ORIGINAL RESEARCH

Assessment of Medication Prescribing Pattern in COVID-19 Admitted Patients by Using WHO Prescribing Indicators at Eka Kotebe General Hospital, Addis Ababa, Ethiopia; Retrospective Cross-Sectional Study

Belete Birhanu[1], Solomon Debebe[1], Tsegaye Nigussie[2], Alemayehu Dandana[1]

[1]Hospital Pharmacy, Eka Kotebe General Hospital, Addis Ababa, Ethiopia; [2]Department of Pharmacy, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia

Correspondence: Tsegaye Nigussie, Tel +251916209909, Email tsega1994et24@gmail.com

Introduction: Drug therapy is a crucial component of health care and plays a vital role in preserving life. However, the irrational utilization of medications is a worldwide issue, particularly in developing nations.

Objective: To assess the prescription patterns of medications based on the World Health Organization's prescribing indicator among patients who were admitted with COVID-19 to Eka Kotebe General Hospital in Addis Ababa, Ethiopia, in June 2021.

Methods: A retrospective cross-sectional analysis was conducted to evaluate the prescription patterns of medications in patients admitted with COVID-19 at Eka Kotebe General Hospital from June 2021 to September 15, 2021. The data were extracted using card review formats and prescription assessment questionnaires, and a systematic random sampling procedure was employed to collect the data. Finally, the data were coded and analyzed using SPSS version 26 to meet the study's objectives. Descriptive statistics were employed to determine the frequency and prevalence, and the results were presented using tables and figures.

Results and Discussion: The average number of medications prescribed per encounter was 2.64, which is above the WHO standard. The percentage of encounters in which antibiotics and injections were prescribed was 80.20% and 99.2%, which exceeds the upper limit of WHO standard range (20–26.8%) and (13.4–24.1%), respectively. All medications were prescribed using generic names and were included in Eka Kotebe General Hospital's essential drug list, which is in line with WHO standards.

Conclusion: The degree of polypharmacy and the prescription practices for antibiotics and injections at Eka Kotebe General Hospital deviated from the World Health Organization's standards. As a result, there is a need to enhance medical education programs to rationalize the prescription of antibiotics and injection use.

Keywords: drug prescribing, prescription pattern, COVID-19, Eka Kotebe General Hospital

Introduction

Drug therapy is an integral part of health-care system and provide crucial role in sustaining life, when used rationally, they produce the desired effect of ameliorating and preserving health. However, inappropriate, inadequate, and uneconomical use of medications is prevalent in health facilities globally, particularly in undeveloped countries. This is causing significant expenses both in the limited medical resources and the unfavorable medical outcome. According to WHO rational utilization of drugs defined as receiving medicine that appropriate to the clinical necessity of patients, dosage that fulfil their individual needs, for sufficient duration, and at minimal expenses to the patients and their country.[1]

According to WHO, rational utilization of medication defined as the cost effective utilization of drugs which maximize clinical therapeutic outcomes while reduce both drug-related toxicity and development of drug resistance.[1]

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The rational utilization of medication ought to adhere to the rule of RIGHT (right medication, right dose, right patients, right time, and right cost), and SANE (safety, affordability, need and efficacy). Any divergence from these criteria is considered as irrational utilization of drugs. According to the WHO, about 50% of drugs worldwide are used irrationally, this may result in drug resistance, adverse drug reaction (ADR), prolonged illness, death, and be associated with unnecessarily and unexpectedly high financial cost. Irrational utilization of drugs including polypharmacy, misuse of antimicrobials, incorrect administration, and failure to follow clinical guidelines is a widespread problem. This will lead to treatment failure and exacerbation and prolongation of illness, harm of patients and increasing health-care cost.[1,2]

Several studies conducted in Ethiopia revealed that irrational use of medications are the most challenging problem. Irrational prescribing of drugs leads to misuse, overdose, underdose, toxicity, ADR, cost, and shortage of drugs at health facilities.[3,4] A study conducted in Jimma revealed that out of 2,072 medications ordered, 58 ADRs were reported, and 47% of ADRs were due to error in the drug administration, 91% caused temporary harm and 9% caused permanent harm/ death.[5]

Coronavirus 19 (COVID-19) is a disease caused by infection with the SARS-CoV-2 virus which was initially reported in Wuhan, China in November 2019, and named COVID-19 by WHO in February 2020 and declared as pandemic with significant public health challenges.[6] As per WHO report it advanced quickly as an international disease in which more than 174 million infections and over 3.7 million deaths were recorded globally and infecting in excess of 4.9 million people in Africa. Ethiopia has reported approximately 272,914 confirmed case and 4,209 deaths.

