most widely used antihypertensive, compliance with the National Essential Medicines List (DOEN) in 2008, JNC-7 and Hospital Formulary at X Hospital in Bantul Yogyakarta during 2010 and 2011 using ATC / DDD.*

Methods. *The study was conducted by descriptive design using retrospective method. Information about antihypertensive data was obtained from the Installation Inpatient Medical Records. All the data was then processed to determine the quantity of use of antihypertensives in units of stay and profiles DDD/100 Drug Utilization (DU 90%), compliance with Hospital Formulary, type of appropriate to the National Essential Drugs List (DOEN) and JNC 7 Guideline.*

Outcome. *The purpose of the ATC/DDD system is to serve as a tool for drug utilization research in order to improve quality of drug use*

Results. *The results showed that the widely used antihypertensive drugs per 100 bed days in 2010 and 2011 was amlodipin, which were 91,45 and 60,61, respectively. The utilization of antihypertensive drugs was changed in 2010 and 2011, based on number of antihypertensive drugs within DU 90% segment. Types of antihypertensive appropriate to the DOEN were captopril, lisinopril, nifedipine and diuretic were furosemide and spironolacton in 2010, however in 2011 for the diuretic were furosemide, spironolactone and hydrochlorothiazide. The utility of antihypertensive drugs which were not appropriate with JNC-7 were valsartane, irbesartane, candesartane (Antagonist Agiotensine II), amlodipin (CCB) and spironolactone (Antagonist Aldosterone). Some antihypertensive not appropriate to the Hospital Formulary.*

Conclusion.*The widely used antihypertensive drug was amlodipin. The utilization of antihypertensive drugs was changed in 2010 and 2011. Types of antihypertensive appropriate to the DOEN, however not appropriate to JNC 7 Guideline and the Hospital Formulary.*

Key words : *antihypertensive drugs, methods of ATC / DDD, DU 90%*

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INTRODUCTION

Hypertension is a disease that suffered by many people in Indonesia and all over the world. The increasing quality of life brings changes in individual life pattern. Hypertension with diabetic will increase cardiovascular disease, it needs choosing the right medicine. Drug use evaluation by ATC/DDD methods, which will be done in X Hospital in Bantul Yogyakarta.The overall goal of treating hypertension is to reduce hypertension associated morbidity and mortality.

This study was aimed to know the description of the use of drugs that includes the classification of drugs, the most widely used antihypertensive, compliance with the National Essential Medicines List (DOEN) in 2008, JNC-7 and Hospital Formulary at X Hospital in Bantul Yogyakarta during 2010 and 2011 using ATC / DDD.

METHODS

The study was conducted by descriptive design using retrospective method. Information about antihypertensive data was obtained from the Installation Inpatient Medical Records. All the data was then processed to determine the quantity of use of antihypertensives in units of stay and profiles DDD/100, *Drug Utilization* (DU 90%), type of appropriate to the National Essential Drugs List (DOEN), compliance with JNC 7 Guideline and Hospital Formulary.

RESULTS AND DISCUSSION

The results of this study showed in these tables below:

1. Appropriate to the National Essential Drugs List (DOEN)

From Table I, there were 5 drugs included in the DU 90%, the rank order decreased of the utilization antihypertensive drug was Amlodipin, Furosemide, Irbesartan, Captopril and Valksartan, percent utility of 26,90, 21,61, 20,32, 14,15 and 5,99, respectively.

From Table II, there were 4 drugs included in the DU 90%, the rank order decreased of the utilization antihypertensive drug was Amlodipin, Irbesartan, Captopril and Furosemide, percent utility of 30.24, 23.16, 19.06, and 15.96, respectively.

