Original Article

Morbidity and Drug Prescription Audits of General Medicine OPD using WHO Prescribing Indicators in Province 1, Nepal

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ABSTRACT

Background: Periodic assessment of morbidity and drug use at various levels of the healthcare delivery system is important to recognize common prevalent morbidities and rationalize the use of medicines. The study was conducted to determine the common morbidities and audit prescription of general medicine outpatients using the WHO prescribing indicator in government-operated tertiary care zonal hospitals of eastern Nepal.

Methods: A cross-sectional study was carried out in two government zonal hospitals of Province 1, Nepal, between March 2019 to August 2019. For analysis, descriptive statistics were used to evaluate prescription characteristics. Prescribing characteristics were evaluated using recommended guidelines of the World Health Organization (WHO) prescribing indicators. Bivariate analysis was performed to compare prescription characteristics between hospitals. P<0.05 was considered statistically significant.

Results: Six hundred prescriptions were analyzed. The most prevalent morbidity was endocrine, nutrition & metabolic diseases (21.5%) followed by diseases of the respiratory system (19.8%), circulatory system (17.6%), and digestive system (12.8%). The most frequently encountered individual disease entity were hypertension (18.7%), diabetes (15.5%), acid peptic disorders (14%). A total of 2072 drugs were prescribed with an average of 3.45 (± 1.39) drugs per consultation. About 30.2% of prescriptions encountered contain at least one antibiotic, whereas injectables were prescribed in 1.8%. Only 3.9% of total medicines were prescribed in generic name and 31.7% of drugs prescribed were from essential medicine list. Bivariate analysis showed that there was a significant difference in prescription encounters with antibiotics and generic prescribing between the two hospitals (p < 0.001).

Conclusion: Among the prescriptions evaluated, diseases of the endocrine, respiratory, cardiovascular, and gastrointestinal systems were the most common morbidities. Polypharmacy was prevalent to some extent whereas prescribing in generic and essential medicine lists was poor relative to standard WHO recommendations. However, the overall prescribing of antibiotics and injection was found to be satisfactory.

Keywords: Morbidity profile, prescribing pattern, WHO Core Prescribing indicators, generic prescribing, Essential medicine list

INTRODUCTION

World Health Organization Southeast Asia Region (WHO SEAR) consists of one-fourth of the world's population, which has about 30% of the global burden of disease, and the highest proportion of global mortality (26%).[1,2] Since the last few decades, Nepal has had an epidemiological transition from communicable diseases to non-communicable diseases (NCD), which contributes to increasing morbidities and mortalities. According to the report of Nepal burden of Diseases 2017, NCDs was responsible for two-thirds (66%) of all mortality, with injuries accounting for 9% and remaining 25% of all death was due to communicable, maternal, neonatal, and nutritional (CMNN) disease or disorders.[3] Periodic morbidity profile assessment in the population may contribute to the setting of priorities diseases, mobilization of scarce resources, and development of need-based disease control programs.[4] Similarly, studies on prescribing patterns are essential to estimate the patterns of drug use and patient's exposure to medicine. It is also an important means of assessing the rational use of drugs.[5,6] Province 1 is the easternmost province of Nepal, consisting of about 17.5% of the country's total area. There are around 4.5 million people in the province, with a population density of 175.6 per square kilometer.[7] The government is providing secondary and tertiary level health care facilities to the population through 18 public hospitals located in various areas of this province, out of which two zonal hospitals (namely Koshi and Mechi zonal hospitals) provides specialized tertiary care health services and also serve as referral centers for other government hospitals.[8] However, there is scares research to assess the prescribing practice in these zonal hospitals of province 1 of Nepal. Therefore, this study was undertaken to determine the morbidity and prescribing pattern in government tertiary hospitals of Province 1, Nepal.

