

## Students' Corner

### **A prospective surveillance of drug prescribing and dispensing in a teaching hospital in Western Nepal**

Saurav Ghimire,<sup>1</sup> Sushil Nepal,<sup>2</sup> Sushil Bhandari,<sup>3</sup> Prabha Nepal,<sup>4</sup> Subish Palaian<sup>5</sup>

The School of Pharmaceutical and Biomedical Sciences, Pokhara University, Lekhnath- 12, Kaski,<sup>1-4</sup> Department of Hospital  
and Clinical Pharmacy/ Pharmacology, Manipal College of Medical Sciences, Pokhara,<sup>5</sup> Nepal.

#### **Abstract**

**Objective:** To evaluate the drug dispensing practices and patients' knowledge on drug use among the outpatients and to identify and analyze the problems in drug prescribing and dispensing.

**Methods:** A prospective cross-sectional descriptive study was conducted using World Health Organization (WHO) core drug use indicators from July 13, 2008 to August 15, 2008 in Manipal Teaching Hospital, Pokhara, Nepal.

**Results:** A total of 4231 prescriptions were encountered with the total of 10591 drugs prescribed. The average number of drug per prescription was 2.5. Only 13% (n= 10591) of drugs were prescribed by generic name. Percentage of drug prescribed from WHO model list of Essential drugs, Essential drug list of Nepal and Nepalese National Formulary was 21.7%, 32.8% and 42.3% respectively. Antibiotics and injections encountered were 28.3% and 3.1% respectively. Average cost per prescription was found to be Nepalese Rupees (NRs) 285.99 (US \$ 3.73). Patient knowledge on correct use of drugs and appropriate labeling was found to be 81% and 1.4% respectively. Average dispensing time per prescription was 52 seconds.

**Conclusion:** The finding from current study shows a trend towards irrational prescribing and dispensing. Hence, there is a need for effective intervention programme to encourage the physicians and dispensing pharmacists in promoting more rational drug use (JPMA 59:726; 2009).

## Introduction

Inappropriate drug prescribing is a global problem.<sup>1</sup> Misuse of drugs occur in all countries. The irrational practices are especially common and costly in developing countries. Such practices include; polypharmacy, the use of wrong or ineffective drugs, underuse or incorrect use of effective drugs, use of combination products which are often more costly and offer no advantage over single compounds and common overuse of antimicrobials and injections.<sup>2</sup> Irrational drug use leads to reduction in the quality of drug therapy, wastage of resources, increased treatment cost, increased risk for adverse drug reactions, and emergence of drug resistance.<sup>3</sup> Rational Use of Drug (RUD) requires that patients acquire medications appropriate to their clinical needs, in doses that meet their own requirements, for an adequate period of time, and at lowest cost to them and their community, as defined by World Health Organization (WHO) conference at Nairobi 1985.<sup>4</sup> In a low and middle income country like Nepal, large proportions of the population have limited access to medicines due to poor availability and patients being unable to pay for their prescriptions and not able to buy medicines.<sup>2</sup> Nearly 42% of the health budget is spent on drugs and international donors spend another three times, 80% of medicinal products are imported to Nepal however, the availability of drugs in the health posts and clinics are sporadic resulting into the prevalence of inappropriate drug use.<sup>2</sup> The other issues that complicate the appropriate drug use are remote rural population not accessible to health facilities, and widespread poverty and illiteracy.<sup>2</sup> Although, research has been undertaken on medicine prices, so far there has been insufficient progress in improving medicine affordability and availability for individual patients in many countries.<sup>5</sup>

Drug utilization studies have been done ever since the existence of pharmacy profession. Pharmacy education always stress the following '3Rs' i.e. right drug, right dose and right time and promise to reduce the preventable drug related morbidity.<sup>6</sup> Kafle and Khanal were the first to conduct a study on prescribing practices at private sectors in Nepal.<sup>7</sup> Nancy L Blum highlighted on the immediate need for rationalizing the use of pharmaceuticals and prioritized the need of establishing Drug Information Network in Nepal.<sup>2</sup> Manipal Teaching Hospital (MTH) is continuously serving in Western Nepal with the objective of promoting RUD. In MTH, a Drug Information Centre (DIC) was established in November 2003, since then several initiatives were taken to promote rational use of medicines in the hospital. Some of the initiatives taken were revitalization of the hospital pharmacy, Drug and Therapeutic Committee (DTC), establishment of Medication Counseling Centre (MCC) for the patients, and setting up of pharmacovigilance center.

