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Research Article

EVALUATION OF DIRECT MEDICAL COST IN TREATING HYPERTENSION IN A MALAYSIAN PUBLIC UNIVERSITY

MUNA AWAD SUHIL*, MOHAMED AZMI AHMAD HASSALI, MOHAMED IZHAM MOHAMED IBRAHIM

School of Pharmaceutical Sciences, Universiti Sains Malaysia, Penang, Malaysia. E mail: salagee2003@hotmail.com

ABSTRACT

This study determined incremental direct expenditures of treating hypertension in the University Sains Malaysia (USM) located in Penang, Malaysia. We have used prevalence based cost of illness approach as sub-division of pharmacoeconomic study in order to calculate the total expenses for illness and then to estimate the direct medical cost of hypertension for 2005 and 2006 from the organizational perspective. In this study, the calculated direct medical cost was consisted of the cost of drugs and the cost of health providers in managing hypertension. It is observed that the total direct cost of hypertension management in 2005 was RM 114,654.86. Of this amount 74.65% was spent on medicines while health workers cost constituted about 25.35% of the overall amount. The total cost per patent per year was RM 235.88. The total direct cost of hypertension management in 2006 was RM 116,822.55 of this amount 80.53% was spent on medicines while health workers cost constituted about 19.47% of the overall amount. The total cost per hypertensive person per year was RM 228.61. It is found that the drugs constituted about 74.6% of total direct medical costs in 2005 and 80.5% of total direct medical costs in 2006, while the cost of health personnel constituted 25.3% of the total direct medical cost in 2005 and 19.4% of total direct medical costs in 2006. With incremental direct medical expenditures estimated at nearly RM 1168, 22.55 in 2006, hypertension expenditures represent a significant amount of health care resource use in this small population setting in Malaysia.

Key words: Hypertension, Cost-of-treatment, Direct cost.

INTRODUCTION

Hypertension being the most commonly diagnosed disease in the world[1] is an important health problem, as the relationship between high blood pressure and risk of cardiovascular, cerebrovascular, and peripheral vascular diseases is well established.[2, 3] As a modifiable risk factor, treatment of hypertension through lifestyle changes and medication is a vital approach to preventing these diseases and has immense public health implications. Despite its benefits, treatment of hypertension is costly, and estimating the cost of hypertension treatment is of significant importance to determine the monetary impact of disease treatment on the society.[4]

The WHO and the European society of hypertension recognize that the early death and disability caused by cardiovascular disease is a big economic burden for any country, but could be solved by preventive measures particularly good control of hypertension. However, one of the major limitations in the effective hypertension control are the constraints imposed on health care resources particularly in low- and middle- income countries, which contributes to 80% of the global burden of cardiovascular disease.[5] High blood pressure in adults had a high impact on the economy and the quality of life of individuals with important implication for resource expenditure.[6,7] When the economic burden of hypertension is considered, the assessment of both direct cost and indirect costs must be considered.

In Malaysia in 2004, about RM145 million was spent on antihypertensive medications. In 2005, there were 37.580 hypertension related admission to government hospital- that cost RM 110 million.[8,9] The cost of therapy may be a barrier to controlling high blood pressure and should be an important consideration in selecting antihypertensive medication. Generic formulations are acceptable. Non generic newer drugs are usually more expensive than diuretics or beta blockers.[10]

METHOD

In this study, the direct medical cost calculated consisted of the cost of drugs and the cost of health providers in managing hypertension. The cost of drugs was determined by multiplying the total quantity of each drug per prescription by the unit price of the drug in order to obtain the cost of prescriptions before adding the total costs of prescriptions to get the total cost of drugs.

