

EVALUATION OF RATIONAL MEDICINE USE IN SELECTED GOVERNMENT HOSPITALS  
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**Background:** Rational use of Medicines (RUM) plays an important role in avoiding possible adverse drug reactions, maximizing therapeutic outcomes with patient adherence, and minimizing the cost of drug therapy. In Sierra Leone, no review has been done on RUM based on the three World Health Organization (WHO) core drug use indicators.

**Objective:** To assess the rational use of essential medicine in selected public hospitals in Freetown.

**Method:** Prospective cross-sectional study involving 250 health professionals and 150 outpatients at three public hospitals in Freetown, Sierra Leone. In each hospital, 30 key essential medicines were selected using the WHO prescribing indicators. A standard data collection checklist was used. Data obtained were organized using Microsoft Excel spreadsheets to obtain frequencies and percentages. Core drug use indicators were analysed using the WHO guidelines.

**Results:** About 69.9% of medicines were prescribed by generic name (Reference value=100%), the percentage encounters with injection were 68.9%, and 76.5% for antibiotics (Reference values=<20% and <30% respectively). In all 3 hospitals, 100% of medicines were prescribed from the Essential Medicine List of Sierra Leone. Patient care indicators showed that 81% of the patients knew the correct dosage of their medications, and 61.4% knew how long the drugs dispensed should be taken. Only 70.6% understood the instructions given by health providers about drug administration. Average consultation and dispensing time were 4 minutes and 1 minute, respectively. All the public hospitals had copies of the Essential Drug List and Standard Treatment Guidelines.

**Conclusion:** Rational Medicine Use was not fully observed in this study. Therefore, these public hospitals should work towards comprehensive implementation of the WHO guidelines.

**Keywords:** Rational Use of Medicine, Prescribing indicators, Freetown, Essential medicines.

**Introduction**

Rational Medicine Use (RUM) calls for patients to get medicines that meet their medical needs, in suitable doses, for a sufficient period, and at a low-priced cost to them and their communities <sup>[1,2]</sup> RUM plays a fundamental role in avoiding adverse drug reactions, maximize treatment outcomes by promoting patient adherence, and minimizing the cost of drug therapy. <sup>[3]</sup> In Sierra Leone, essential drugs are key integral part of the health delivery system. This is seen in the Free Health Care Initiatives of the past and current Government. Essential drugs account for a significant proportion of the overall health expenditures in the Ministry of Health and Sanitation. Irrational drug use is often seen in countries with weak health systems <sup>[4]</sup>. No review has been carried out that systematically expresses RUM based on the key indicators of WHO medicine use in Sierra Leone. In Freetown, the availability, and the effective use of Standard Treatment Guidelines (STGs), and the RUM listed in the Essential Medicine List (EML) remain a serious problem.

Therefore, this study aimed to systematically examine prescribing, health facility and patient care indicators based on WHO key indicators of medicine use in Sierra Leone.

Objectives from the Health care Professionals were to assess the knowledge of the Rational Use of Medicine and the level of training on RUM.

Objectives from prescribing Indicators were to determine the percentage of medicines prescribed by generic name, the percentage of encounters with an antibiotic, the percentage of injections prescribed and the average number of medicines per patient encounter.

Objectives from facility indicators were to assess the availability of EML and STGs in health facilities. Objectives from patients' indicators were to determine the average consultation and dispensing time, and the percentage of patients' knowledge of correct dose, dosage, and administration.

## **Methods**

### ***Study design***

This was a descriptive and quantitative cross-sectional study. The study was conducted from July to November 2019. A prospective cross-sectional study design was used to evaluate prescribing indicators, patient care, and facility indicators.

### ***Study Sites***

Three main teaching hospitals in Freetown, namely, Ola Durojaiye Children's Hospital (ODCH), Princess Christian Maternity Hospital (PCMH) in the eastern part of Freetown and Connaught Hospital (CH) in the central part of Freetown.