It also an outbreak caused unparalleled emergency in all areas of the global health-care system. Nearly 80% of those infected exhibited mild to moderate sign of coughing, fever, and lung infiltration that are comparable to bacterial pneumonia. Even though only 20% of those affected experience severe infection just 6% of critically ill patients require ICU assistance.[6,7] In patients hospitalized with COVID-19 and at high risk, such as the elderly and those with multiple comorbidities, their mortality rate can vary from 5 to 27%.[8–11] Patients admitted with COVID-19 frequently necessitate noninvasive assistance and invasive ventilation. Despite the viral origin of COVID-19 and the absence of proof of bacterial superinfection in a significant number of cases, medical professional is often obligated to administer a multiple of antimicrobials due to the lack of targeted antiviral medication, challenges in distinguishing between bacterial pneumonia and COVID-19 and doubts concerning secondary bacterial infection.[2,12]

As the COVID-19 outbreak continued to spread, initially treatment guideline recommended the use of antibiotics as empiric measure particularly for those with severe infection.[7] Systematic review revealed that from 72% of patients with COVID-19 receiving antibiotics, only 8% of patients had confirmed bacterial coinfection.[9] However, currently the WHO advised the use of antibiotics only for patients with moderate COVID-19 and suspected coinfection.[13] Despite this more than half of all medications are prescribed, dispensed, and sold inappropriately worldwide and nearly 50% of patients do not take them as directed.

A recent survey of 203 American physicians showed that antibiotics are very commonly prescribed drugs in patients with COVID-19, second only to acetaminophen.[8] In China[14] and Turkey[12] empirical broad-spectrum antibiotics were utilized in patients with COVID-19 because laboratory diagnosis takes time and distinguishing the disease from other bacterial diseases and viral pneumonia is often difficult. In China approximately 58% of patients admitted to hospital with COVID-19 receive IV antibiotics. Different studies revealed that 70% of hospitalized patients receive one or more antibiotics whereas it is scaled up to 100% in ICU.[2] This excessive prescribing and overuse of antibiotics is notable during this pandemic, in the long-term this may complicate COVID-19 management and the existing battle against antimicrobial resistance.[9] A retrospective study in China of severe or critically ill patients with COVID-19 treated by methylprednisolone showed a lower mortality rate.[15–17] However, in Nottingham (UK),[18] Saudi Arabia,[19] and Ethiopia[20] it was reported that corticosteroid utilization has no impact on mortality, but is possible to cause harm, including avascular necrosis, psychosis, diabetes, delay viral clearance, and increase mortality.[10]

Methods

This study is a retrospective cross-sectional analysis that was carried out at EKGH from June 2021 to September, 2021. Eka Kotebe General Hospital is a large medical facility situated in the Yeka Subcity of Addis Ababa, Ethiopia. In 2021, the hospital catered to approximately 3,073 patients annually, including those from surrounding areas and other suburbs. The hospital provides a wide range of health-care services through its various departments, staffed by a multidisciplinary group of

professionals. EKGH was the first hospital in Ethiopia to offer admission and treatment for COVID-19 patients from March 2020, when the first case was detected in the country. This study included all COVID-19-positive patients who received prescribed drugs at EKGH, except for those with incomplete records. The sample size was determined using the statistical formula n=Za/22*P (1-P)/d2, resulting in the inclusion of 384 patient records from March 2020 to June 2021. A systematic random sampling technique was employed to select the sample from the target population. With the exception of incomplete medical records, all study population included under study. WHO prescription indicators were used to evaluate the prescribing patterns of drugs for COVID-19 patients admitted to the hospital. The checklist was pretested on 10 COVID-19 patient medical records in the ward to ensure the validity of the study and to minimize risk of biases. Data collection was performed by five well-trained health-care providers with basic knowledge of pharmacotherapy and pharmaceutical care. The data collected was supervised and regularly reviewed for completeness by the principal investigators. The collected data was cleared, edited, coded, entered, and processed using SPSS version 22. Descriptive statistics were used to determine the frequency and prevalence of the collected data. Finally, the processed data was compiled, organized, and presented using tables and figures.