MATERIALS AND METHODS

A cross-sectional study was carried out among the general medicine outpatients of two government-run tertiary hospitals (namely, Koshi Hospital, Biratnagar, Morang, and Mechi Hospital, Bhadrapur, Jhapa,), also known as zonal hospitals of province 1, Nepal in between March to August 2019. Both hospitals provide specialized healthcare services in eastern Nepal. Each day around 50-100 patients visit the medicine OPD departments of both the hospital for their disease consultation. The study population consisted of primary outpatients of either sex visiting the general medicine outpatient department of hospitals. Pediatric patients, patients coming for Directly Observed Treatment Short-course (DOTS), leprosy, pregnant and lactating women, patients for prophylaxis, immunization, chronically ill patients requiring in-patients care or admission, and those who were not willing to participate in the study were excluded from the study. As per WHO, the evaluation of 600 prescriptions would be sufficient for assessing the prescribing pattern.[9] Therefore, a sample size of a total of 600 prescriptions (300 prescriptions from each hospital) was taken for evaluation. Patients were selected using a systematic random sampling technique. Data collection tools were developed as per the study objectives considering the World Health Organization-International Network on Rational Use of Drugs (WHO-INRUD) detail drug use record form.[9]

The data collection tool was designed as such to record information on general demographic details of patients, health problem description (diagnosis), and prescription details (include the drug name of individual medication prescribed). The data were collected from selected patients who had received the prescription from the physician after consultation, in the hospital outpatient area. However, the prescriber was not made aware of the study objectives. The patient's prescription was reviewed after taking their consent to participate in the study. In instances where patients are reluctant to give sufficient time for recording data, a digital or printed copy of prescriptions was taken and then transformed into a data collection form. Ethical approval was taken from the ethical review board of Nepal Health Research Council (ref no 2770; Reg no: 137/2019) and written informed consent was obtained from each patient before data collection. The collected data were later entered in MS EXCEL until the data of estimated sample size were obtained from the study center and final analyses were performed using SPSS. version 16. Data about morbidity, an individual prescription encounter with at least one antibiotics and injection were coded as "1" for present "0" for absent (categorical variables) whereas a total number of drugs prescribed, drug prescribed in generic and essential medicine list was recorded in number (continuous variables). For comparison, both hospitals were coded anonymously as "Hospital 1" and "Hospital 2" for ethical reasons. Continuous variables were expressed as the mean (standard deviation) or median (Inter Quartile Range), and categorical variables were summarized as the counts and percentages in each category for assessing morbidity. Bivariate analysis using Mann Whitney

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test for continuous non-normally distributed variables and chi-square test for categorical variables were used to compare prescription characteristics of two hospitals. P-value <0.05 was considered statistically significant. The morbidity pattern was classified based on the tenth revised version of the International Classification of Disease (ICD-10) criteria[10]. Prescribing characteristics were evaluated for the number of drugs prescribed, the percentage of drugs prescribed with a generic name, the percentage of encounters with at least one antibiotic, percentage of encounters with injection, and the percentage of drugs prescribed from EDL[11] following guidelines outlined under evaluating core prescribing indicators provided by WHO as follows [9]:

- The average number of drugs per encounter was calculated by dividing "total number of drugs prescribed by the total number of encounters surveyed"

- Percentage of drugs prescribed by generic name was calculated by taking "total number of drugs prescribed by generic name divided by the total number of drugs prescribed, multiply by 100".

- Percentage of encounters with an antibiotic prescribed was obtained using "total number of patient prescription encounters with antibiotic prescribed divided by the total number of encounters surveyed, multiply by100".

- Percentage of encounters with an injection prescribed was measured by taking "total number of patient prescription encounters with an injection prescribed divided by the total number of encounters surveyed, multiply by 100".

- Percentage of drugs prescribed from essential drug list was calculated by dividing, "total number of drugs prescribed that conforms with national essential drug list divided by the total number of prescribed drugs, multiply by100

RESULTS

Six hundred prescriptions (300 each from each hospital) were collected from 288 (48%) male and 312 (52%) female patients. The median age of the patients was 48 years with an Inter Quartile Range (IQR) of 30 years. Among them, 525 (87.5%) patients were diagnosed with a single disease, while 75 (12.5%) of patients had one or more comorbidities.

The most prevalent morbidity was endocrine, nutrition & metabolic diseases (21.5%) followed by diseases of the respiratory system (19.8%), circulatory system (17.6%), and digestive system (12.8%). Besides, diseases of the musculoskeletal system and connective tissues, and certain infections and parasitic diseases, account for 4.9% and 2.7% respectively. More details are given in Table 1.

The most frequently encountered morbidity, described as an individual disease entity is shown in Table 2. It indicates that more than half of the total patients were diagnosed with non-communicable/ non-infectious diseases like hypertension (18.7%), diabetes (15.5%), acid peptic disorders (14%), thyroid disorders (6%), etc. In the infectious cause of illness, upper respiratory infection (9.5%), urinary tract infection (7%), lower respiratory tract infections (6.3%) were most prominent.