Amlodipin was the highest percentage to use because it is effecacious in improving left ventricular function in hypertension and ischemic heart (Alam *et al.*, 2009; Pimenta,

Table I. The value of DDD/100days and DU90% in 2010

Generic name	DDD/100days	% of used	Cumulative percentage	Segment
Amlodipine	91,45	26.90	26.90	DU 90%
Furosemide	73.45	21.61	48.51	
Irbesartan	69.09	20.32	68.83	
Captopril	48.09	14.15	82.98	
Valsartan	20.36	5.99	88.97	
Ramipril	15.27	4.49	93.46	10%
Nifedipin	6.18	1.76	95.22	
Candesartan	6	1.76	96.98	
Bisoprolol	3.64	1.07	98.05	
Diltiazem	3.51	1.03	99.08	
Lisinopril	1.27	0.38	99.49	
Spironolactone	1.21	0.36	99.87	
Nicardipin	0.44	0,13	100	

Table II. The value of DDD/100days and DU 90% in 2011

Generic name	DDD/100days	% of use	Cumulative percentage	Segment
Amlodipin	60.61	30.24	30.24	DU 90%
Irbesartan	46.42	23.16	53.40	
Captopril	38.20	19.06	72.46	
Furosemide	31.97	15.96	88.42	
Diltiazem	7.87	3.93	92.35	10%
Imidapril	4.24	2.11	94.46	
Valsartan	2.88	1.44	95.90	
HCT	2.12	1.06	96.96	
Lisinopril	1.82	0.91	97.87	
Nifedipin	1.82	0.91	98.78	
Bisoprolol	1	0.50	99.28	
Spironolactone	0.76	0.38	99.66	
Ramipril	0.61	0.30	99.96	
Nicardipin	0.13	0.06	100	

2009). In JNC 7, for compelling indication diabetes, the first choice is ACEI (Angiotensin Coverting Enzyme Inhibitor) or ARB (Angiotensin Receptor Blocker), because both tend to renoprotective effect, then used diuretic thiazide and the last BB (Beta Blocker) or CCB (Calcium Channel Blocker) (JNC 7, 2003). Based on this study, it can be concluded that the utilization of antihypertensive drugs was changed in 2010 and 2011, based on number of antihypertensive drugs within DU 90% segment.

2. The use of antihypertensive compliance

a. Antihypertensive drugs utilization

Antihypertensive drugs utilization at X Hospital Bantul Yogyakarta were appropriate to the DOEN; were, captopril, lisinopril, nifedipin, furosemide, spironolactone (Depkes, 2008) and captopril, lisinopril, nifedipin, furosemide, hydrochlorothiazide and spironolacton (Depkes, 2011).

b. JNC 7

From Table III, it appeared that there were two classes of antihypertensive drugs were not appropriate with JNC 7, namely Ca antagonist and Antagonist aldosteron. Both dihydropyridine and non-dihydropyridine calcium channel blockers (CCBs) effective in lowering blood pressure, but only non-dihydropyridine CCBs (diltiazem and verapamil) which may reduce over proteinuria and improve glomerular size selectivity in patient with nephropathy due to type 2 diabetes (Giuseppe *et al*., 2002.; Burney and Bakris, 2010).

The precence of diabetic nephropathy should influence the choice of an ACE inhibitors versus an ARB. Amlodipin an Calcium Channel Blocker (CCB) (dihydropyridine) are second line to ACEI or ARB. Data are emerging for combined therapy (Dipiro, 2008).

In cardiac disease cases, for blood pressure management: a given lower goal than for essential hypertension, often requires more antihypertensive medications. Hypertension regimen should include an ACE inhibitor or ARB (Dipiro, 2008). Thiazide diuretics, ARB, and ACE inhibitors may be the best first-line although other agents are usually necessary and goals may not be achieved even with three or four agents. Aggressive blood pressure control may be the most important factor in preventing

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Table III. Antihipertensive compare to JNC 7 in 2010 and 2011