Ethical Consideration

The entire procedure began when the management of Eka Kotebe General Hospital (EKGH) and its ethical review board obtained approval with letter number EKA/150/5/96. The letter was submitted to concerned bodies such as doctors, nurses, pharmacists, and card room staff who work in the COVID-19 medical ward of the hospital. Privacy and confidentiality were ensured during the pharmaceutical care services. Thus, name and address of the patients were not recorded in the drug prescribing pattern data collection checklist. We obtained informed consent from each participant before extracting data from patient profiles.

Dissemination of Results

The output of this study was beneficial for planner, health personal, regional, and federal health bureaus, NGOs, and researchers, who are engaged in the health-care system. Thus, the finding of the study was disseminated to different organizations targeting clinical care providers and policymakers, including EKGH, the health-care facilities stakeholders, suburb and woreda health departments by using different mechanisms such as clinical seminar, workshops and meeting, scientific forums, and conferences to assist in health-care planning thus improving practice. Publication of the findings in a peer reviewed journal was also considered.

Result

Sociodemographic Characteristics

In the current study, the prescribing pattern of EKGH was assessed through the analysis of 384 prescriptions. As depicted in Table 1, among the enrolled prescriptions of COVID-19 patients admitted to EKGH, 39.56% were prescribed for females, while the remaining 60.44% were for males. The study finding also indicated that 48.96% and 41.67% of the patients were between the ages of 25 and 64 years and >64, respectively, from the reviewed prescription paper most of the prescriptions did not meet the requirements for patient-related information.

Average Number of Drugs per Encounter

As illustrated in Figure 1, among the 384 prescriptions assessed in this investigation, 94 (24.48%) comprised one medication per prescription, 88 (22.92%) two medications per prescription, and 104 (27.08%) three medications per prescription.

Encounters with Antibiotic(s) Prescribed

In EKGH, antibiotics were the most frequently recommended medications. As shown in Table 2, 80.2% the prescription prescriptions included antibiotics. From these (40.6%) had one antibiotic each, and 139 (24.5%) had two medications per prescription. Most frequently prescribed antibiotics were ceftriaxone (39.61%), cefepime (27.92%), and meropenem (23.70%).

Table 1 Sociodemographic Characteristics of Patients Admitted to Eka Kotebe General Hospital with COVID-19

Sociodemographic Characteristics		Frequency	Percent
Sex	Male	232	60.44
	Female	152	39.56
Age	0–14	20	5.20
	15–24	16	4.16
	25–64	188	48.96
	>65	160	41.67
Date	Yes	376	97.90
	No	8	2.10
Weight	Yes	3	0.80
	No	381	99.20
Diagnosis	Yes	21	5.50
	No	363	94.50

Encounters with Injection(s) Prescribed

Regarding route of administration as indicated Table 3, almost all patients with COVID-19 in EKGH was treated with injection (99.2%).

Drugs Prescribed with Generic Name

In Ethiopia, almost all medicine were prescribed by their generic name and from the list of essential drugs list. As shown in Table 4, mean count of medicines recommended per prescription was 2.64 at EKGH and the proportion of visits were recommended by 80.2% of antibiotic and 99.2% injection.

Discussion

This study found that the average number of drugs per prescription for EKGH was 2.64, which is above the WHO standard. Similarly, divergent results were reported in India,[12,21] and Lagos, Nigeria, FHRH,[22] Dessie Referral Hospital[23] and HFSUH Ethiopia[24] also reported that the average number of drugs per prescription (2.94, 1.83, 1.8, and 1.9, respectively). Disease severity, likelihood of bacterial super infection, and increased burden on health-care professionals may reduce the limit for antibiotic usage, ultimately resulting polypharmacy and a surge in antimicrobial resistance. Therefore, overprescribing of drugs potentially leads to drug-drug interactions, higher treatment costs, and greater levels of resistance.[9,12]
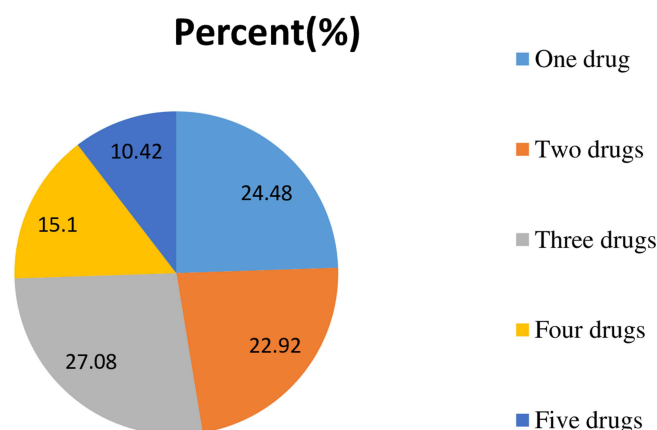

Figure 1 Number of drugs prescribed per prescription in EKGH from June, 2021 to September, 2021.