Drug utilization studies should be done periodically to promote RUD in terms of prescribing and dispensing and also

to evaluate the patients understanding of drug usage.<sup>8</sup> Hence, to give continuation to the effort of promoting RUD we made an attempt to carry out this study with an objective of evaluating the drug dispensing practices and patients' knowledge on drug use among the medical outpatients and to identify and analyze the problems in drug prescribing and dispensing.

## Methods

A prospective cross-sectional descriptive study was conducted for 22 days (July 13, 2008 to August 15, 2008). The study was carried out at the out patient pharmacy (OPP) in MTH. MTH is a 750 bedded tertiary care teaching hospital. The patients visiting are mainly from Pokhara and neighbouring districts Syangja, Baglung, Tanahaun and Parbat. OPP is located in the ground floor of the hospital. The patients visiting Out Patient Department (OPD) come to the OPP with a prescription for getting medicines. There is a separate pharmacy [In Patient Pharmacy (IPP)] on the second floor of the hospital for dispensing medicines to the hospitalized patients.

Patients visiting the OPP with a prescription from hospital OPD were enrolled in the study. A total of 4231 patients were taken during the study period. Follow up visits were counted as separate visits. Hospital accessories and appliances were not counted as drugs.

International Network for Rational Use of Drug (INRUD) encounter form<sup>9</sup> was modified and used for data collection. The INRUD encounter form was divided into prescribing indicator and patient care indicator. Data were collected by researchers (four B. Pharm students) and work division was made accordingly to fill prescribing indicators, dispensing time and quantity of drug dispensed per prescription (the time taken by the dispenser in order to make labeling and giving instructions to the patient was considered as dispensing time). After the medicines were dispensed, envelope labeling was checked and patients were interviewed for their knowledge on the dispensed medicines (i.e. when and how much medicines to be taken). Patient's attendant was interviewed for paediatric patients and patients with mental incompetence. Results were analyzed using Microsoft excel 2003 spreadsheet. The SPSS version 9.0 was used to carryout descriptive statistics.

## Results

A total of 4231 encounters with 10591 drugs were prescribed. Out of them 9763 (92.2%) were dispensed from the OPP. The remaining drugs were either not available in the pharmacy or the patient did not have adequate money to buy them or they had the medication already with them.

Majority of the patients were within the age group 21-

30 years. The mean age of the patients was  $34.68 \pm 19.95$  years.

Among the total 4231 prescriptions, majority were from the Medicine department.

The average number of drugs per prescription was found to be highest in the Obstetrics and Gynaecology department (Table-1).

**Table-1: Average number of drugs per prescription.**

Department	Total number of drugs	Average drug per prescription
Obstetrics and Gynaecology	652	2.9
Medicine	3251	2.8
Otorhinolaryngology	1044	2.7
Dermatology	1373	2.6
Orthopaedics	872	2.4
Psychiatry	741	2.4
Paediatrics	565	2.1
Surgery	385	2.0
Dental	219	2.0
Emergency	45	2.0
Ophthalmology	555	1.9
Medical oncology	19	1.6
Operation theatre	1	1.0
Not mentioned*	869	2.4

\*= the departments were not mentioned in the following prescriptions.

Among the total of 10591 drugs prescribed, antimicrobials were found to be highest accounting 2127 for (20.1%). The details of the therapeutic category of drugs prescribed are listed in Table-2.

