

Original Article

Availability of Essential Medicines at a University Hospital in Addis Ababa, a cross-sectional study

Muluwork Sahile Berassa^{1*}, Seblewengel Getachew Worku²

Abstract

Background: Though access to essential medicines (EMs) is a universal human right and the World Health Organization (WHO) recommends at least 80% availability of EMs in healthcare facilities, about one-third of the world population does not have access to EMs, particularly in Africa and Asia. In these regions, this figure reaches 50%. Studies in Ethiopia have also indicated frequent EMs shortages in public health facilities. The current study aimed to assess the availability of EMs and the facility's ability to provide the needed necessary medicines in TikurAnbesa Specialized Hospital (TASH).

Methods: An institutional-based cross-sectional study design was employed in TASH from August to November 2020. Observational checklists were used to assess the availability of 26 tracer medicines that are expected to be available in tertiary hospitals. Additionally, 125 outpatient encounters were prospectively assessed to determine the percentage of medicines dispensed from outpatient pharmacies. SPSS 21.0 was utilized for the analysis.

Result: The availability of EMs and the facility's ability to provide the required medication were found to be 65.3% and 66.7%, respectively. Among the 26 tracer medicines assessed, 13 (50%) experienced stockouts in the past six months. Specifically, Quinine injection, Z-KM(AM)-LF-Eto-Cs, and Glucose 40% were out of stock for six months, while Magnesium sulfate injection, Propranolol tablet, and Ketamine injection were stocked out for three months.

Conclusion: The availability of EMs in TASH was found to be low, with fifty percent of tracer medicines being stocked out in the past six months. Thus, it is crucial for policymakers, pharmacy directors, hospital administrators, and logistic managers to work in harmony to ensure a continuous supply of these essential medicines to the patients. [Ethiop. J. Health Dev. 2023; 37(3): 00-00]

Keywords: Essential medicine, stock-out, availability, TikurAnbesa Specialized Hospital, Ethiopia

Background

Essential medicines are products that satisfy the priority healthcare needs of the population, and should be readily available in the healthcare facilities at all times in adequate amounts with affordable prices for the community (1). Though access to essential medicines is a universal human right, and WHO recommends at least 80% availability of essential medicines in healthcare facilities, about one-third of the world population does not have access to essential medicines, particularly in Africa and Asia. This figure staggers 50%. The availability of generic medicines in public sectors of developing and middle-income countries ranges from 29.4% to 54.4% (2-4).

Similarly, there are frequent drug shortages in the public health facilities of Ethiopia. A national survey estimated that only 70% of key essential medicines were available in the public warehouse and 72.4% were available in the public health facility dispensaries. The median availability of a basket of medicines used for chronic illnesses, including hypertension, diabetes, and mental illnesses, was found to be low (54.55%). The length of stock-out duration was 19.6 and 26.6 days for public health facility dispensaries and warehouses supplying the public sector, respectively (5). Likewise, studies conducted in different parts of Ethiopia indicated poor availability of essential medicines ranging from 26%-73% (6-8).

The availability of essential medicine largely influences the quality of healthcare and patient satisfaction with services provided in public health facilities. The percentage of clients who get all of the prescribed drugs from dispensaries is one of the indicators of continuous availability of medicines and quality of pharmaceutical care in the country. Therefore it is important to measure the availability of essential medicines in TikurAnbesa Specialized Hospital (TASH) as core components to assess the readiness of facilities to deliver quality pharmaceutical services and to increase patient satisfaction. Hence, this study aimed to assess the availability of essential medicines and the facility's ability to provide the needed medication in TASH: Addis Ababa, Ethiopia.

Methods

Study Design

An institutional-based cross-sectional study design was employed to assess the availability of essential medicine in TASH. In addition, 125 outpatient encounters were prospectively assessed to determine the percentage of medicines dispensed from outpatient pharmacies of the hospital.

Study Setting and Period

An Institutional-based cross-sectional study was conducted in TASH from August to November 2020.

¹ Department of Pharmaceutics and Social Pharmacy, School of Pharmacy, College of Health Sciences, Addis Ababa University

² Department of Pharmaceutics and Social Pharmacy, School of Pharmacy, College of Health Sciences, Addis Ababa University

*Corresponding author email - muluwork.sahile78@gmail.com

The hospital is located in central Addis Ababa near the Emigration office. TASH is the largest education-affiliated referral Hospital in the country. It provides a full range of health care services, including outpatient, inpatient, surgical, referral, and teaching medical services that are not available in other public or private institutions. The hospital has about 700 beds and provides health care services for 370,000–400,000 clients a year. It has 1204 healthcare professionals, of which 85 are pharmacy professionals. There are more than ten pharmacy departments in the hospital, which include OPD pharmacy, pediatric oncology, adult oncology, oncology day care pharmacy, operation room pharmacy, intensive care unit pharmacy, adult emergency pharmacy, pediatric emergency pharmacy, diabetes clinic pharmacy, Anti-retroviral clinic pharmacy, and orthopedic clinic pharmacy.