Table 2 Number of Prescribed Antibiotics in EKGH Patients Admitted with COVID-19 from June 2021 to September 2021

Number of Antibiotics per Prescription	Frequency	Percent	Commonly Prescribed Antibiotics IV	Percent
0	76	19.8	Ceftriaxone	39.61
1	156	40.6	Cefepime	27.92
2	139	36.2	Meropenem	23.70
3	13	3.4	Ciprofloxacillin	6.17
			Other	2.59

Table 3 Number of Injections per Prescription

Number of Injections per Prescription	Frequency	Percent	Percent
None	3	0.8	0.8
1	156	40.6	99.2
2	92	23.96	
3	86	22.39	
4	49	12.76	

Table 4 Prescribing Indicators in Eka Kotebe General Hospital

WHO Core Prescribing Indicators	Value Observed	WHO Standard
Average number of drugs per encounter	2.64	1.6–1.8
Drugs prescribed with generic name	100%	100%
Encounters with antibiotic(s) prescribed	80.20%	20–26.8%
Encounters with injection(s) prescribed	99.2%	13.4–24.1%
Drugs prescribed from EDL	98.60%	100%

In this study 100% of drugs were prescribed by their generic name which is in line with WHO standards. Similarly, in HUTRH (98.7%),[25] FHRH (97.4%),[22] and Bule Hora (96.8%),[20] this was almost in line with WHO standards. However, in Nigeria,[26] and Dessie Referral Hospital[23] lower results were reported 42.7% and 93.9%, respectively. Raising the utilization of generic medicines can significantly decrease both the expenses incurred by patients and facilities and impact the adherence rate.[16] In this study, 80.2% of COVID-19 patients were given one or more antibiotics, which exceeds the upper limit of the WHO standard range (20–26.8%). Similarly, in the USA 72% received antibiotic therapy, but only 8% of confirmed bacterial coinfection and in the UK (72%), Turkey (68.91%), China (58%) are treated with IV antibiotics. Antibiotics and IV formulation were the most commonly prescribed drugs, which exceeded WHO indicators per prescription regardless of drug induction, and this may be related to the severity of COVID-19 patients during admission or lack of COVID-19 treatment guidelines.

In this study, most drugs were prescribed as injectable (99.2%), which is above the WHO standard ranges (13.4–24.1%), and approximately 98.6% were prescribed from the essential drugs list, which is slightly below the WHO ideal of 100% and also this results were agreed with FHRH (100%),[22] 91.76% in Dessie Referral Hospital,[23] 93.04% in HFSUH,[24,25] and 96.6% in HUTRH[25] reports. However, this figure disagrees with the reports of 23.04% in India.[27] Currently, microorganisms are leading to severe infection which results from antimicrobial resistance, inadequate regulation, and nonadherence to guidelines regarding antimicrobial utilization. To prevent the emergence of drug-resistant bacteria, it is important to use antibiotics appropriately.

Limitations of the Study

Incomplete prescription paper with patient and drug information. This study was limited in that it was not designed to reveal the factors that determine rational drug use.

Conclusion

The results of this study, drug prescription pattern in this hospital showed deviation from the WHO recommended standard. Generally, over prescription of antibiotics and injections in EKGH is the main problem identified in this study. Generic and EDL-based prescribing practice in EKGH has demonstrated that there is no issue and is actually very beneficial in contrast to use of costly medications. The findings of this study show the necessity for regulatory authorities to develop COVID-19 treatment guidelines.

Abbreviations

ADR, adverse drug reaction; COVID-19, coronavirus disease 2019; EKGH, Eka Kotebe General Hospital; FDA, Food and Drug Administration; GPP, good prescribing practice; ME, edication error; NEDL, national essential drug list; NGOs, nongovernmental organizations; NSAIDs, on-steroidal anti-inflammatory drugs; WHO, World Health Organization.

Data Sharing Statement

All data used for this study are included in the manuscript.

Acknowledgment

Disclosure

The authors report no conflicts of interest in this work.

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