To estimate the cost of health workers involved in the management of hypertensive patients, the time cost of doctors, medical assistants, assistant nurses, and registration personnel was calculated (total cost of visit). Other part of health workers costs was dispensing costs, which refer to the times spent by pharmacists and dispensers in preparing and dispensing drugs to patients (total dispensing costs). All these costs were estimated as cost of time per minute according to the government salary .The cost of time per minute for each health workers are outlined below:

- Cost of medical officers time for one minute: (Salary of 2740.31/month)/ (186 working hours/month) / (60 minutes)= RM0.25/minute
- Cost of pharmacists time for one minute: (Salary of RM5000/month)/(186 working hours/month)/(60 minutes)= RM0.45/minute
- Cost of the dispensers time for one minute: (Salary of RM 1500/month)/(186 working hours/month)/(60minutes)=RM0.13/minute
- Average cost of dispensing per minute=average cost of pharmacist per minute plus cost of the dispenser for one minute= (0.45+0.13)/2=RM0.29/minute
- Cost of medical assistants time per minute: (Salary RM2100/month)/(186 working hours/month)/(60 minute) = RM0.19/minute
- Cost of assistant nurse per minute: (Salary RM1308/month)/(186 working hours/month)/(60minute)=RM0.12/minute
- Average cost of medical assistant and assistant nurses time for one minute 0.19+0.12)/2=RM0.16
- Registration personnel's time for one minute (Salary of RM1442/month)/(186 working hours/month)/(60minutes0=rm0.13/minute

The monthly income details of health care personnel were obtained through a direct interview and from the administrative office, while a small survey was conducted to estimate the time spent by each professional in hypertension management

RESULTS

Direct medical cost evaluation

In this section, only direct medical costs were calculated, which include the cost of health workers time and the cost of drugs. Other direct costs are not included in this study.

Cost of drug treatment

The total cost of drugs was RM 85585.64 of which RM 71707.97 (83.79%) was spent on antihypertensive drugs. Details are shown in Table 1.

Table 1: The frequency of antihypertensive prescribed during 2005

Drugs	Frequency	Percent
Tenormin®	960	17.7
Hydrochlorothiazide	902	16.7
Renitec® 10mg	638	11.8
Norvasc® 10mg	627	11.6
Norvasc® 5mg	608	11.2
Moduretic®	421	7.7
Renitec® 5mg	345	6.3
Renitec® 20mg	314	5.8
Betaloc® 100mg	313	5.7
Nifecard® retard	56	1.0
Zestril® 10mg	47	0.8
Inderal®	46	0.8
Adalat® 10mg	34	0.6
Adalat® 20mg	30	0.5
Plendil ®	26	0.4
Capoten ®25mg	25	0.4
Prazocin	8	0.1
Zestril® 5mg	2	.0.0
Total	**5402**	**100.0%**

Time cost of health workers

The time of health workers was estimated for doctors, medical assistants, assistant nurses, and registration personnel, who dealt with hypertensive patients (total cost of visit). The time spent by pharmacists and dispensers in preparing and dispensing drugs for patients formed the basis for determining total dispensing costs. The result showed that the cost of one visit amounted to RM 4.68 while the cost of total visits amounted to RM 20219.21. The cost of dispensing one prescription was equal to RM 2.03, while the cost of dispensing all the prescriptions amounted to RM 8836.59. Finally, the total cost of health personnel's time is RM 29069.22.

The total direct cost of hypertension management in 2005 was RM 114654.86**.** Of this amount, 74.65% was spent on medicines, while health workers cost constituted about 25.35% of the overall cost. The total cost per patient per year was RM 235.88. Table 2 provides a summary of the total direct medical cost on hypertension management for 2005.

Table 2: Prescribing frequency of combination anti-hypertensive drugs in the USM Clinic

Drug	Frequency	Percent
Diuretic + CCB	180	21.4
BB + Diuretic	142	16.8
CCB + ACEI	137	16.2
BB + CCB	124	14.7
Diuretic + ACEI	105	12.4
BB + ACEI	88	10.4
BB + Diuretic + CCB	21	2.5
BB+ Diuretic + ACEI	21	2.5
Diuretic + CCB+ ACEI	10	1.1
BB+ CCB+ ACEI	9	1.0
BB + Diuretic + CCB+ ACEI	3	0.3
AB + Diuretic	1	0.1

In 2006, the total cost of drugs was RM 94075.95 of which RM 80241.5 (85.29%) was spent on antihypertensive drugs. A break down of the drug costs for various therapeutic categories is presented in Table 3.