### ***Study Population***

The total number of registered health professionals in these three (3) study sites was 546. The health professionals drawn from the three selected tertiary government hospitals stated above and comprised; (a) Health professionals e.g. Medical Doctor (MD), Pharmacist (P), Community Health Officer (CHO) State Registered Nurse (SRN), State Enrolled Community Health Nurse (SECHN), Maternal Child Health Aid (MCHA). Outpatients from the period of September to November 2019 were 403.

A total of 30 essential medicines using the WHO model list were assessed in the targeted health facilities.

### ***Sample size:***

The sample size of 250 health professionals and 150 patients was calculated<sup>[5]</sup>. The sample size formula  $N = Z^2 * P [1-p] / d^2$  was used to calculate sample size where N = Total sample size, Z = level of confidence of 95% (Z =1.96), P = expected prevalence or proportion. The 50% is used for expected prevalence since no other study has been carried out before in Sierra Leone. We used 7% as the marginal error "d" due to limited resources available for the study.

### ***Sampling technique***

A multistage sampling was used for the healthcare providers, a total of 250 were blindly selected from the three study sites; 45 were Pharmacists/dispensers, 95 were medical doctors, and 110 were Nurses/Aides. Data was collected from respondents in clusters of professionals in the three different study sites. A nonprobability sampling method referred to as purposive was used for the Out-patients, 150 out-patients (targeting 50 participants per facility) were recruited. Out-patients recruited for the study were those suffering from common ailments (like malaria, typhoid fever, diarrhoea etc.) among the various ages and sexes. The patients were randomly selected as they were leaving the dispensing area of the Pharmacy Department and had received their medicines. We ascertained whether the medicines were adequately labelled and if the patients knew how to take their medicines. Their satisfaction from received services was obtained.

### ***Selecting the Tracer Essential Medicines (TEMs)***

A list of 30 TEMs used to treat common health problems in Public Hospitals was selected to measure their availability. Also, inquiries were made on the availability and uses of copies of STGs and NEML in each Facility.

List of 30 Sampled Essential TEM; Artemether/Lumefantrine tablets, Acetaminophen 500mg tablets and 250mg/5ml suspension, Aluminum Hydroxide 500mg tablets, Albendazole 400mg tablets,

Bisacodyl 5mg tablets, Mannitol 10%, Amoxicillin 500,250mg tablets and suspension 50/125mg/5ml, Benzylpenicillin 2.4 miu, Cimetidine 200mg tabs, Co-trimoxazole 480mg tabs, Metronidazole 200mg tablets and suspensions, Oral Rehydration Salts 1 litre 20.5mg sachet, Doxycycline 100mg caps, Quinine Sulphate 300mg tablets, Vitamin B-Complex, Ferrous 5mg+ Folic Acid 25mg, Ringer Lactate 500ml, Griseofulvin 250 mg tablets, Oxytocin 10 iu/ml, Normal saline 0.9% sodium chloride, 500ml, Hydrocortisone 100mg tabs, Diazepam 5mg tablets, Penicillin V.K. inj., Epinephrine 1 mg/ml, Folic Acid 5mg tablets, Methyl Dopa 250 mg tablets, Propranolol HCL 40mg tablets, Multivitamin tablets, Ascorbic Acid 250 mg tabs and Hydrochlorothiazide 25mg tabs.

### **Study indicators**

This study utilized the WHO medicines use operational package indicators of RUM indicators [5,6,7].

