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Variation in Prices of Cardiovascular Drugs in Public and Private Pharmacies in Nepal

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Abstract

Introduction: Higher price of cardiovascular drugs is one of the reasons for high out-of-pocket expenditure in cardiovascular care. The objective of the study was to determine the price variation in commonly available cardiovascular drugs between public and private hospital pharmacies in Nepal.

Methods: A cross-sectional survey was conducted in 3 public and 3 private pharmacies in tertiary-level hospitals in Nepal. The price was recorded for the list of drugs commonly available in those pharmacies. A total of 23 drugs were selected for data collection. The price was recorded based on the payment receipt and price reported by surrogate customers. We defined the price variation as the difference between price of cardiovascular drugs between public hospital and private pharmacy. The price variation was expressed as percentage.

Results: Price of Amlodipine 5 mg was higher by 667% in private pharmacy nearby Tribhuvan University Teaching Hospital (TUTH) compared to that of TUTH pharmacy. Price of Enalapril 5 mg was higher by 14.47% in Manmohan Cardio Thoracic and Vascular Transplant Centre (MCVTC) compared to nearby private pharmacy. We observed that the price of cardiovascular drugs varied significantly between hospital and private retail pharmacies in TUTH ($P < .001$) and MCVTC ($P < .001$).

Conclusion: For most of the cardiovascular drugs, the price in private retail pharmacies were significantly higher than in hospital pharmacies. Future steps should be taken to establish and run own pharmacies in hospitals which would reduce the cost of medicine and thereby, increase access to medicine.

Keywords
cardiovascular diseases, drugs, price variation, Nepal

Introduction

Cardiovascular disease is one of the most common outpatient morbidities in Nepal.[1-3] Nepal Heart Foundation in 2011 reported that over 40,000 people of Nepal are having heart diseases, and it accounts for 25% of the total deaths in the country.[4] There has been increase in cardiovascular diseases (CVDs)[5] in Nepal, largely attributed to unhealthy lifestyles.[6] Primary health care facilities form the foundation of health system in Nepal. They provide basic health services at the community level. District, zonal, and regional hospitals are higher specialty hospitals in the chain. In addition to that, there are eight tertiary hospitals, located in country's capital, Kathmandu. For cardiovascular care, patients mostly visit tertiary hospitals. Each hospital at district, regional, and center level has hospital pharmacies. Hospital pharmacy is the department or service in a hospital which is managed under the direction of a professionally competent and certified pharmacist.[7] These hospital pharmacies are poorly developed resulting in unavailability of common drugs.

Tribhuvan University Teaching Hospital (TUTH), Manmohan CardioThoraic and Vascular Transplant Centre (MCVTC), and Sahid Gangalal National Heart Centre (SGNHC) are the 3 major tertiary health facilities located in the capital of Nepal for the treatment of CVDs.[8] An earlier study in six middle- and low-income countries reported that the total availability of medicines

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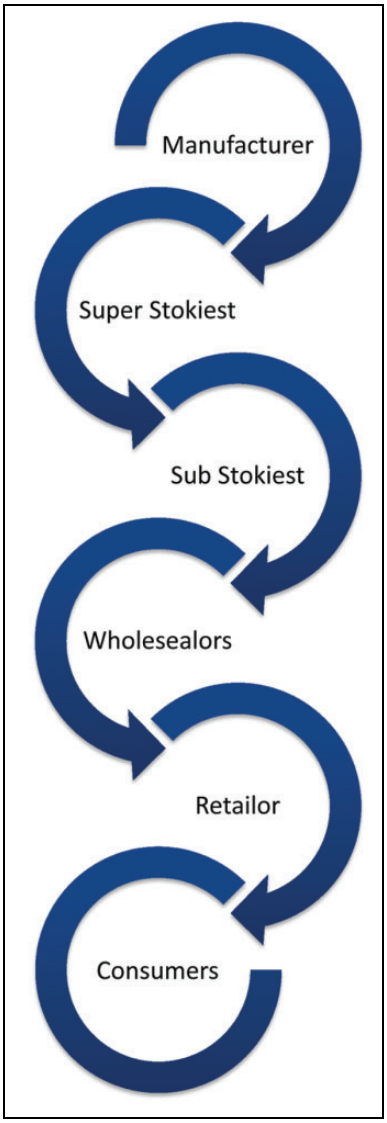