Study Population and Sampling

TASH was selected purposively because it is the largest hospital in the country and faces significant challenges in ensuring the availability of essential medicines in Tertiary hospitals (9). All pharmacies giving outpatient pharmacy service in the hospital, pharmaceutical and medical supplies stores, and all outpatient encounters were the target population. The main outpatient pharmacy, main pharmaceutical store, and Prospective 125 outpatient encounters were included in the study.

Twenty-six tracer drugs (TDs) that were selected by the federal ministry of Health of Ethiopia and expected to be available in tertiary hospitals, were used as a tool to assess the availability of essential medicines. The TDs assessed include Ciprofloxacin 500mg tablet, Ceftriaxone 1gm injection, Fluconazole capsule/tablet, Metronidazole injection, Quinine injection, rifampicin/isoniazid/ethambutol/pyrazinamide fixed-dose combination, Ethambutol /Pyrazinamide /Kanamycin (Amikacin)/ Levofloxacin/Ethionamide/Cycloserine (E-Z-Km(Am)-Lfx-Eto-Cs) fixed-dose combination, Tenofovir/ Zidovudine+Lamivudine+ Efavirenz /Nevirapine (TDF/ZDV+3TC+EFV/NVP) adult combination, Magnesium Sulphate injection, Oxytocin 10units/ml injection, Isophen insulin N/R suspension /solution, Hydralazine injection, Nifedipine tablet, Adrenaline (Epinephrine) injection, Aminophylline injection, Propranolol tablet, Furosemide injection, Glucose 40%, Dextrose in normal saline/Ringer lactate, Dexamethasone/Hydrocortisone injection, Dopamin/Dobutamine, Atropine (injectable), Ketamine injection, Morphine injection, Doxorubicin Powder for injection, Cyclophosphamide powder for inj./tab(10).

Patient encounters that come to the outpatient pharmacy at the time of data collection and essential medicines that have at least 6 months of data on bin cards during the year under review were included in the study. Patient encounters in dispensaries other than the outpatient pharmacy unit, medical supplies, laboratory reagents, and documents with incomplete information were excluded from the study.

The outcome variables of the study were the availability of essential medicines and the facility's

ability to provide the needed medicine in a study setting. Data were collected on patient age, sex, drug availability on the day of the visit, number of medicines prescribed, number of medicines dispensed, and months out of stock.

Data collection tools and procedures

An observational checklist developed from the World Health Organization operational package for assessing, monitoring, and evaluating country pharmaceutical situation level II survey forms and the HMIS indicators reference guide prepared by Ethiopia Ministry of Health, was utilized (9,11). Components of the checklist include availability of essential medicine, percentage of drug dispensed, and average stock out duration of essential medicine within the last 6 months were assessed based on WHO's recommendation.

A product is said to be available if it is available in the health facility on the day of the visit. The annual availability of essential medicines is the proportion of months in the period under consideration for which a given tracer drug was available when needed. Any month in which drug unavailability is experienced, even for only 1 day, is reported as months out of stock. The following ranges were used for describing availability (13): ($\leq 50\%$ very low, 51–65% low, 66–80% fairly high, $>80\%$ high). The percentage of drugs actually dispensed also measures drug availability; it is measured by dividing the number of drugs actually dispensed at the health facility by the total number of drugs prescribed, multiplied by 100 (12).

Three trained pharmacy professionals collected data. The quality of data was assured by pre-testing the data collection tool at St. Paul Hospital and by providing training to data collectors on techniques of data collection. All the data were examined for completeness and consistency during data collection.

Data Analysis and Presentation

The collected data was entered and analyzed using Statistical Package for the Social Sciences (SPSS) Version 21. Descriptive statistics, including mean, percentage, and frequency were used to describe the data. The results were then summarized and presented through tables and graphs.

Results

Availability of essential medicine

In this study, we evaluated the availability of 26 essential medicines and determined, that the overall availability of essential medicine was 17(65.3%) on the day of the visit.