Types	ATC code	Name/ dosage form	Appropriate to JNC 7	
			2010	2011
ACEI	C09AA01	Captopril/ tablet	√	√
		Farmoten/ tablet		√
	C09AA03	Interpril/ tablet	√	√
		Noperten/ tablet	√	
	CA09AA05	Hyperil /tablet	√	√
		Cardace/ tablet	√	
	C09AA16	Tanapress/ tablet		√
Loop diuretic	C03CA01	Furosemide/ injeksi	√	√
		Furosemide tablet	√	√
		Farsix/ injection	√	
		Farsix/ tablet	√	√
		Lasix/ injection	√	√
		Lasix / tablet		√
Thiazide Diuretic	CA03AA03	HCT/ tablet		√
ß blocker	C07AB07	Bisoprolol/ tablet	√	√
Angiotensin Antagonist II	C08CA01	Valsartan/ tablet	√	
	C09CA03	Valsartan tablet		√
	C09CA04	Irtan/ tablet	√	√
		Irvask/ tablet	√	√
		Iritensa/ tablet	√	√
	C09CA06	Blopress/ tablet	√	-
Ca Antagonist	C08CA01	Intervask/ tablet	-	-
		Amlodipine/ tab	-	-
		Cardisan/ tablet	-	-
		Divask/ tablet	-	-
Aldosteron Antagonist	C03DA01	Spironolakctone/ tablet	-	-
CCB	C08CA04	Perdipine/ tablet	√	√
	C08CA05	Nifedipine/ tablet	√	√
	C08DB01	Diltiazem/ tablet	√	√
		Herbesser/ tablet	√	√
		Herbesser CD/ tablet		√

adverse outcomes in patients with type 2 diabetes (Vijan and Hayward, 2003).

It was recommended to publish standard of therapy as a guideline for the physicians in prescribing.

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Table IV. Antihipertensive compared to Hospital Formulary in 2010 and 2011

Types	ATC code	Name/ dosage form	Apropiate to hospital formulary	
			2010	2011
ACEI	C09AA01	Captopril /tablet	√	√
		Farmoten /tablet		√
	C09AA03	Interpril /tablet	√	√
		Noperten/ tablet	-	
	C09AA05	Hyperil /tablet	√	√
		Cardace /tablet	-	
	C09AA16	Tanapress/tablet		-
Loop diuretic	C03CA01	Furosemide /injection	√	√
		Furosemide/ tablet	√	√
		Farsix /injection	√	
		Farsix/ tablet	√	√
		Lasix/ injction	√	√
		Lasix/ tablet		√
Thiazide diuretic	CA03AA03	HCT/tablet		√
ß bloker	C07AB07	Bisoprolol/ tablet	√	√
Angiotensin II antagonist	C08CA01	Valsartan/ tablet	√	
	C09CA03	Valsartan/tablet		√
	C09CA04	Irtan /tablet	-	-
		Irvask/ tablet	√	√
		Iritensa/ tablet	√	√
	C09CA06	Blopress/ tablet	√	
Ca Antagonist	C08CA01	Intervask/ tablet	-	-
		Amlodipine/ tablet	√	√
		Cardisan/ tablet	√	√
		Divask/ tablet	√	√
Aldosterone antagonist	C03DA01	Spironolactone/ tablet	√	√
CCB	C08CA04	Perdipin/ tablet	√	√
	C08CA05	Nifedipin/ tablet	√	√
	C08DB01	Diltiazem/ tablet	√	√
		Herbesser/ tablet	√	√
		Herbesser CD/ tablet		√

c. Hospital Formulary

From Table IV, showed that antihypertensive drugs compared to Hospital Formulary were not appropriate namely Cardace, Noperten, Irtan, Intervask in 2010, not appropriate was 16%. Also showed that antihypertensive drugs compared to Hospital Formulary were not appropriate namely Tanapress, Irtan, Intervask in 2010, not appropriate was 10%.

In accordance with results it was suggested to review Hospital Formulary in order

to make drug inventory more effective and efficient.

CONCLUSION

The general results lead to conclusion that the widely used antihypertensive drug was amlodipin. The utilization of antihypertensive drugs was changed in 2010 and 2011. Types of antihypertensive appropriate to the DOEN, however were not appropriate to the Hospital Formulary and JNC 7 Guideline.

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