Figure 1. Process of drug purchasing in retail pharmacies.

in the public hospital pharmacy was considerably lower.[9] Hospital pharmacies are poorly developed in Nepal resulting in unavailability of common drugs, specifically of CVD. For this reason, patients visit or referred to visit private retail pharmacies. In the hospital pharmacies in Nepal, the manufacturers supply the drugs directly through competitive pricing such as bidding and tenders. But in the private retail pharmacies, the process of getting drugs is through manufacturer to super stockiest, and substockiest, distributors, wholesalers, and retailers follow between them (Figure 1). Pharmaceutical companies decide not only the final price to the patient but also the markup for the private retail pharmacies. But for non-scheduled drugs, the markups are usually not set, but it is agreed by the partners on trade. Affordability and accessibility of medicines are the most prevailing problems mainly in developing countries like Nepal which also determine health service utilization.[10] One-third of the world's population lacks reliable access to medicines, primarily because they can't afford. This is one of the major causes of loss of millions of lives and major barrier to access to health care.[11-13]

The price variation of drugs between hospital pharmacy and private pharmacies has been reported from India, Sri Lanka, Pakistan, Philippines, Malaysia, Peru, Armenia, and Kenya.[14-16] But the price variation in drugs between hospital and private pharmacies is largely unknown in Nepal. The objective of this research was to report the price variation in common cardiovascular drugs between hospital and private pharmacies in tertiary-level hospitals of Nepal.

Methods

Study Design and Setting

A cross-sectional study was conducted in three tertiary hospitals pharmacies and 3 private retail pharmacies located in Kathmandu from August to September 2012. The 3 hospitals, namely, TUTH, MCVTC, and SGNHC are within 5-km distance from each other. Mix methods (quantitative and qualitative) were applied for data collection. Similarly, Key Informant Interviews (KIIs) were conducted with three private and hospital pharmacy retailers. Similarly, three KIIs were conducted with costumer at hospital and private retail pharmacies.

Sampling and Data Collection

Tertiary hospitals for cardiovascular care were purposively selected for the study, as these were the major specialized hospitals in Nepal. At each hospital, 1 private retail pharmacy was selected purposively among pharmacies in its periphery for study. A systematic data collection form was developed and pretested at Bir Hospital in Kathmandu. Researchers reviewed the available cardiovascular drugs in hospital and private retail pharmacies. All the available cardiovascular drugs (Generic) were listed in the drug list. Generic drug doesn't require a production license from innovator company and marketed only after release of patents or other exclusive rights. They are equally potent to the branded counterparts. Non generic drugs requires a license for production, and marketed under different brand names. Brand name for a drug is the name used by pharmaceutical company for their product. Only the solid dosage formser of the cardiovascular drugs available in hospital and retail pharmacies were included in the analysis. In case of two brands of same medicine, the brand most recently sold was selected for the study.

Price of drugs were collected asking the retail persons in the pharmacies. It was easier to get the price of drugs from hospital pharmacies, while the retails at private pharmacies were reluctant to tell the price of drugs. The price of drugs from the private pharmacies was collected by the surrogate customers. Four surrogate customers were recruited to get accurate retail price of drugs because billing system is irregular practice in private pharmacies of Nepal (Table 1).

The unit retail price of the same drug with the same brand name and the same dose was collected from hospital and private pharmacies on same day. The price of each drug at

Table 1. List of Drugs (Generic Names and Brand Names).

Generic Name	Brand Name
Amiodarone 100 mg	Cardone 100 mg
Amiodarone 200 mg	Cardone 200 mg
Amlodipine 2.5 mg	Amcab 2.5 mg
Amlodipine 5 mg	Amcab 5 mg
Atenolol 50 mg	Cardinol 50 mg
Digoxin 0.25 mg	Lanoxin 0.25 mg
Diltiazem 30 mg	Dilzem 30 mg
Diltiazem 60 mg	Dilcard 60 mg
Diltiazem SR 90 mg	Dilzem SR 90 mg
Enalapril 2.5 mg	Enpil 2.5 mg
Enalapril 5 mg	Enpil 5 mg
Frusemide 40 mg	Lasix 40 mg
Hydroclorthiazide 12.5 mg	Diazide 12.5 mg
Hydroclorthiazide 25 mg	Diazide 25 mg
Isosorbide dinitrate 10 mg	Isodril 10 mg
Losartan 25 mg	Lotan 25 mg
Losartan 50 mg	Lotan 50 mg
Metoprolol 25 mg	Metloc 25 mg
Metoprolol 50 mg	Metloc 50 mg
Nifedipine SR 20 mg	Depicor SR 20 mg
Propranolol 40 mg	Inderal 40 mg
Spironolactone 25 mg	Spril 25 mg
Warfarin 5 mg	Farin 5 mg