Altogether there were 1420 antibiotics prescribed from different departments, among which the Otorhinolaryngology department prescribed more. The details of the antibiotics

**Table-2: Therapeutic category of drugs prescribed (n= 10591).**

Therapeutic classification	Number of drugs	Percentage
Antimicrobials	2127	20.1
Analgesic and anti-inflammatory drugs	1555	14.7
Drugs acting on gastrointestinal system	1149	10.8
Vitamins, minerals and dietary supplements	961	9.1
Drugs acting on central nervous system	941	8.9
Drugs acting on cardiovascular and renal system	838	7.9
Antiallergic drugs	733	6.9
Drugs acting on respiratory system	647	6.1
Dermatological and other topical agents	231	2.2
Ophthalmic preparations	202	1.9
Antiparasitic drugs	163	1.5
Antidiabetic drugs	139	1.3
Antispasmodic drugs	126	1.2
Antiseptic, anti- infectives	114	1.1
Fixed dose combinations difficult to classify	114	1.1
Hormone and hormone antagonists	111	1.0
Oral care preparations	77	0.7
Vaccines	36	0.3
Anticancer agents	17	0.2
Miscellaneous	310	2.9

**Table-3: Encounters with an antibiotic prescribed (n= 1196).**

Departments	Number	Percentage
Otorhinolaryngology	242	62.7
Medicine	219	18.8
Dermatology	128	24.6
Paediatrics	122	46.2
Ophthalmology	109	37.5
Obstetrics and Gynaecology	84	37.0
Surgery	61	31.6
Dental	59	55.1
Orthopaedics	7	1.9
Emergency	6	27.3
Psychiatry	3	1.0
Medical oncology	1	8.3
Operation theatre	1	100
Not mentioned*	154	42.7

\*= the departments were not mentioned in the following prescriptions.

encountered is listed in Table-3.

There were 143 injectables prescribed from different departments. The highest number of injectables were prescribed by Orthopaedics department. The first five injectables prescribed were Triamcinolone (n= 24, 16.8%), Nandrolone (n= 21, 14.7%), Methyl prednisolone (n= 17, 11.9%), Human insulin (n= 15, 10.5%) and Hepatitis B vaccine (n= 14, 9.8).

Cost analysis was done for 3178 prescriptions. Remaining prescriptions were not analyzed because the drugs were either not available in hospital pharmacy or the patients had drugs in their home or they did not have enough money to buy them. Majority of prescriptions 959 (30.2%) had a price less than NRs 100. The mean cost per prescription was NRs  $285.99 \pm 495.75$  (US\$  $3.73 \pm 6.47$ ).

From the total of 4231 patients only 3959 were interviewed for their knowledge on proper use of drugs among

**Table-4: Pattern of WHO core drug use indicators in medical outpatients.**

WHO core drug use indicators	Findings
<b>Prescribing indicators</b>	
Average number of drugs per prescription	2.5
Percentage of drugs prescribed by generic name	13%
Percentage of encounters with an antibiotic prescribed	28.30%
Percentage of encounters with an injection prescribed	3.10%
Percentage of drugs prescribed from National essential drug list	32.80%
Percentage of drugs prescribed from WHO model list of essential drugs	21.70%
Percentage of drugs prescribed from Nepalese national formulary	42.30%
<b>Patient care indicators</b>	
Average dispensing time (seconds)	52
Percentage of drugs actually dispensed	92.20%
Percentage of drugs adequately labeled	1.40%
Percentage of patients knowledge on correct drug dosage	81%

which 3207 had proper knowledge on drug usage. The remaining patients could not be interviewed because they were not willing.

The percentage of appropriately labeled envelope was found to be 1.4% (n= 4231). The overall findings for the WHO core drug use indicators are listed in Table-4.

## Discussion

The results of this study allowed us for an assessment of prescriptions dispensed at MTH. Recently, there has been a rigorous effort to ensure RUD for which WHO has identified specific drug use indicators that include number and cost of drugs, use of generic names in prescribed drugs and adherence to Essential Drug List (EDL).<sup>1,10</sup>

The age distribution of the patients showed that young patients (21-30 years) constituted the highest number visiting the OPD. The previous drug utilization studies done in MTH showed similar results.<sup>8</sup> The reason behind this might be because the younger generations are more conscious about their health issues and also they represent higher proportion of the population.