#### **(a) Availability and storage Indicators:**

- Percentage of medicines prescribed that are dispensed at health facilities (Reference value=100%)
- Percentage of essential medicines available in health facilities (Reference value=100%)
- Percentage of premises stocking one or more medicines that have expired (Reference value=0%)
- Percentage of generic and branded products prescribed. (Reference value=100% generic)

#### **(b) Medicines dispensing indicators:**

- Percentage of medicines dispensed (Reference value=100%)
- Percentage medicine prescription adequately labelled (Name of medicine, dosage, dose, and quantity dispensed) (Reference value=100%)
- Average consultation time and average dispensing time (10-20 minutes)
- Percentage of prescriptions whose indications were understood by patients (patients were able to recognize the medicine, its indications and use) (Reference value=100%)

#### **(c) Prescribing indicators:**

- Average number of essential medicines per prescription at public health facility pharmacy unit (Reference value=100%)
- Percentage of patients prescribed antibiotics in public health facilities (Reference values <30%)
- Percentage of patients prescribed injectables in public health facilities (Reference values < 20%)
- Percentage of medicines listed on the EML at public health facilities (Reference value=100%)
- Percentage of medicines prescribed by generic name at public health facilities (Reference value=100%)

**Table 1: WHO/HAI standard reference values for different availability parameters for Essential Medicines.**

< 30%	30% - 49%	50% - 80%	> 80%
Poor	Low	Fairly high	High

### **Study instruments**

- i. Structured health professional interview questionnaire
- ii. Structured out-patient exit-interview questionnaire
- iv. Checklist of thirty tracer medicines availability

### **Pre-testing of questionnaire**

The pre-testing of the checklist/ questionnaire was carried out at a public healthcare facility that was not included in the study, the Republic of Sierra Leone Armed Forces Hospital. This is a densely

populated health facility involved with rendering free health services. The piloting was meant to determine participants' levels of understanding and responses to the study questionnaires and to identify, review and rectify questionnaires for completeness of the forms.

### ***Data collection***

Data was collected using structured observational and interview questionnaires for knowledge of RUM among health professionals in the study sites, prescribing, and patient care and health facility indicators. The structured outpatient exit interviews and reference of patient prescription papers were used to check the patient's knowledge of how to take the correct dosage. A stopwatch was used to determine the contact time of health care providers with patients (consultation and dispensing time). Data regarding prescribing indicators were also taken from sampled prescription records prospectively and filled in structured observational questionnaires accordingly. On the other hand, data regarding patient care indicators were taken from patients and their prescriptions in the Outpatient Department (OPD) and were recorded in structured observational questionnaires.

### ***Data quality control***

Completeness and consistency of the collected data were achieved by making frequent checks on the data collection process.

### ***Data analysis***

Data collected were organised and analysed using pre-designed Microsoft Excel data spreadsheets. Analysis of the data was done to characterize other identified indices including the percentage of generic/ branded drugs prescribed, the percentage of anti-infective agents and injectables prescribed in addition to the 30 tracer essential medicines. The data were presented as percentages and averages as seen in the results of this study.

### ***Ethical consideration***

The Medical Superintendents of the selected Hospitals gave permission to conduct the study. Informed consent forms were attached to the checklist/questionnaire of each participant.

## **Results**

### ***Response rate***

A total of 250 health professionals involved in prescribing and dispensing essential medicines in the targeted healthcare facilities and 150 patients were interviewed. From the number of health professionals 95 (38%) were Prescribers, 45 (18%) were dispensers and 110 (44%) were non-prescribers and dispensers.

**Table 2: The categories of health professionals involved in prescribing and dispensing**

Public Hospitals in Freetown	No. of Community Health Officers (CHO) Interviewed	No. of State Register nurses interviewed (SRN)	No. of State Enrolled Community Health Nurse interviewed (SECHN)	No. of Maternal and Child Health Care Nursing Aide Interviewed (MCHA)	No. of Community Health Assistants (CHA)	No. of Pharmacy professionals interviewed	No. of Medical doctors interviewed
Connaught Hospital	0	28	9	4	0	19	45

Ola During Hospital	0	8	10	2	0	16	24
PCMH	0	39	2	8	0	10	26
<b>Total</b>	<b>0</b>	<b>75</b>	<b>21</b>	<b>14</b>	<b>0</b>	<b>45</b>	<b>95</b>

### *Healthcare professionals' knowledge of Rational Use of Medicines*

About 140 (56%) confirmed receiving formal training in prescribing medicines. Out of the 250 health professionals involved in the study, only 138(55.2%) received training on STGs and EML. The majority, 118(47.2%) of health professionals interviewed did not know what polypharmacy is. Similarly, 120(48%) agreed that polypharmacy increased irrational use of medicines. However, in terms of years of experience in prescribing medicines, the maximum year was 35 years, and the minimum was 5 years.