Table 2. Price Variation at Tribhuvan University Teaching Hospital.

Name of the Drugs	Hospital (NRP)	Retailer (NRP)	Variation, %
Amiodarone 100 mg	12.54	14.03	14.83
Amiodarone 200 mg	21.66	26.33	10.80
Amlodipine 2.5 mg	.34	2.00	484.80
Amlodipine 5 mg	.46	5.00	667.54
Atenolol 50 mg	.68	4.00	338.60
Digoxin 0.25 mg	2.80	2.92	7.14
Diltiazem 30 mg	4.71	5.44	15.50
Diltiazem 60 mg	8.66	9.00	7.16
Diltiazem SR 90 mg	12.95	13.76	6.25
Enalapril 2.5 mg	.45	2.00	344.44
Enalapril 5 mg	.68	3.25	411.70
Frusemide 40 mg	.51	.85	65.69
Hydroclorthiazide 12.5 mg	.51	1.75	96.08
Hydroclorthiazide 25 mg	.76	3.00	150.00
Isosorbide dinitrate 10 mg	1.20	2.00	150.00
Losartan 25 mg	.84	5.00	495.24
Losartan 50 mg	1.14	10.00	601.75
Metoprolol 25 mg	.95	4.00	236.84
Metoprolol 50 mg	1.50	2.55	200.00
Nifedipine SR 20 mg	2.04	5.00	69.12
Propranolol 40 mg	1.91	4.20	83.25
Spironolactone 25 mg	1.71	7.00	16.96
Warfarin 5 mg	4.56	5.50	20.61

NRP = Net Retail Price.

hospital pharmacy was compared with the price of the same drug at private retail pharmacy. A detail method for calculating price variation and availability of drugs is described elsewhere.[9] Surgical items available in the pharmacies and drugs other than cardiovascular drugs were excluded from drug list.

Price variation was expressed as the difference in price of drugs in retail pharmacy to hospital pharmacy divided by the price of drug in hospital pharmacy (expressed as percentage):

$$\text{Price variation} = \frac{\text{Price of drug in retail pharmacy} - \text{Price of drug in hospital pharmacy}}{\text{Price of drug in hospital pharmacy}} \times 100.$$

Statistical Analysis

Twenty-three drugs common at 3 hospital and private retail pharmacies were selected and their price variation was calculated. Microsoft excel 2007 was used for data entry, and SPSS version 17 was used for the analysis.

Data was presented as percentage, mean and standard deviation. The price of drugs at hospital pharmacies and private retail pharmacies was compared across all 3 locations at 95% confidence interval (CI). Students' *t* test was used for test of significance.

Results

The price variation in three locations is shown in Tables 2 to 5. Highest price variation of 667% was recorded for Amlodipine 5 mg in TUTH. Lowest price variation negative of 14.47% was recorded for Enalapril 5 mg in MCVTC. We observed that the price of cardiovascular drugs varied significantly in TUTH ($P < .001$) and MCVTC ($P < .001$).

In a KII, retailer at private pharmacies in TUTH said:

> *'We know that we have been selling medicines at higher price than hospital pharmacy. The procurement system here in Nepal is lengthy. We seldom buy medicines directly through pharmaceutical companies. We have to go through many channels. In each channel an average 15-20% price is added up (figure 1). In my personal experience, manufacturers make about 32% profit, and super-stockiest makes about 18%, while all other; substockiest; 16%, distributors; 16%, wholesalers makes 16%. This results in high price a customer has to pay for the medicine. I know that this added price is paid off for aggressive advertisements of drugs, gifts to doctors and sponsorship of parties for medical students in teaching hospitals.'*

Table 3. Price Variation at Manmohan Cardio Thoracic Center.

