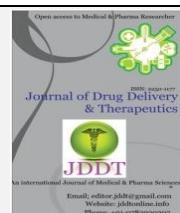


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Research Article

## Prescription auditing based on World Health Organization (WHO) prescribing indicators: a case of Dilla University Referral Hospital

Nigatu Addisu Bekele <sup>1\*</sup>, Jarsso Tadesse<sup>2</sup><sup>1</sup>Lecturer of Clinical Pharmacy, Department of Pharmacy, Dilla University, Dilla, Ethiopia; P.O.Box: 13;<sup>2</sup>Assistant Professor of Internal Medicine, School of Medicine, Dilla University, Dilla, Ethiopia; P.O.Box: 52

### ABSTRACT

**Introduction:** Rational use of drugs requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, at the lowest cost to them and their community. The issues of irrational use of medicines is global and that a global approach coordinated by WHO with more vigorous implementation of leadership and evidence based advocacy of rational use of medicine is essential

**Materials and Methods:** Cross-sectional descriptive and quantitative study was conducted at Dilla University Referral Hospital to determine the current prescribing practices. 1440 prescriptions were selected using systematic random sampling and reviewed retrospectively for a 2-year period from September 01/2016 to August 31/ 2018 using prescriptions and Prescription registry.

**Results:** The average number of drugs prescribed per prescription was 1.813 ranging from 1 and 6. 1437(99.79%), 1287(89.38%), 1392 (96.67%), 1428 (99.17%) and 0(0%) of the analyzed prescriptions had name of the patient, date, medical record number, age and address of the patients respectively. Antibiotic and injection was prescribed in 842(58.47%) and 94(6.53%) of encounters respectively. The Percentage of drugs prescribed by generic name and from an essential drug list was 85.33% (n=2227) and 97.43% (n=2543), respectively. Of the total 2610 drugs, 2431(93.14%) drugs were actually dispensed.

**Conclusion:** Polypharmacy, percentage of encounters with injection and percentage of drugs from essential drug list was within acceptable range. The prescribing practice for antibiotics and generic medicines shows significant deviation from WHO.

**Keywords:** Prescription auditing, WHO prescribing indicators, Dilla University Referral Hospital.

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### \*Address for Correspondence:

Nigatu Addisu Bekele, Lecturer of Clinical Pharmacy, Department of Pharmacy, Dilla University, Dilla, Ethiopia; P.O. Box: 13;

### INTRODUCTION

Rational use of drugs is based on use of right drug, right dosage at right cost which is well reflected in the world health organization (WHO) definition: "Rational use of drugs requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, at the lowest cost to them and their community"<sup>1</sup>. Worldwide more than 50% of all medicines are prescribed, dispensed or sold inappropriately and failure to prescribe in accordance with clinical guidelines is one of the common types of irrational medicine use<sup>2</sup>. The issues of irrational use of medicines is global and that a global approach coordinated by WHO with more vigorous implementation of leadership and evidence based advocacy of rational use of medicine is essential<sup>3</sup>. Every country has its own standards for the minimum information required for a prescription, and its own laws and regulations to define

which drugs require a prescription and who is entitled to write it. Name, signature and address of the prescriber, date of the prescription, name and strength of the drug, dosage form and total amount of the drug, name, age, sex and address of the patient should be included<sup>4</sup>.

Following the formation of International Network for the Rational Use of Drugs (INRUD) to conduct multidisciplinary intervention research to promote the rational use of medicines in 1989, WHO and INRUD designed standard methodology for selected drug use indicators in health facilities in 1993 in which only a small number of core indicators are recommended and they are highly standardized and grouped as prescribing indicators (five standards), Patient care indicators (five standards) and Facility indicators (two standards)<sup>5,6</sup>. Average number of items per encounter should be limited minimize the effect of polypharmacy and WHO recommends the prescription to be generic and from EML or formulary<sup>7</sup>. In Ethiopia,

regardless of the tremendous improvement in the pharmaceutical sector over the past years, there is still the need to emphasize the setting up of appropriate system to monitor the rational use of medicines regularly<sup>8</sup>.

## METHODS

The study was conducted at Dilla university referral hospital, Dilla town, south Ethiopia with the catchment population of nearly 2 million people. Well-trained pharmacy personnel collected data on prescribing indicators retrospectively by using prescriptions and prescription registry. As per WHO document recommending on sample size to be used in such studies to be at least 600 encounters<sup>9</sup>, in our study, more than 1,440 encounters were collected retrospectively from more than 57,000 prescriptions written for a 2-year period from September 01/2016 to August 31/ 2018.