### *Prescribing indices*

The average number of medicines prescribed per prescription was five (5) with a range of 1- 8 medicines per encounter. The WHO guidelines on Rational Use of Medicine (RUM) stipulate a range of value 1.6 -1.8, [4.4±0.1] medicines per encounter.

Generic prescribing was 69.9 %, WHO reference value of 100% [50.5 ± 1.2]. Paracetamol and Artemisinin Combination Therapy were the most frequently prescribed drugs in these facilities. The percentage of injectables prescribed was 68.9%, and the WHO standard reference values are 10.1 – 17.0, [53.7±4.3]. Out of the 30 sampled EMs, 17 were anti-infective and 15 were injectables respectively. A total of 39 (76.5%) anti-infectives were dispensed from the study sites.

**Table 3: Health professionals prescribing practice**

Public Hospitals in Freetown	No. of Essential medicines available (30)	No. of drugs prescribed by generic as per surveyed list (30)	No. of drugs prescribed by trade name	No. of anti-infective prescribed (17)	No. of injectables prescribed (15)	No. of health professionals that received training on RUM	No. of health professionals that received training on STG & EML
Connaught Hospital	26	26	15	17	13	79	65
Ola During Hospital	18	18	7	9	10	63	32
PCMH	21	21	6	13	8	56	41

### *Percentage Availability of Standard Treatment Guidelines in Health Facilities*

From the 3 study sites visited, Standard Treatment Guidelines (STGs) for HIV/AIDs, Malaria, and TB were identified. STGs for the three disease states were available in all the facilities surveyed. Essential Medicine List (EML) and the National STGs for common diseases in S/L were also present during the study. This indicated that 100% of the study sites had access to the National STGs and EML.

NO:	Public Hospitals in Freetown	Knows the indication of the drugs dispensed	Knows when and how to take the drugs dispensed	Knows the side effects of the drugs dispensed	Knows the duration of the drugs dispensed	Instructed by health providers on how to take the drugs	Satisfied with services provided by health providers
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Average consultation time was 4 min, less than 10 min as per the WHO standard.

During the out-patient exit interviews, it was observed that the majority of the medicines prescribed were generic 69.9 % and 30.1% were trade names. Paracetamol and ACT were the most frequently prescribed drugs in these facilities.

Figure 2 below presents the details of the frequency of medicines prescribed by trade or generic names

**Table 4: Outpatient Exit Interview Data**

***Outpatient Exit Interview Data***

Table 4 provides details on the information obtained from the patient exit questionnaire.

Out of the one hundred and fifty-three (150) patients involved in the study, 94 (61.4%) patients knew the indication of the dispensed drugs, 124 (81%) knew when and how to take the drugs, 23 (15%) knew the side effects of the drugs, 94 (61.4%) knew how long the drugs dispensed should take, 108 (70.6%) understood the instruction given by health providers with regards drug administration and 119 (77.8%) were satisfied with the services provided by health workers.