Name of the Drugs	Hospital (NRP)	Retailer (NRP)	Variation, %
Amiodarone 100 mg	7.47	12.00	60.64
Amiodarone 200 mg	13.20	22.00	66.67
Amlodipine 2.5 mg	.95	2.00	110.53
Amlodipine 5 mg	1.16	4.00	244.83
Atenolol 50 mg	1.27	3.00	136.22
Digoxin 0.25 mg	2.47	2.94	19.19
Diltiazem 30 mg	4.69	5.44	15.99
Diltiazem 60 mg	5.74	9.28	61.67
Diltiazem SR 90 mg	12.47	13.76	10.34
Enalapril 2.5 mg	.71	2.00	181.69
Enalapril 5 mg	1.40	4.00	185.71
Frusemide 40 mg	.56	.75	33.93
Hydroclorthiazide 12.5 mg	.91	1.75	92.31
Hydroclorthiazide 25 mg	1.65	3.00	81.82
Isosorbide dinitrate 10 mg	1.19	3.00	152.10
Losartan 25 mg	1.69	5.00	195.86
Losartan 50 mg	3.43	9.00	162.39
Metoprolol 25 mg	1.82	4.00	119.78
Metoprolol 50 mg	2.82	5.00	77.30
Nifedipine SR 20 mg	2.68	5.00	86.57
Propranolol 40 mg	3.08	3.50	13.64
Spironolactone 25 mg	1.22	2.75	125.41
Warfarin 5 mg	3.10	5.50	77.42

NRP = Net Retail Price.

Table 4. Price Variation at Sahid Gangalal Health Care Center.

Name of the Drugs	Hospital (NRP)	Retailer (NRP)	Variation, %
Amiodarone 100 mg	13.37	14.03	4.94
Amiodarone 200 mg	25.08	26.33	5.00
Amlodipine 2.5 mg	1.90	2.00	5.26
Amlodipine 5 mg	4.50	5.00	11.11
Atenolol 50 mg	3.80	4.00	5.26
Digoxin 0.25 mg	2.79	2.92	4.66
Diltiazem 30 mg	5.17	5.44	5.26
Diltiazem 60 mg	8.55	9.00	5.26
Diltiazem SR 90 mg	13.07	13.76	5.26
Enalapril 2.5 mg	1.90	2.00	5.26
Enalapril 5 mg	3.80	3.25	−14.47
Frusemide 40 mg	.67	.85	26.87
Hydroclorthiazide 12.5 mg	1.66	1.75	5.42
Hydroclorthiazide 25 mg	2.85	3.00	5.26
Isosorbide dinitrate 10 mg	1.80	2.00	11.11
Losartan 25 mg	4.75	5.00	5.26
Losartan 50mg	9.50	10.00	5.26
Metoprolol 25 mg	3.80	4.00	5.26
Metoprolol 50 mg	2.42	2.55	5.37
Nifedipine SR 20 mg	4.75	5.00	5.26
Propranolol 40 mg	4.00	4.20	5.00
Spironolactone 25 mg	2.80	7.00	150.00
Warfarin 5 mg	5.22	5.50	5.36

NRP = Net Retail Price.

In KII with hospital pharmacy retailer at TUTH, we asked what makes the drugs cheaper compared to the drugs at private retail pharmacies, he said:

'*We buy drugs directly through tenders. Tenders make us to buy medicines at competitive low price. I think price of drugs is very important issue as this affects the health seeking behavior of patients. So, the government should promote hospital pharmacies to provide drugs at cheaper price. But as of now, we do not have all the cardiovascular drugs. Often patients have to go to private retail pharmacies.*'

Respondent at KII at hospital pharmacy in MCVTC said:

'People come here for cardiovascular and thoracic problems, For which they may have to take medicines for many years. If we charge them ten rupees (about 0.10$) more, this turns out to be millions in ten years.'

The other participants shared that because of irregularity in drug procurement mechanism in hospitals, the pharmacies often lack enough stocks of all medicines and year round availability. Hospital pharmacy usually had high retail of drugs. So procurement delay just for 1 day in hospital pharmacies turns out to be the high expense of patients in buying medicines in private retail pharmacies.