Prescription evaluation using WHO Core Prescribing indicators.

A total of 2072 drugs were prescribed in 600 prescriptions analyzed. An average of 3.45 (± 1.39) (median 3 (IR 1-11)) drugs per consultation were prescribed. About 30.2% of prescription encounters were prescribed with at least one antibiotic, whereas prescription containing injectable was found in 1.83% of all encounters. About 3.9% of drugs were prescribed in generic and 31.7% out of total drugs prescribed appeared on the essential medicine list (Table 3). Comparison of WHO Prescribing indicator of individual hospitals using bivariate analysis shows that prescription encounters with antibiotics were significantly higher at hospital "1" as compared to hospital "2" (p < 0.001) whereas generic prescribing was more in hospital "2" which was significant in comparison to hospital "1" (p <0.001) (Table 4).

Prescription containing antibiotics and Injection

A total of 210 antibiotics were prescribed among total prescription encounters with antibiotics. Azithromycin (28.6%), Amoxycillin/Clavulanic acid (Potassium clavulanate) (20.6%), cefixime (8.6%) plain or in combination with Clavulanic acid salts (6.7%) and Nitrofurantoin (7.1%), were the most commonly recommended antibiotics (Table 5). Whereas, only 11 prescription encounters contain injectable mainly consisted of insulin (65%), followed by few prescriptions containing injectable antibiotics (cephalosporin's/aminoglycosides), corticosteroids (hydrocortisone), acid inhibitors (PPIs), and antiemetic (ondansetron).

Table 1: Morbidity profile of patients as per ICD-10 criteria

Code	Description	Frequency (%)	Diseases (frequency)
A00-B98	Certain infectious and parasitic diseases	19 (2.7)	Gastroenteritis (10), Mycoses (4), Helminthiasis (5)
C00-D48	Neoplasms	2 (0.3)	Fibroadenoma (2)
D50-D89	Disease of blood and blood forming organs	5 (0.7)	Anaemia (5)
E00-E90	Endocrine, nutritional and metabolic diseases	150 (21.5)	Diabetes (93), Thyroid disorder (36), Dyslipidemia (21)
F00-F99	Mental and behavioral disorder	13 (1.9)	Anxiety (11), Depression (2)
G00-G99	Diseases of nervous system	1 (0.1)	Epileptic seizure (1)
I00-I99	Diseases of circulatory System	123 (17.6)	Hypertension (112), ischemic heart diseases (8), Rheumatic Heart disease (2), Congestive heart failure (1)
J00-J99	Diseases of respiratory System	138 (19.8)	Chronic Obstructive Pulmonary Disease (COPD) (19), Asthma (12), Upper respiratory tract infection (URTI) (57), Lower Respiratory Tract infection (LRTI) (38), Common cold (8) , Allergic rhinitis (4)
K00-K99	Diseases of digestive system	89 (12.8)	Acid peptic disease (84) , Hemorrhoids (3) Inflammatory bowel syndrome (IBD) (1), Pain abdomen (1)
L00-L99	Diseases of Skin and Subcutaneous tissue	1 (0.1)	Urticaria (1)
M00-M99	Diseases of musculoskeletal system and connective tissue	34 (4.9)	Musculoskeletal pain (28), Gout (3), Arthritis (3)
N00-N99	Diseases of genitourinary system	70 (10)	Hyperplasia of prostrate (23), Urinary tract infection (42), Pelvic inflammatory disease (3), Premenopausal syndrome (2)
R00-R99	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	47 (6.7)	Fever (20), Dizziness /Headache (26), Malaise and Fatigue (1)
S00-T98	Injury, poisoning and certain other consequences of external causes	6 (0.9)	Wound/Injury (6)
	Total	698 (100)	All disease entity 698

Table 2: Ten most prevalent individual disease entity among general outpatient's (N=600)

Morbidity	Number of Patients (n)	Percentages (%)
Hypertension	112	18.7
Diabetes Mellitus	93	15.5
Acid peptic diseases	84	14
Upper respiratory tract infection (URTI)	57	9.5
Urinary tract infection (UTI)	42	7
Lower respiratory tract infection (LRTI)	38	6.3
Thyroid disorders	36	6
Musculoskeletal pain	28	4.7
dizziness /headache	26	4.3
Hyperplasia of prostate	23	3.8

Table 3: WHO core prescribing indicators summary (N= 600)