Percentage of Medicines Dispensed

The percentages of medicines dispensed were analyzed by assessing 125 patient prescriptions containing 378 medicines in the outpatient pharmacies of TikurAnbesa Specialized Hospital. Out of 378 medicines prescribed only 252 were dispensed on the day of the visit, indicating that TikurAnbesa Specialized Hospital was able to provide the required medicines at a rate of 66.7%.

Stock out Duration of Tracer drugs

Assessing stock-out duration helps to measure the annual availability of essential medicines. Among 26 tracer drugs (TD) assessed, 13(50%) were stocked out in the past six months. Three of the TDs namely quinine injection, Z-KM(AM)-LF-Eto-Cs, and Glucose 40%, experienced a high level of stock-out, with

durations lasting for six months. The remaining 10 tracer drugs had stock-out duration ranging from 1-3 months. Magnesium sulfate injection, Propranolol tablet, and ketamine injection were unavailable for 3 months(see Table 1).

Table 1: Tracer drugs stock out duration in the past six months in TASH, Addis Ababa, Ethiopia, 2020.

List of tracer drugs	Stock out any time in the past 6 months	Months out of stock(1/2/3/4/5/6)
Quinine injection	April-October	6
E-Z-Km(Am)-Lfx-Eto-Cs	April-October	6
Magnesium Sulphate injection	June, July, September	3
Ketamin injection	July, August, October	3
Oxytocin 10units/ml injection	June, September	2
Ciprofloxacin 500mg tablet	July, October	2
Isophen insulin N/R suspension /solution	April, august	2
Adrenaline (Epinephrine) injection	April, May	2
Propranolol tablet	August, October	2
Glucose 40%	April, October	2
Morphine injection	September-October	2
Fluconazole capsule/tablet	September	1
Dopamine/Dobutamin	August	1

Discussions

The current study aimed to assess the availability of essential medicines and the facility's ability to provide the needed medication in TASH: Addis Ababa, Ethiopia. The unavailability of drugs largely influences the healthcare quality, while getting prescribed medicines within the facility pharmacy improves patient satisfaction and overall trust in the healthcare system. The unavailability of pharmaceuticals at the hospital pharmacies results in increased expense to purchase medications from external pharmacies, delayed treatment outcomes, and psychological stress. Access to essential medicines can be measured in different ways, including the availability of essential medicine, the percentage of prescribed medicines dispensed to patients at public health facility dispensaries, and the average stock-out duration in public health facility dispensaries. In this current study, the overall availability of essential medicine in TikurAnbesa Specialized Hospital was found to be 65.3%, which is far lower compared to the minimum requirement of WHO (80%) to be available in public health facilities and the national percentage availability in public health facilities of Ethiopia (72.4%)(2,5, 14,15). However, the findings from this study are better than the findings from Malawi(48.5%) and Ghana(64.1%)(16,17). The reasons for such low availability in TASH might be attributed to the low stock status of the pharmaceutical fund and supply agencies, low budget allocation to the hospital pharmacy, and issues in procurement and stock management.

The percentage of clients who get all the prescribed drugs from the dispensary serves as an indicator of access to quality and affordable medicines. In this study, the overall percentage of medicines dispensed in the outpatient pharmacies of TikurAnbesa Specialized

Hospital, which was found to be 66.7%, which is very low compared to the WHO Recommendation (100%), as well as studies conducted in public health facilities of Ethiopia (92.43%), and Pakistan (90.9%)(5,18,19). This finding is an alarming since the unavailability of prescribed medicines in the hospital pharmacy forces the patient to purchase them from outside pharmacies, where the costs are nearly 20 times higher than those at TASH pharmacy.

Delays in treatment and complications are a significant outcome of the stock of drugs in the hospital pharmacy, and patients are challenged to buy the drugs outside. Essential medicine is considered available when it is not stocked out even for a single day in the month; it should be available in the health facilities at all times in adequate amounts with affordable prices by the community (15,20). Among 26 tracer drugs assessed, 13(50%) were stocked out in the past six months. Three of the TD that are quinine injection, Z-KM(AM)-LF-Eto-Cs, and Glucose 40%, experienced a high level of stock-out, which is six months duration, and the remaining ten tracer drugs experienced stock-outs duration ranged from one to three months. Additionally, Magnesium sulfate injection, Propranolol tablet, and ketamine injection were unavailable for a period of three months.

The findings of this study indicate a higher stock-out duration compared to previous research conducted in Adama, Ethiopia (40.6 days) and Gondar (30.5 days) (21, 22). Several factors may contribute to this discrepancy, including low or irregular consumption, issues with quantification and procurement, absence or incompleteness of logistic data, and logistical challenges that exceed the hospital's capacity.