The gender analysis showed that female patients made more visits (51%) than males (39%). This distribution corresponds to the population census 2001 of Nepal.<sup>11</sup> Nepalese female population being less employed than the male, they can spare their time in making hospital visits. The higher number of female visits especially housewives has been noted in previous studies.<sup>12</sup> Also, many patients from surrounding villages visit the hospital among which the female population being less educated are unaware about their health and hygiene so they are more prone to infections. This might also have contributed to higher number of female visitors to the hospital.

With regard to the average number of drugs per prescription, the value found in the present study was 2.5 which is comparable with the results of Jordan (2.3),<sup>13</sup> Brazil (2.4),<sup>14</sup> and India (2.7).<sup>15</sup> In similar studies conducted, the highest and lowest values found were 3.8 in Nigeria<sup>16</sup> and 1.3 in Ecuador.<sup>16</sup> In the previous study done in MTH average number of drugs per prescription was 2.91.<sup>8</sup> The variation in results may be due to difference in characteristics of health care delivery system, socioeconomic profile, and morbidity and mortality characteristics in the population. Since, WHO has recommended that average number of drug per prescription should be 2.0,<sup>17</sup> the results of our study reflects polypharmacy which may lead to adverse drug reactions, decrease adherence to drug regimens and unnecessary drug expenses. In contrast, since the medical department encountered highest number of prescriptions with a larger number of drugs prescribed for chronic clinical conditions like hypertension, and diabetes, the patients can require more

drugs than as stated by WHO. In such cases polypharmacy can be acceptable.<sup>18</sup>

The percentage of drugs prescribed by generic name was 13% in our study which is less than that reported in studies conducted in Cambodia (99.8%),<sup>19</sup> India (73.4%)<sup>20</sup> and Brazil (30.6%).<sup>21</sup> In similar studies done in Nepal the results obtained were 63.5%<sup>22</sup> and 59%.<sup>11,23</sup> The factor that might have contributed to the low proportion of generic drug prescription is the poor promotion and low production of generic drugs in Nepal. The use of generic names is recommended by WHO and regarded as an important factor for promoting RUD. The use of generic name contributes to cost reduction and provides more alternatives for drug purchases.<sup>14</sup>

In the present study the encounters with antibiotic prescription was 28.3%. The antibiotic prescription is remarkably less than that reported in Sudan (63%), Iran (61.9%),<sup>24</sup> England (60.7%) and Norway (48%).<sup>17</sup> According to WHO, 15-25% of antibiotics encountered is expectable in the countries where an infectious disease is more prevalent.<sup>3,10</sup> However, this result does not indicate that the prescription pattern was better than in other countries since we did not study the clinical condition or diagnosis of the patients.

In our study, the percentage of prescription with an injection encountered was 3.1% which is less than 5.2% reported in MTH in the past.<sup>22</sup> In the studies conducted in Brazil<sup>21</sup> and India<sup>3</sup> the frequency of injections used was 8.3% and 13.6% respectively. Minimum use of injections is preferred and this reduces the risk of infection through parenteral route and cost incurred in therapy.

Our study revealed that the percentage of drugs prescribed from national EDL was 32.8%, that of WHO model list of essential drugs was 21.7% and from the Nepalese National Formulary (NNF) was 42.3%. The possible reason for this lower value could be the prescribers lacking the understanding and importance of essential drug concept and formulary. The low rate of prescribing from national EDL may be contributed by excessive use of antibiotics (Azithromycin, Cefpodoxime etc), antihistamines (Cetirizine, Fexofenadine etc) and several multivitamin preparations which are not included in national EDL. However, it should not be ignored that essential drugs are specially meant for primary health care delivery system, whereas our study was conducted in a tertiary care hospital.

The department wise categorization of prescriptions revealed that the Medicine department had the maximum outpatient visits. The general physicians are assigned their duty in Medicine department and the patients with acute or even chronic ailments first make a visit to this department which might contribute to higher visits. A similar study conducted in the past has revealed that medicine department

has a high outpatient turnover.<sup>8</sup>

We found only 1.4% of prescriptions to be adequately labeled. This shows that there was a slight improvement with respect to the previous study where only 0.4% of medication envelopes were adequately labeled. In a similar study conducted in India the value was 18.5%<sup>20</sup> and Cambodia 0%.<sup>25</sup> Since the pharmacists are actively participating in dispensing of medication, their involvement in providing adequate information to the patient can be judged through this procedure, which was unfortunately found very low. Hence, this low rate of appropriate envelope labeling must be taken as a matter of concern.