Prescribing indicators	Total drugs / encounter	Average ±SD (median)/ percentage	Recommended WHO standard [12]
Average number of drugs per encounter (SD)	2072	3.45±1.39 (3)	<2
Percentage of encounters with an antibiotic prescribed	181	30.2 %	≤30%
Percentage of encounters with an injection prescribed	11	1.8%	<20%
Percentage of drugs prescribed by generic name	82	3.9%	100%
Percentage of drugs prescribed from essential drugs list	657	31.7%	100%

Table 4. Comparison of WHO Prescribing Indicator of two hospitals (N=300)

Prescribing indicators	Hospital 1	Hospital 2	p-value*
Average number of drugs per encounter (SD)	3.48 (±1.32)	3.43 (±1.47)	0.290
Percentage of encounters with an antibiotic prescribed	39.3 %	21 %	< 0.001
Percentage of encounters with an injection prescribed	2 %	1.7%	0.761
Percentage of drugs prescribed by generic name	0.3 %	7.7 %	<0.001
Percentage of drugs prescribed from essential drugs list	29.9 %	33.6%	0.340

*P-value calculated by using Mann Whitney test for median for continuous non-normally distributed variables and chi-square test for categorical variables. P-value <0.05 shows statistical significant.

Table 5: Most commonly prescribed antibiotics (N=210)

Antibiotics	Frequency (n)	Percentage (%)
Azithromycin	60	28.6
Amoxycillin / Clavulanic acid	43	20.5
Cefixime	18	8.6
Nitrofurantion	15	7.1
Cefixime / Clavulanic acid	14	6.7
Levofloxacin	9	4.3
Cefodoxime /Clavulanic acid	9	4.3
Ofloxacin	8	3.8
Clarithromycin	7	3.3
Amoxicillin	6	2.8
Ciprofloxacin	5	2.4
Others	16	7.6

DISCUSSION

In this study, we found that more than half of the total patients have non-communicable diseases, many of non-infectious nature of endocrine, cardiovascular and gastrointestinal system diseases. This demonstrates that chronic non-communicable diseases are a growing cause of morbidity in the population. A similar study conducted previously in the teaching hospital of western Nepal also reported communicable diseases as the major diagnosis at outpatient departments.[13] The potential of higher detection of non-communicable diseases may be attributed due to the epidemiological transition of communicable diseases to non-communicable diseases. The development of effective medicine, combined with active disease prevention measures over the last few decades, may be the primary reason

for this shift of disease and morbidity profile in the population.[14] Another explanation for these spikes of non-communicable diseases could be the result of increasing urbanizations and changing lifestyles of most people in urban areas.

Similarly, the most common recorded morbidities were hypertension (18.7%), diabetes (15.5%), acid peptic disorders (14%), upper respiratory tract infections (9.5%), urinary tract infections (7%), lower respiratory tract infections (6.3%), etc. According to the annual report 2074/75 of the department of health Services of Nepal, about 91 % of hospital patients were found admitted due to non-communicable diseases. [15] The finding of our study also agree with the study in a private tertiary care hospital in Bangladesh where the most prevalent morbidity was diabetes mellitus, hypertension, urinary tract infections, upper respiratory tract infections, acid peptic diseases, and hypothyroidism.[4] Similarly, a survey in India also identified respiratory, circulatory, digestive, and endocrine problems to be the most frequent cause for visiting a healthcare practitioner. [16]

The average number of drugs prescribed per prescription was 3.45 (SD 1.39). This value is higher than the recommended optimal value (<2).[12] Related findings have been seen in a recent study in district hospital (3.2) [17] and central Nepal teaching hospital (5.85) [18]. Polypharmacy was also reported in similar studies conducted in hospitals of Bahawalpur, Pakistan (2.8) [19], Uttar Pradesh, India (2.9) [15], Lucknow India (2.91)[16], Faridpur city, Bangladesh (4.14)[17], Iran (2.06-3.68) [18]. This shows that prescription consisting of polypharmacy is a unique problem, particularly in developing countries. Polypharmacy may increase the cost of medication, drug-drug interactions, poor patient compliance, and adverse drug reactions. The reason for polypharmacy may be due to the symptomatic treatment approach, lack of standard treatment guidelines, patient preference, consequences of pharmaceutical marketing, or the existence of multiple comorbidities in patients. [19]