**Discussion**

World Health Organization (WHO) introduced the concept of essential medicines to satisfy the priority health needs of the population with safe, efficacious, and cost-effective medicines [8]. This concept was adopted by developing countries including the Republic of Sierra Leone located in West Africa. This

1	<b>Connaught Hospital</b>	<b>28</b>	<b>39</b>	<b>15</b>	<b>26</b>	<b>37</b>	<b>38</b>
2	<b>Ola During Hospital</b>	<b>35</b>	<b>45</b>	<b>3</b>	<b>23</b>	<b>43</b>	<b>47</b>
3	<b>PCMH</b>	<b>31</b>	<b>40</b>	<b>5</b>	<b>45</b>	<b>28</b>	<b>34</b>

study has reported the knowledge, and practice of prescribing and dispensing essential medicines in three major hospitals in the Country's capital.

The average number of medicines per patient encounter for this study was higher than the WHO standard [9] and comparatively higher than similar studies conducted in Nigeria and Pakistan [7,10,11]. This may occur in developing countries where there are inadequate programs for the promotion of rational use of medicines as well as standard values for WHO drug prescribing indicators. This may suggest a high incidence of polypharmacy which could lead to the risk of drug-drug interactions, side effects or non-adherence to medication. The overprescribing may also have a psychosocial impact on patients. About half of the prescribers interviewed said they had no knowledge about polypharmacy. This indicates that some prescribers did not know that polypharmacy contributes to the irrational use of medicines. The study shows that there is a high need for health professionals to be updated or trained in prescribing practice. Investing in the training of more doctors, pharmacy professionals, community health officers and other health professionals would result in improving the capacity and structures of these facilities and having a high level of competencies that would eventually reflect on the quality of health care services.

The findings of this study showed that 30% of the prescriptions contained trade names; this was lower than the WHO stipulated reference value of 100% of essential medicines to be prescribed with generic names. Similar values have been reported for Liberia [12].

The percentage of injectables and anti-infectives prescribed in the sampled health facilities was higher than the WHO standard, similar to another study conducted in Ethiopia [13]. The rational use of anti-

infective agents especially antibiotics is necessary to prevent the emergence of resistant strains of microorganisms.

During the patient exit interviews it was observed that there were large numbers of patients at the health facilities seeking health service, and some of the prescriptions were done on pieces of paper. Also, the labelling of dispensed medicines was inadequate (containing trade names of products, the dosage and the frequencies of medicines were not properly written). There was a long line of patients seeking services at the hospitals and the time allocated for information dissemination per patient was adequate (more than 8 minutes per patient). It usually takes more than five minutes to adequately conduct an assessment, evaluate laboratory reports, and prescribe a treatment regimen. A similar study was done in Liberia and the time allocated for consultation time was less than 5 minutes <sup>[12]</sup>.

An average knowledge of the indication, usage, and duration of their medications was observed, this finding was better than a study done in Gambia which recorded very poor knowledge <sup>[14]</sup>. However, little was known about the side effects of the drug. Instructions for medicines administration to patients must be simple, clear, and well-explained. Patients need proper education and counselling to avoid drug therapy problems.

Availability of essential medicines, EML and STGs in the study sites was good, similar to a study done in Mali <sup>[15]</sup>. The Connaught Hospital had more than the other two hospitals. According to the study we realized that Connaught caters for a broad range of diseases and has the greatest population of higher health professionals in specialities than the two public hospitals.

### **The Scope and Limitation of the Study**

The intention of the study was not to provide an intervention, but an overview of medicines use in tertiary public hospitals in Freetown, to help policymakers analyze and design appropriate interventions in strengthening and promoting rational use of medicines. Additionally, our study did not include hospitals in the districts and private sector.

### **Conclusion**

This study has shown irrational drug use practices in all three healthcare facilities; polypharmacy, antibiotics overprescribing, and inadequate level of patients' knowledge about prescribed medicines. Consultation and dispensing times were adequate. Continuous professional training on rational use of drugs and WHO recommendations are relevant for prescribers and pharmacists. Further studies involving many facilities to estimate overall prescribing practices is recommended.

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### **Conflict of interest statement**

There is no conflict of interest or any financial or personal relationships with other people or organizations that could inappropriately bias the conduct and findings of this study.

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