The patient's knowledge on correct drug dosage was found to be 81%. Similar study revealed 52.8% in Chennai, India, 55% in Cambodia,<sup>25</sup> 70% in Brazil<sup>21</sup> and 80.8% in paediatric patients in India.<sup>20</sup> Dispensing is the end point of contact between pharmacist and patient or the patient's attendant. At this point it is the duty and responsibility of pharmacist to provide adequate information on proper use of drug. From our study it is evident that the patient had adequate knowledge as compared to the other study, without any restriction in age or gender of the patient or patient's attendants. However, this does not assure that the drug will be correctly used by the patient because no follow up study was conducted.

Our study showed that the average dispensing time was 52 seconds. This time is longer than in India (14.1 seconds),<sup>25</sup> Brazil (18.4 seconds)<sup>21</sup> and Bangladesh (23 seconds)<sup>16,21</sup> and shorter than that which was seen in previous study done in Nepal (86 seconds).<sup>23</sup> We believe this dispensing time to be very low because a pharmacist can hardly explain about the dosage regimen, any side effect of drug therapy and precautions to be taken along with appropriate labeling of envelope in such a short period of time. Also, as per the WHO recommendation the pharmacist should spend at least 3 minutes in orienting each patient<sup>21</sup> which was found to be lacking in our study.

The average cost per prescription was NRs 285.99 (US\$ 3.73) which is higher than that of the study done in Western Nepal by Alam et al., (US\$ 3.26).<sup>8</sup> In a similar study it was found to be US\$ 3.14 in India<sup>15</sup> and US\$ 2.26 in Pakistan.<sup>22</sup> Increase in the cost may be because of low generic or higher brand prescribing and higher average number of drugs per prescription. The other contributing factors may be due to higher prescribing of costlier antimicrobials, antihistamines and multivitamin preparations. With the increase in cost of drug therapy, patient compliance will virtually decrease and the chronic drug users may not adhere to the drug therapy.<sup>1</sup>

### Limitations of the study:

We did not assess the pharmacotherapeutic aspects of

the prescription in relation to health problems or diagnosis of the patients and also did not devise any follow up mechanism to know whether the patient appropriately used the drugs after they were dispensed. The study was conducted in a single hospital and hence cannot be considered as a representative study of Western Nepal. Although the number of patients enrolled in the study was higher, we were limited to seasonal variation as it was conducted in a single season which might influence the morbidity pattern.

### Conclusions

The findings of the present study show trends towards irrational prescribing and dispensing. The average number of drug per prescription was significantly higher than recommended by WHO, generic prescribing was remarkably lower, antibiotics and injections prescribed were considerably higher, prescribing from EDL, WHO model list of essential drugs and NNF was also low and appropriate labeling of envelope was surprisingly low. While other parameters analyzed was found judgemental, the patient's knowledge on correct dosage was found to be fairly good.

### Acknowledgements

We express our appreciation to the Drug Information Center, Manipal Teaching Hospital for assisting us in conducting this research project.