This indicator study is restricted to encounters of ambulatory patients of all categories of diseases and age groups and were critically analyzed. The sample was selected using a systematic random sampling method, and the sampling unit was patient encounters taking place at the outpatient department for the treatment of acute and chronic illness. All data in the ordinary prescribing indicator recording form were first analyzed manually and then using Microsoft Excel 2007. In the statistical analysis, frequencies, averages and percentages were obtained.

## RESULTS AND DISCUSSIONS

A total of 2,610 individual drugs were prescribed for 1440 drug encounters, giving an average of 1.813; and the range of drugs per encounter varied from 1 to 6. It is nearly within the standard (1.6-1.8) of WHO recommendation<sup>7</sup> and acceptable. It is also in line with similar study conducted in different parts of the country, Hawassa University Hospital (1.9) in South Ethiopia<sup>10</sup>, Bahirdar Hospital (1.8) in North Ethiopia<sup>11</sup>. Compared with our studies, in the study of drug use patterns in different developing countries, the average number of drugs per encounter was high in tertiary care hospital (8.8) Ambala, Haryana<sup>12</sup>, Guru Gobind Singh Government Hospital

(6.49)<sup>13</sup> of India, Saudi Arabia(2.4)<sup>14</sup> and Ayder Referral Hospital of Northern Ethiopia (2.61)<sup>15</sup>. The average number of drugs per encounter in our case is higher than that of Gondar Hospital (0.98)<sup>11</sup> and adama(1.2)<sup>16</sup>. A high average number of drugs might be due to financial incentives to prescribers to prescribe more as a result of repetitive and continuous promotion by suppliers, lack of therapeutic training of clinicians, or shortage of laboratory investigation resulting in empirical therapy. The low values might mean there is constraint in the availability of drugs, or prescribers have appropriate training in therapeutics.

Among these 1440 prescriptions, 1437(99.79%) of them had names of the patients while none of them recorded patient address. At same time, 1287(89.38%), 1392 (96.67%) and 1428 (99.17%) of the analyzed prescriptions recorded date, medical record number and age of the patients respectively. [Table 1]

Prescribers' adherence to basic prescription writing protocol was assessed in this study. Regarding to prescription orders containing patient information, prescribers' adherence ranges from 0% for prescriptions with no records about patients' weight to 99.79% of the prescriptions with patients' names which is comparable with a study carried out in Ayder referral hospital, northern Ethiopia in which it is 1.04% and 100% respectively<sup>15</sup>. The percentages of encounters with patient name is also comparable with the study in Adama(98.00%)<sup>16</sup>.

Among the important patient related parameters which are useful for tracing for lost ones in the medical follow-up, MRN and patient address is documented in 96.67% and 0% respectively.

Our findings are better than the studies in different parts of the country in these regard showing that (94.5%)<sup>15</sup> and (17.18%)<sup>17</sup>. Such varieties of findings within the same country may be due to individual hospitals practice, the role of DTC in rational drug use. But prescribers have to be awarded the importance of patient tracing parameters.

Table 1: The number and percentage of prescription orders containing patient related information in Dilla University Referral Hospital, 2018 (N=1440).

| Variables                   | Number and percentages (%) |
|-----------------------------|----------------------------|
| Name of the patient         | 1437(99.79)                |
| Sex                         | 1434(99.58)                |
| Age                         | 1428(99.17)                |
| Medical Record number (MRN) | 1392(96.67)                |
| Weight                      | 15(1.04)                   |
| Address                     | 0(0.00)                    |

Prescribers' information showed that 1140(79.17%), 525(36.46%) and 1347 (93.54 %) of the prescription orders completed the names of the prescribers, educational qualifications and signatures in the order given. None of the prescribers wrote their address on prescriptions

As to the information related with drugs, 2479(94.98%), 2430(93.10%), 2408(92.26) and 1924(73.72%) and of prescriptions indicated the doses, routes of administration, frequency of administrations and duration of treatments (Table 2).

Drug related information such as dose, frequency of administration and duration of treatments are key information helping pharmacists dispense the right drug of right dose at right time for the optimal therapeutic outcome. Our study revealed that all parameters of these regard are below the standard, needing further effort to optimize. It is also below the study conducted in Ayder referral hospital<sup>15</sup>, but by far better than the study conducted in Jimma University Specialized Hospital<sup>17</sup>. Such differences may be due to prescriber's commitment and practice, difference in enforcement by Drug and Therapeutics Committee (DTC) and pharmacy personnel.