The strength of the current study was using the World Health Organization's operational package for assessing, monitoring, and evaluating the country's pharmaceutical situation level-II survey form and the federal Ministry of Health HMIS reference guide, which allows for measuring the availability of essential medicine in a reliable and standard way. However, this study did not assess factors affecting the availability of essential medicine. Though the study was conducted at TikurAnbessa Specialized Hospital, which is the largest education affiliated referral Hospital in the country hospital, care should be taken while generalizing the result to hospitals in Ethiopia.

Conclusion

The availability of essential medicines and the percentage of medicines dispensed in the outpatient pharmacies of TikurAnbessa Specialized Hospital were found to be low. Besides, it was observed that fifty percent of tracer medicines had been stocked out in the past six months. Among 26 tracer drugs assessed, four priority life-saving medicines, quinine injection, Z-KM(AM)-LF-Eto-Cs, and Glucose 40% were consistently stocked out for six months period, while Dopamine/Dobutamine was stocked out for one month. Thus, it is imperative for policymakers, pharmacy directors, hospital administrators, and logistic managers to work in harmony to improve the availability of essential medicines. This can be achieved through strict inventory control, capacity building of staff responsible for logistics, increased budget allocation for medicines, and strengthening of Drug and Therapeutics Committees.

List of Abbreviations

TASH: TikurAnbessa Specialized Hospital

E-Z-Km(Am)-Lfx-Eto-Cs: Ethambutol-Pyrazinamide-Kanamycin (Amikacin)-Levofloxacin-Ethionamide-Cycloserine

TDF/ZDV+3TC+EFV/NVP- Tenofovir/
Zidovudine+Lamivudine+Efavirenz /Nevirapine

Declarations

Ethics approval

Ethical clearance and approval were obtained from the ethics review committee of the School of Pharmacy, Addis Ababa University. Permission to conduct the research was obtained from the administrative office of TikurAnbessa Specialized Hospital. The pharmacy coordinator, store manager, and pharmacist working in outpatient pharmacies of the hospital were informed about the purpose of the study and the documents required for the study. Before the data collection, verbal consent was obtained from pharmacists working in each pharmacy unit.

Consent for publication

Not applicable.

Availability of data and material

The datasets used during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

None.

Authors' contribution

All authors participated, starting from the conception of the research idea to the interpretation of the result and manuscript authorization. All authors have read, agreed to the final manuscript and approved the final manuscript.

Acknowledgments

The authors are grateful to Addis Ababa University for the initiation of undertaking this research. Our thanks also go to all the staff members of TikurAnbessa Specialized Hospital, especially to pharmacy staff members, for their cooperation during the data collection period.

Authors' information

¹Department of Pharmaceutics and Social Pharmacy, School of Pharmacy, College of Health Sciences, Addis Ababa University, Addis Ababa, Ethiopia.

²Department of Pharmaceutics and Social Pharmacy, School of Pharmacy, College of Health Sciences, Addis Ababa University, Addis Ababa, Ethiopia.

Reference

- World Health Organization. The world health report: reducing risks, promotion healthy life. Geneva; 2002. http://www.who.int/whr/2002/en/whr02_en.pdf. Accessed 11 May 2020.
- World Health Organization Equitable access to essential medicines: a framework for collective action. WHO Policy Perspect Med. <http://apps.who.int/n/iris/handle/10665/68571>. Accessed 11 May 2020.
- World Health Organization. The selection of essential Medicines WHO policy perspectives on medicines. Geneva; 2002. http://whqlibdoc.who.int/hq/2002/WHO_EDM_2002.2.pdf. Accessed 11 May 2020.
- Cameron A, Ewen M, Ross-Degnan D, Ball D, Laing R. Medicine prices, availability, and affordability in 36 developing and middle-income countries: a secondary analysis. *Lancet* 2009, 17; 373(9659):240-9. doi: 10.1016/S0140-6736(08)61762-6.
- Ethiopian Food and Drug Authority/ Federal Ministry of Health /.The-Ethiopian-Pharmaceutical-Sector-Assessment-2017. <https://www.scribd.com/document/494212641/Pharmaceutical-Assessment-2016> Accessed on 11 May 2020.
- Ethiopian Public Health Institute. Ethiopia Service Availability and readiness assessment 2016 summaryreport. <https://www.ephi.gov.et/images/pictures/download2009/v6%20Final%20SARA%20>