Table 3: The mean and median DDD of antihypertensive drugs per prescription associated with gender in 2005

Gender	Mean±SD (DDD)	Median (DDD)	Total DDD of prescription	% of total DDD
Male (n=1635)	68.36±61.74	56.00	111769.42	69.6
Female (n=887)	55.00±49.96	40.00	48782.41	30.4
Total (n=2522)	**63.66±58.21**	**46.67**	**160551.83**	**100.0%**

The total direct cost of hypertension management in 2006 was RM 116822.55. About 80.53% of this was spent on medicines, while health workers cost constituted about 19.47% of the overall costs. The total cost per patient per year was RM 228.61. Summary of the total direct medical cost for 2006 is shown in Table 4.

Table 4: Percentage consumption of antihypertensive drugs at USM clinic in 2005

Drug	DID	% of DID
Renitec®	4.16	31.0
Norvasc®	3.90	29.1
Hydrochlorothiazide	1.98	14.7
Tenormin®	1.86	13.8
Betaloc®	0.56	4.1
Moduretics®	0.53	3.9
Nifecard®	0.15	1.1
Zestril®	0.11	0.8
Plendil®	0.10	0.7
Capoten®	0.05	0.3
Inderal®	0.01	0.1
Minipress®	0.01	0.1
Total	**13.42**	**100.0%**

Comparison in terms of direct medical costs

Total direct cost in 2006 increased by 1.89%, while the total cost of drugs increased by 9.92%. However the total cost of health personnel decreased by 21.75% and the cost of treatment for hypertensive patient per year by 3.5%.

DISCUSSION

Hypertension stands as an important spot of worry for economic evaluations because of the wide range of issues involved for the individual and society. It is one of the most expensive diseases as far as treatment is concerned, as it generates higher health care expenses than those produced by individuals with normal blood pressure.[11] Additionally, despite the existing guidelines for the treatment of hypertension, its treatment is inadequate in a large number of hypertensive individuals in Malaysia, therefore causing major organ damages, mainly in patients with higher or uncontrolled blood pressure. These complications add huge costs to the overall cost of health care; developments in the hypertension treatment process should decrease the occurrence of these complications and consequently improve cost control.[12]

The study found that antihypertensive drugs constituted about 83.79% of total cost of drugs prescribed for hypertensive patients. Overall, drugs prescribed to hypertensive patients constituted about 75% of direct cost while the 25% was for operating expenditure. This finding is similar with another study in the USA, in which the amount allocated for hypertension in 2007, about 6% to 8% of the total health budget, was US$2,486,145,132. Of these, US$ 1,178,725,132 was direct cost. In a recent study it is found that the total incremental annual direct expenditures for patients with hypertension was estimated to be more than $US54.0 billion in 2001 after adjusting for demographics and co- morbidities. Mean incremental annual direct expenditure for an individual with hypertension was $US 1,131. Prescription medicines, inpatient visits, and outpatient visits constituted 90% of overall incremental expenditures.[4]

In Mexico, found that 60% with regard to the four categories of estimated direct costs, results were: consultations and diagnoses, 12%; drugs, 14%; hospitalizations, 11%; and complications, 63%.[6] In India, which found that a total of Rs 179 402 was spent in 1 year on drug acquisition for 300 hypertensive patients. In this study, a retrospective analysis was conducted of the cost of hypertension care at one internal medicine clinic, looking at the cost of office visits, laboratory tests, and medications.[13] Drug costs were the major determinants for cost of care, comprising 80% of the total cost of treatment after the first year of therapy. This difference in percentage with our study can be attributed to different health care cost in different countries. In the present study, the direct cost was restricted only to drugs acquisition cost and cost of paying health workers (Figure 1, 2).