Table 2: The number and percentage of prescription orders containing drugs with some important drug information and other relevant parameters in Dilla University Referral Hospital, 2018.

| Variables                              | Number and percentages |
|----------------------------------------|------------------------|
| Drugs with dose                        | 2479(94.98 %)          |
| Drugs with routes of administration    | 2430(93.10%)           |
| Drugs with frequency of administration | 2408(92.26)            |
| Drugs with duration of treatments      | 1924(73.72%)           |

Patient care involves multidisciplinary act. Pharmacists support patient care by delivering pharmaceutical care which supports medical and nursing cares. Pharmacists' comments and interventions depend on drug selection based on drug, disease and patient related factors. The diagnosis of the case will have a great help in this regard. In our study, only 165(11.46%) of encounters appeared with diagnosis or ICD code, which means 88.54% of the encounters were prescribed for unspecified diagnosis, making it difficult for pharmacists to comment on the indication, dose and other aspects of the drug.. This is too low to have a good pharmaceutical care and intervention. It is also by far less than studies conducted in India (56%)<sup>18</sup>, (22.25%)<sup>20</sup>, and (41.50%)<sup>19</sup>, but better than the study in Ayder referral hospital(2.6%)<sup>15</sup> and JUSH(0%)<sup>17</sup>. Such difference may be attributed by the fact that pharmacists role in patient management was very low in Ethiopia compared with other regions of the world which may be improved in future following the introduction of new patient oriented pharmacy curriculum.

Table 3: The number and percentage of prescription orders containing drugs with other relevant parameters in Dilla University Referral Hospital, 2018[N=1440]

| Variables                   | Number and percentages |
|-----------------------------|------------------------|
| Date of prescription        | 1287(89.38%)           |
| Illegibility                | 43(2.99%)              |
| Diagnosis (ICD code number) | 165(11.46%)            |

Of total 2610 drugs prescribed, 2227(85.33%) were prescribed by generic name and 342(13.10%) of all were written in abbreviations like HCT, TTC, CAF, ASA and 308(11.80%) and 75(1.72%) were prescribed by brand and chemical name respectively. An injection was prescribed in 85 encounters (7.46%) and almost all drugs prescribed (2543(97.43%)) were from the essential drug list of Ethiopia.

WHO recommends generic prescription <sup>7</sup>. The percentage of drugs prescribed by generic name at Dilla University Referral Hospital is 85.33%, which is It is almost similar with a national baseline study on drug use indicators in Ethiopia in September 2002 reported to be 87% <sup>23</sup>. It is lower than the standard derived to serve as ideal (100%) <sup>7</sup>. It is less than studies in Hawassa University Teaching and Referral Hospital (98.70%)<sup>10</sup>, eastern part of Ethiopia

(97%)<sup>21</sup>, Nekemte Referral Hospital (98.26)<sup>22</sup>, Adama Hospital Medical College (96%)<sup>16</sup> and public health facilities in Maharashtra of India(100%)<sup>19</sup>. It is higher than the percentage of drugs prescribed by generic name in a study conducted at Jimma Hospital, south west Ethiopia, 75.2% <sup>24</sup>, Ayder hospital(83%)<sup>15</sup>, Eastern province, Saudi Arabia 61.2%<sup>14</sup>, Teaching hospital in North India, None is prescribed in generic name<sup>18</sup>, Garhwal (Uttaranchal), IndiaAbout 51% of the drugs were prescribed by generic names<sup>20</sup>, Tertiary care hospital (4.16%) Ambala, Haryana<sup>12</sup>. Such differences are due to prescribers interest toward brand prescription which is majorly expected to be due to promoters influence and increased number of senior physicians.

The percentage of encounters with antibiotic, 842 (58.47%), is high in our study when compared with the standard (20-26.8%)<sup>7</sup>. It is similar with the study in hawassa referral hospital (58.10%)<sup>10</sup> and higher than the study in saudi arabia(32.20%)<sup>14</sup>. Such increased percentage of encounters with antibiotics is majorly due to high prevalence of infectious cases in the region.

Percentages of encounters with injections in our study are low (6.53%). Studies in different regions of the country shows increased percentage of injection containing encounters. It is 38.10%<sup>10</sup> in southern part of the country, 11.2% <sup>21</sup> in eastern part of the country and 21.94%<sup>22</sup> in western part of the country. Our finding is nearly similar with the study in India(7%) <sup>18</sup> and higher than the findings in saudi arabia(2%)<sup>14</sup>. This less percentage of injection containing encounters may be due to easily availability of oral medications and increased cost of parenteral preparations.

A major step towards rational use of medicines was taken in 1977, when WHO established the 1<sup>st</sup> model list of essential medicines to assist countries in formulating their own national lists and essential medicines list based on treatments of choice is one of the core interventions to promote rational use of medicines<sup>2</sup>. 2543(97.43%) of the drugs prescribed in this study were from EDL of the country. It is better than the studies in hawassa referral hospital (96.6%)<sup>10</sup>, eastern part of the country(92%)<sup>21</sup>, Adama(94.70%)<sup>16</sup>, different parts of india (79.20%)<sup>18</sup>, (73.01%)<sup>24</sup> and (90.30%)<sup>25</sup>. This finding is expected to be due to the fact that DURH has its own hospital specific drug list prepared by the hospital which is in line with the national guidelines.