- Report%20Jan%202017.pdf. Accessed on 11 May 2020.
7. Abiye Z, Tesfaye A, Hawaze S. Barriers to access: availability and affordability of essential drugs in a retail outlet of a public health center in southwestern Ethiopia. *J Appl Pharm Sci.* 2013;3(10):101–5.
 8. Nigussie WD. Assessment of the degree of adherence to health facility indicators related to rational drug use in selected health facilities of AmharaRegion , Northwest Ethiopia. *Int J PharmaSci Res.* 2014;5(04):171–8.
 9. Federal Ministry of Health of Ethiopia the Health Sector Transformation Plan 2015. <http://www.global financing facility .org /Ethiopia -health-sector-transformation-plan-20151-201920>. Accessed on 11 May 2020.
 10. Federal Ministry of Health of Ethiopia. Health Management Information System.Indicator-Reference-guide 2014 .[.http://196.189.110.22/bitstream/handle/12345678 9/392/ HMIS% 20 Indicator% 20Reference % 20Guide% 20.pdf?sequence=1&isAllowed=y](http://196.189.110.22/bitstream/handle/12345678 9/392/ HMIS% 20 Indicator% 20Reference % 20Guide% 20.pdf?sequence=1&isAllowed=y). Accessed on 11 May 2020.
 11. World Health Organization Operational Package for Assessing, Monitoring-and-Evaluating Country Pharmaceutical Situation: Guide for Coordinators and Data Collectors, World Health Organization, Geneva, Switzerland, 2007. https://www.who.int/medicines /publications/ WHO_TCM_2007.2.pdf?ua=1. Accessed on 11 May 2020.
 12. World Health Organization. How to investigate drug use in health facilities: selected drug use indicators. Geneva: WHO/DAP/93.1; 1993. https://apps.who.int/iris/bitstream/ handle/ 10665/60519/WHO_DAP_93.1.pdf. Accessed on 11 May 2020.
 13. Nyanwura EM, Esena RK. Essential Medicine Availabilityand affordability: a case study of the ten top registered diseases in Bulisa district of Ghana. *International Journal of Scientific and Technology Research.International Journal Of Scientific & Technology Research.* 2013;2(8):208-219.
 14. World Health Organization. The world health report: reducing risks, promoting healthy life. Geneva; 2002. http://www.who.int/whr/2002/en/whr02_en.pdf. Accessed on 11 May 2020.
 15. World Health Organization. WHO Medium-term strategic plan 2008-2013; plan M-TS. 2008-2013. http://uis.unesco.org/sites/default/files/documents/ uis-medium-term-strategy-2008-2013-en_0.pdf. Accessed on 11 May 2020.
 16. Khuluza F, Haefele-Abah C. The availability, prices, and affordability of essential medicines in Malawi: A cross-sectional study. *PLoS One.* 2019;14(2):e0212125 doi: 10.1371/ journal.pone.0212125. PMID: 30753219; PMCID: PMC6372227.
 17. Mohammed E., Reuben K. Essential medicines availability and affordability: a case study of the top ten registered diseases in Builsa District [Doctoral dissertation]. University of Ghana. *International Journal Of Scientific & Technology Research.*2013;2(8):208-219.
 18. Yilma Z, Mekonnen T, Abdela E, Agmassie Z, Yehualaw A, Debasu Z, Tafere C, and Ararsie M Assessment of Prescription Completeness and Drug Use Pattern in Tibebe-Ghion Comprehensive Specialized Hospital, Bahir Dar, Ethiopia. *BioMed Research International Volume 2020, Article ID 8842515, 7 pages.*
 19. Atif M, Sarwar M. Azeem M, Naz M, Amir S, Nazir K. Assessment of core drug use indicators using WHO/INRUD methodology at primary healthcare centers in Bahawalpur, Pakistan. *BMC Health Services Research .*2016;16(1):684–689.
 20. Food, Medicine, and Health Care Administration and Control Authority of Ethiopia. National essential medicine list 5thed. Addis Ababa; 2014. <http:// apps. who. int/ medicine docs /documents /s17823en /s17823en/s.pdf> . Accessed on 11 May 2020
 21. Kefale AT, Shebo HH. Availability of essential medicines and pharmaceutical inventory management practice at health centers of Adama town, Ethiopia. *BMC Health Serv Res.* 2019;19(1):1–7.
 22. Fentie M, Fenta A, Moges F, Oumer H, Belay S, Sebhat Y. Availability of essential medicines and inventory management practice in primary public health facilities of Gondar town , north West Ethiopia. *J PharmaSci.Tech.* 2015;4(2):54–6.