In KII with customers at MCVTC, the respondent said:

'*I know that the price of the drug is high here, but I am forced to do this because the same drug is not available in hospital pharmacy in Manmohan Cardiothoracic and Vascular Transplant Center.*'

Discussion

This study revealed a high variation in prices of cardiovascular drugs in public and private pharmacies in Nepal. We found that price of cardiovascular drugs was significantly higher in private retail pharmacies than in hospital pharmacies in tertiary hospitals.

Such price variation is common in developing countries, where pharmaceutical sectors are poorly regulated.[17,18] Price variation arises largely because of different procurement mechanism in public and private pharmacies. First, procurement is made directly from pharmaceutical companies; the latter has multi-layered procurement mechanism. At each layer, a certain markup is added, resulting in a high price to be paid by the consumers. A study in India showed that a private retail pharmacy's margin was 25% to 30% for branded medicines and 201% to 1016% for branded generic medicines.[19] The price variation in medicine between hospital pharmacy and private pharmacies has been reported in other countries as well such as India, Sri Lanka, Pakistan, Philippines, Malaysia, Peru, Armenia, and Kenya.[14-16] One possible explanation of price variation could be due to ineffective implementation of existing policy, rules, and

Table 5. Test of Significance for Price Variation.

Comparison	*t* value	*P* value	Mean Difference (Lower–Upper)	SD	Mean (Minimum–Maximum)
Retailer at TUTH vs TUTH hospital pharmacy	4.439	.00	195.40 (104.12 to 286.69)	211.09699	195.4048 (6.25 to 667.54)
Retailer at MCVTC vs MCVTC hospital pharmacy	7.438	.00	100.52 (72.49 to 128.55)	64.81391	100.5221 (10.34 to 244.83)
Retailer SGNHC vs SGNHC hospital pharmacy	1.887	.072	12.10 (−1.20 to 25.39)	30.74784	12.0984 (−14.47 to 150.00)

Abbreviations: MCVTC, Manmohan Cardio Thoracic and Vascular Transplant Centre; SD, standard deviation; SGNHC, Sahid Gangalal National Heart Centre; TUTH, Tribhuvan University Teaching Hospital.

regulations for governing private retail pharmacies in Nepal. The manufacturers set the price and register that with Department of Drug Administration (DDA). For most of the drugs, the retailers do not charge a price exceeding maximum retail price printed on the pack. The DDA's role in fixing the price of generic drug is not effective. Their role in scrutinizing the price of common drugs may be largely overlooked. Amidst of increase in cardiovascular morbidity among general population in recent years in Nepal, the government should play proactive role to keep the price of cardiovascular drugs at affordable price.[19] The layers between retailers and manufacturers should be narrowed such that private retailer pharmacies can procure directly from manufacturers so that markups shared between these layers could be reduced.

Our study strongly recommends provision of pharmacy in each public hospital. International Pharmaceutical Federation also recommended for strengthening hospital pharmacy, medicine procurement, medication monitoring, medicine distribution, medicine administration, and developing human resource in pharmacy sector.[20] The DDA should take prompt steps to expand hospital pharmacies in Nepal. This study is the first to explore the price variation in the drugs of CVD. We did not use Health Action International's core drug list because they had very few drugs listed for CVDs, so for studying price variation in drugs of CVD, much detailed listing of commonly used cardiovascular drugs is necessary. We also differed in calculating the price variation in drugs. Earlier study used the price of lowest generic drug as reference drug; however, we used price of all drugs obtained from hospital pharmacies as the price of reference drugs.[9] The hospitals are selected purposively; therefore, the findings might not represent the true price variation in other hospitals of Nepal. Given the existence of high price variation in generic drugs between hospital and private pharmacies, the price variation in non-generic could be still higher. Further research could focus on the price variation in non-generic and generic medicines in large representative samples of hospital and private pharmacies in Nepal.

Conclusion

Significant price variation was observed in the price of cardiovascular drugs in public hospital and private retail pharmacies in Nepal. Prices of most cardiovascular drugs were lower in public hospital pharmacies. Introduction of more public hospital pharmacies may result in savings of out-of-pocket expenditure of patients in Nepal. The DDA should take steps to promote hospital pharmacies in public hospitals and monitor the private ones.

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Authors' Note

NK designed the study and was involved in the field work. SM analyzed the data and prepared the first draft of the article. VK and NS contributed in preparing the final draft of the article.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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