Table 4: Summary of results obtained at Dilla University Referral Hospital, 2018 (n = 1440 encounters)

| Prescribing indicators assessed              | Total drugs/ encounters | Average/ percent | Standard derived or ideal |
|----------------------------------------------|-------------------------|------------------|---------------------------|
| Average number of drugs per encounter        | 2610                    | 1.813            | (1.6-1.8)                 |
| Percentage of encounter with antibiotics     | 842                     | 58.47%           | (20.0-26.8%)              |
| Percentage of encounters with injection      | 94                      | 6.53%            | (13.4%-24.1%)             |
| Percentage of drugs prescribed by generic    | 2227                    | (85.33%)         | 100%                      |
| Percentage of drugs from essential drug list | 2543                    | 97.43%           | 100%                      |

Of a total of 2610 drugs prescribed, 885 (33.91%) were antibiotics. The most commonly prescribed antibiotics were Amoxicillin+Clavulanic acid 172 (19.44%), Amoxicillin 141 (15.93%), Ciprofloxacin 131(14.80%) and B. Penicillin 1(0.11) being the least (Table 5).

Table 5: Most commonly prescribed antibiotics at the medical outpatient pharmacy of Dilla University Referral Hospital; 2018

| Commonly prescribed antibiotics | Frequency | Percentage (%) |
|---------------------------------|-----------|----------------|
| Amoxicillin + Clavulanic acid   | 172       | 19.44          |
| Amoxicillin                     | 141       | 15.93          |
| Ciprofloxacin                   | 131       | 14.80          |
| Metronidazole                   | 87        | 9.83           |
| Azithromycin                    | 78        | 8.81           |
| Cloxacillin                     | 59        | 6.67           |
| Norfloxacin                     | 49        | 5.54           |
| Doxycycline                     | 48        | 5.42           |
| Cephalexin                      | 54        | 6.10           |
| Ceftriaxone                     | 18        | 2.03           |
| Tetracycline                    | 8         | 0.90           |
| Clarithromycin                  | 9         | 1.02           |
| Erythromycin                    | 10        | 1.13           |
| Chloramphenicol                 | 8         | 0.90           |
| Clindamycin                     | 3         | 0.34           |
| Cotrimoxazole                   | 5         | 0.57           |
| B. Penicilline                  | 2         | 0.23           |
| Gentamicin                      | 1         | 0.11           |
| Ampicillin                      | 2         | 0.23           |
| Total                           | 885       | 100            |

The percentage of encounters in which an injection was prescribed at Dilla University Referral Hospital was 6.53%. Of all 94 encounters having injections, 4 encounters had two different injections. The most commonly prescribed injections were Diclofenac 34(34.70%), ceftriaxone18 (18.37%) and Tramadol 11 (11.22%). (Table 6)

Table 6: Most commonly prescribed injections at the medical outpatient pharmacy of Dilla University Referral Hospital; 2018

| Commonly prescribed injection | Frequency | Percentage (%) |
|-------------------------------|-----------|----------------|
| Diclofenac                    | 34        | 34.70          |
| Ceftriaxone                   | 18        | 18.37          |
| Tramadol                      | 11        | 11.22          |
| Cimetidine                    | 9         | 9.19           |
| Chlorpromazine                | 8         | 8.16           |
| Pethidine                     | 5         | 5.10           |
| Furosemide                    | 3         | 3.06           |
| Diazepam                      | 3         | 3.06           |
| Cloxacillin                   | 2         | 2.04           |
| B. Penicilline                | 2         | 2.04           |
| Ampicillin                    | 1         | 1.02           |
| Gentamicin                    | 1         | 1.02           |
| Hydrocortisone                | 1         | 1.02           |
| Total                         | 98        | 100            |

Of the total 2610 drugs, 2431(93.14%) drugs were actually dispensed.

## CONCLUSION

On the basis of our finding, polypharmacy, percentage of encounters with injection and percentage of drugs from essential drug list was not a problem. Further interventions are needed in addressing patient information like patient address and patient weight critical for patient follow-up and optimal therapy. The prescribing practices for antibiotics and generic medicines shows significant deviation from WHO standard and it needs to be closely regulated. Drug use evaluation should be conducted to justify the overuse of antibiotics and to check whether they are appropriately prescribed or not. Promoting rational use of drugs needs cooperation and commitment of

stakeholders. These are establishment and empowerment of drug and therapeutics committee (DTC), targeted continuous education for prescribers and dispensers, availability and affordability of pharmaceuticals, establishment of drug information service.

## Abbreviations

DURH: Dilla University Referral Hospital

EDL: Essential drug List

EML: Essential Medicines List

INRUD: International Network for Rational Use of Drugs

WHO: World health organization

**Declarations:** No competing interests

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