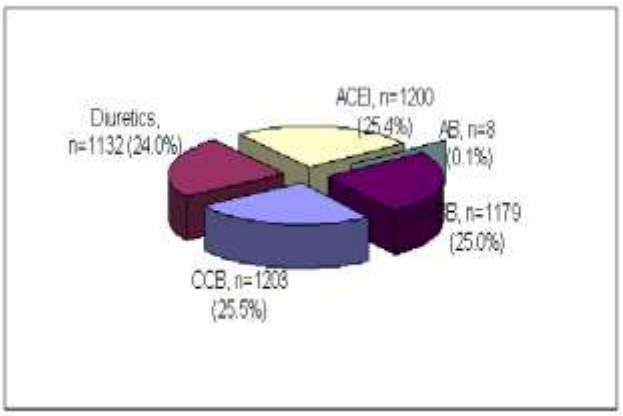

Figure 1: The total numbers of antihypertensive classes prescribed in 2005

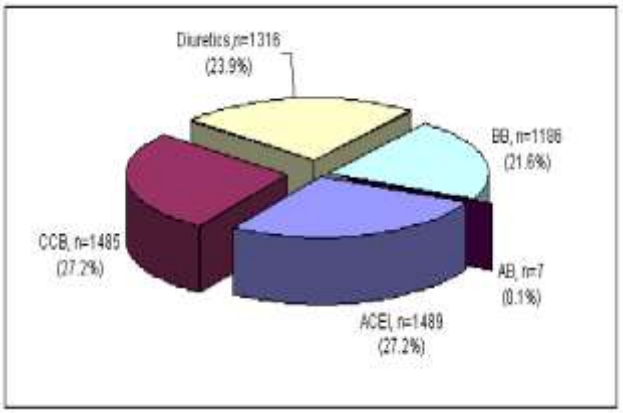

Figure 2: The total numbers of antihypertensive classes prescribed in 2006

For the year 2005, the present study found that the total direct cost for controlling hypertension in the USM Clinic was RM 114654.86 and the average cost per patient per year was RM 235.88**.** Most of the USM clinic prescribers tend to prescribe expensive drugs such as ACEI and CCB rather than BB and diuretics. Perhaps this may be due to the fact that most hypertensive patients are non-compliant to drugs.[14] Beside that, most of the hypertensive patients had co-morbidities and they needed combination of antihypertensive drugs to achieve goal blood pressure.[15]

A study conducted in Germany [16], found that the average cost of antihypertensive drug treatment was $375 per year. In a study [6] in England revealed that the estimates of the cost of hypertension treatment ranged from $7 billion to $15.5 billion per year. In East-Asia, it is found that the direct and indirect costs was about $1,000 per hypertensive patient and its squeal result in more than $3,700 in direct medical expenditures alone, per patient per year.[17]

The differences observed between this study and the previous studies could be due to differences in the estimation of the prevalence of hypertension. In addition, this study reported only the costs of hypertension for the main campus of USM, whereas previous studies considered all public and private institutions in their respective health systems. The differences in costs may also be due to the different stages of hypertension, compliance with medication guidelines, health care system, health care cost, and the components used to determine costs, including direct costs.

The study observed that the total direct medical cost increased by 1.89% from 2005 to 2006 due to the increase in the total drugs expenditure by 9.92%, while the total cost of health personnel decreased by 21.75% from 2005 to 2006. This result was affected by the number of patients and the number of prescriptions in 2006, which was lower than 2005. It means lower visits to USM clinic will lower the time spent by health personnel and ultimately lower the expenditure cost.

Changing patterns of prescription and the entry of new drugs into the market accounted for most of the rise in average cost per prescription. Unless the rising expenditure can be justified by demonstrable improvements in treatment outcomes, continuation of these trends will have profound effects on the cost-effectiveness of antihypertensive therapy.

This finding is consistent with the study done by Maling TJ, Kawachi (1990) which found that the rising cost of treating hypertension has become an issue of concern in several countries, including the United States, parts of Europe, and more recently, New Zealand. In New Zealand between 1981 and 1987; the total inflation-adjusted expenditure on antihypertensive drugs increased by 61.7%, from $21.4 million to $34.6 million in constant 1981 dollars. The major part (56.3%) of this increase in overall expenditure was explained by the rise in real cost of drug treatment, while the number of patients on drug therapy remained virtually static over the same period.[18, 19, 20]

CONCLUSION

Drugs constituted about 74.6% of total direct medical costs in 2005 and 80.5% of total direct medical costs in 2006, while the cost of health personnel constituted 25.3% of total direct medical cost in 2005 and 19.4% of total direct medical costs in 2006. Antihypertensive medications accounted for 83.7% of total drug costs in 2005 and 85.2% of total drug costs in 2006. The total direct medical costs of hypertension management in 2005 were RM 114654.86 and the cost per patient per year was RM 235.88. In 2006, the total direct medical cost increased to RM116822.55 and the cost per patient per year decreased to RM 228.61.

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