### References

1. Enwere OO, Falade CO, Salako BL. Drug prescribing pattern at the medical outpatient clinic of a tertiary hospital in southwestern Nigeria. *Pharmacoepidemiol Drug Saf* 2007; 16: 1244-9.
2. Blum NL. Drug Information Development. A Case Study Nepal. Rational Pharmaceutical Management Project. United States Pharmacopoeia. (Online) 2000. Available from URL: <http://www.usp.org/pdf/EN/dqi/nepalCaseStudy.pdf>.
3. Bharti SS, Shinde M, Nandeshwar S, Tiwari SC. Pattern of prescribing practices in the Madhya Pradesh, India. *Kathmandu Univ Med J* 2008; 6: 55-9.
4. WHO. The Rational Use of Drugs. Report of a Conference of experts Nairobi, 25-29 November 1985.
5. Gelder S, Ewen M, Noguci N, Laing R. Price: Availability and affordability- an international comparison of chronic disease medicines. World Health Organization and Health Action International. Cairo, 2006, pp 7.
6. Fulda TR, Lyles A, Pugh MC, Christensen DB. Current status of prospective drug utilization review. *J Manag Care Pharm* 2004; 10: 433- 41.
7. Kafle KK, Khanal DP. Prescribing Practices at Private Sectors in Nepal. *J Inst Med* 1995; 17: 147-8.
8. Alam K, Mishra P, Prabhu M, Shankar PR, Palaian S, Bhandari RB, et al. A study on rational drug prescribing and dispensing in outpatients in a tertiary care teaching hospital of Western Nepal. *Kathmandu Univ Med J* 2006; 4: 436- 43.
9. INRUD (2002) Eleventh National Training course on Rational use of Drugs. pp 19.
10. WHO. How to investigate drug use in health facilities: selected drug use indicators. 1993, Geneva.
11. INRUD. District drug use and health profile. International Network for Rational Use of Drugs-Nepal. 2nd ed. Kathmandu: 2004; pp 2, 28, 31, 60.
12. Lamichhane DC, Giri B, Pathak O, Panta O, Shankar P. Morbidity profile and prescribing patterns among outpatients in a teaching hospital in western Nepal. *Mcgill J Med* 2006; 9: 126-33.
13. Otoom S, Batieha A, Hadidi H, Hasan M, Al- Saudi K. Evaluation of drug use in Jordan using WHO prescribing indicators. *East Mediterr Health J* 2002; 8: 537-43.
14. Acurcio FA, Perini E, Magalhaes SM, Terceiro LG, Vieira Filho JM, Coutinho

- KE, et al. Analysis of medical prescriptions dispensed at health centers in Belo Horizonte, Minas Gerais, Brazil. *Cad Saude Publica* 2004; 20: 72-9.
15. Mhetre NA, Bodhankar SL, Pandit VA, Zambare GN. Study of pattern of drug usage in an urban area. *Indian J Pharmacol* 2003; 35: 316-7.
  16. Hogerzeil HV, Bimo, Ross-Degnan D, Lang RO, Ofori-Adjei D, Santoso B, et al. Field tests for rational drug use in twelve developing countries. *Lancet* 1993; 342: 1408-10.
  17. Sharif SI, Al-Shaqra M, Hajjar H, Shamout A, Wess L. Patterns of Drug Prescribing in a Hospital in Dubai, United Arab Emirates. *LJM, AOP* 2007; 070928: 10-2.
  18. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, et al. The Seventh Report of the Joint National Committee, on Prevention, Detection, Evaluation and Treatment of High Blood Pressure: the JNC 7 report. *J Am Med Assoc* 2003; 289: 2560-72.
  19. Chareonkul C, Khun VL, Boonshuyar C. Rational drug use in Cambodia: study of three pilot health centers in Kampong Thom Province. *Southeast Asian J Trop Med Public Health* 2002; 33: 418-24.
  20. Karande S, Sankhe P, Kulkarni M. Patterns of prescription and drug dispensing. *Indian J Pediatr* 2005; 72: 117-22.
  21. Pereira JC, Baltan VT, deMello DL. (National Health Innovation System: relations between scientific fields are economic sectors). *Rev Saude Publica* 2004; 38: 1- 7.
  22. Shankar PR, Pranab KS, Upadhyay DK, Dubey AK, Subish P. Drug Utilization Among Surgical Outpatients. *TMJ* 2006; 56: 230- 4.
  23. Kafle KK, Shrestha N. Drug use indicators study in Surkhet district in Nepal. Health Development Project (HDP). May 1992.
  24. Moghadamnia AA, Mirbolooki MR, Aghili MB. General practitioner prescribing patterns in Babol city, Islamic Republic of Iran. *East Mediterr Health J* 2002; 8: 550-5.
  25. Sutharson L, Hariharan RS, Vamsadhara C. Drug utilization study in diabetology outpatient setting of a tertiary hospital. *Indian J Pharmacol* 2003; 35: 237-40.
-