In this study, the overall percentage of encounters with an antibiotic prescribed was 30.2%, which is close to the reference optimal value of ≤30 %.[12] In a previous study conducted in hospitals of Nepal and other countries both higher and lower values were reported, 37.9% in central Nepal [18], 26.4% in western Nepal [20], 51.5% in Bahawalpur, Pakistan [21], 46.7% in south Ethiopia [22], 57.8% in eastern Ethiopia [23]. In our study, Hospital 1 had a significantly higher number of prescriptions containing antibiotics encounters than Hospital 2 (p<0.001). Rational prescribing

of antibiotics is important since the abuse and overuse of existing antimicrobials not only adds to the emergence of antimicrobial resistance but also induces treatment inefficiency, hospitalization, extended hospital days stay, and increase healthcare costs.[24] In our study, Macrolides, penicillin's, Cephalosporin's, and fluoroquinolones were most commonly prescribed among antimicrobials. This finding was similar to findings obtained at other hospitals in central Nepal.[17,18]

In this study, the number of prescriptions encountered with injection was low (1.8%). Recent studies conducted in hospital outpatients in Kathmandu, Nepal (1.5)[25], central Nepal (0.7)[18] also reported lower values of injectable been prescribed. However, a survey performed in hospitals of south Ethiopia (38.1%) [26] and Iran (41%) [27] has shown higher rates of injectable encounters in prescriptions. Lower use of non-parenteral preparation might be due to its easy administration, convenience, and cost-effectiveness as compared to injectable. Other factors may be that the use of non-parenteral preparation may be favored by outpatients as injection requires trained personnel for its administration. This inference can be established comparing with study results in hospital inpatients settings where comparatively higher injectable encountered values were reported.[28,18]

Drugs prescribed by generic name was 3.9% which was similar to the study conducted in outpatients of district hospital (2.9%)[17] and tertiary hospital (3.4%) of Kathmandu, Nepal[25] but was very low as compared to the reports of one survey conducted in other districts hospitals from various eco-development regions of Nepal (47.98%).[29] Our findings also contrast with a study conducted in Bahawalpur, Pakistan (56.6%)[21], Zambia (56.9%)[30], and South Ethiopia (98.7%)[26], Eastern Ethiopia (90.61%)[23] were higher generic prescribing was reported. In our study, generic prescribing was significantly higher in Hospital "2" (7.7%) as compared with Hospital "1" (0.3%) (P<0.001). WHO recommends 100% of generic prescribing as ideal.[12] The influence of pharmaceutical firms, prescriber trust in specific drug brands, poor law enforcement, and inadequate oversight by regulatory authorities could be the possible factors influencing non-generic prescribing in our study. Generic prescribing is recommended as it reduces dispensing errors, avoids the wrong drug prescribing due to difficulty remembering brands or errors due to sound-alike brands while improving the overall availability and cost-effectiveness of medicines.

Subsequently, 31.7% of the drug was prescribed from the essential drug list (EDL). This finding was higher than previous results in central Nepal (21.3%)[18] and India (22.57%).[31] However, the value obtained in our study was lower than the WHO recommended value (100%) and that found in other government district hospitals of Nepal (56.54%).[28] Likewise, prescribing from EDL was encouragingly seen in South Ethiopia (94.1%)[21], Zambia (95.9%)[30] and Bahawalpur Pakistan (98.8%).[20] EDLs are prepared considering safety, quality, cost-effectiveness, and an evidence-based approach. Prescribing and utilization of these medicines are encouraged to improve the quality of use of medicine particularly in developing countries.[32] In our research, low prescribing from essential drug list may be attributable to lack of prescriber awareness about essential medicine, unavailability of hospital formulary, poor regulation, and promotional influence of the pharmaceutical company.

Limitation: we used WHO prescribing indicators to assess prescription characteristics, which quantify the magnitude and baseline problem of drug use, however, it doesn't analyze the reason for such problem. Moreover, this study was conducted in a single season and similar geographical areas, so morbidity profile may be influenced due to the seasonal variation or geographical regions of study.

CONCLUSION

Among the prescription evaluated, diseases of the endocrine, respiratory, cardiovascular, and gastrointestinal systems were the most common morbidities. Polypharmacy was prevalent to some extent, whereas prescribing in generic and essential medicine list was poor as compared to the WHO recommended standard and requires needs of significant improvement. On the other hand, prescribing antibiotics and injections was found to be satisfactory. Interventional and awareness program for generic prescribing and essential medicine use is imperative to ensure an optimal prescribing standard in this areas.

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