STUDY PROTOCOL

REVISED An assessment of the factors contributing to the unavailability of drugs at outpatient pharmacy of tertiary care hospital: an observational study

[version 2; peer review: 2 approved]

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Abstract

Introduction

Throughout history and up until the present, there has been a medicine shortage. In the early 1920s, there was a shortage of insulin, which is when drug scarcity first appeared in the records. Drug shortages are now more prevalent globally than they were back then.

The goal of this essay is to pinpoint the key components that make up a definition for medication shortages and to pinpoint the circumstances that should be considered when reporting drug shortages in databases. Understanding the factors that led certain organizations to create their own definition of a medicine shortage was crucial for achieving these goals.

The pharmaceutical regulatory environment can be connected to several reasons why there are medication shortages, including parallel trading, quality standards, and business choices to halt or reduce manufacturing. The many rules governing medicine shortages have not yet been the subject of a thorough investigation. This protocol's objective is to analyze the pertinent legislative and regulatory frameworks in the European pharmaceutical system that affect medication shortages. The objectives of the study will be the non–availability of drugs at an outpatient pharmacy and to analyze the reason of non–availability of drugs.

Methods

Open Peer Review

Approval Status ✓ ✓

	1	2
version 2 (revision) 14 Oct 2024		✓ view
version 1 09 Oct 2023	✓ view	? view

1. **Trudy Huyghebaert**, Bow Valley College, Calgary, Canada

2. **Unyime Israel Eshiet**, University of Uyo, Uyo, Nigeria

Any reports and responses or comments on the article can be found at the end of the article.

An observational study will be adopted in this study. It includes a collection of data from the patient coming to the outpatient pharmacy of AVBRH Sawangi (Meghe) Wardha.

Expected result

It can lead to delayed treatment for patients seeking alternative medication. It can also lead to increased healthcare costs if patients seek alternative treatments that are more expensive or require additional medical care. The unavailability of drugs can also lead to frustration and anxiety for patients who need medication to manage their health condition. It can also negatively impact the reputation of the hospital.

Keywords
Outpatient pharmacy, drug, tertiary care hospital, unavailability of drug, opd, invalid prescription

This article is included in the Datta Meghe Institute of Higher Education and Research collection.

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Author roles: Bakare A: Conceptualization, Resources, Writing – Original Draft Preparation; **Bhargav A**: Supervision, Validation, Writing – Review & Editing

Competing interests: No competing interests were disclosed.

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First published: 09 Oct 2023, **12**:1287 https://doi.org/10.12688/f1000research.139510.1

REVISED **Amendments from Version 1**

1. We have added the objectives as suggested. 2. The methodology part has been updated and details about data collection instruments have been added. Also, the limitations of the study are added.

Any further responses from the reviewers can be found at the end of the article

Introduction

Throughout history and up until the present, there has been a medicine shortage. In the early 1920s, there was a shortage of insulin, which is when drug scarcity first appeared in the records. Drug shortages are now more prevalent globally than they were back then.[1]

The goal of this protocol is to pinpoint the key components that make up a definition for medication shortages and to pinpoint the circumstances that should be considered when reporting drug shortages in databases. Understanding the factors that led certain organizations to create their own definition of a medicine shortage was crucial for achieving these goals.[2]

The pharmaceutical regulatory environment can be connected to several reasons why there are medication shortages, including parallel trading, quality standards, and business choices to halt or reduce manufacturing. The many rules governing medicine shortages have not yet been the subject of a thorough investigation. This protocol's objective is to analyze the pertinent legislative and regulatory frameworks in the European pharmaceutical system that affect medication shortages.[3]

Local ordering problems, regional or national distribution problems, or manufacturing problems can all lead to supply problems that could lead to shortages on a regional or national scale. The United States has a complicated just-in-time inventory system that is used to distribute medications. A cost-saving method used to reduce the costs of carrying extra inventory is just-in-time inventory. This demonstrates that there is generally no product overstock anywhere throughout the supply chain. Generally, wholesalers are used to distribute the pharmaceuticals that manufacturers make. AmerisourceBergen, Cardinal, and McKesson are the top three wholesalers in the US. These wholesalers' distribution centers are dispersed throughout the nation.[4]

Nonetheless, it would be mistaken to ignore the reality that medicine shortages are also moral and political challenges if we just saw them as technical and economic events. Two things are intended by this: First, medicine shortages affect governments' and practitioners' ability to uphold their moral commitments to citizens and society when they occur Namely, to offer benefits, reduce damage, and encourage equity. Second, Social values lead to pharmaceutical shortages, particularly the choices we've made regarding what we value most in the pharmaceutical and biotechnology sectors, in government regulations, and in health care. These insights are significant because they emphasize the moral and political need to forcefully combat medicine shortages and the requirement that those who do so do it in politically and morally astute ways.[5]

The key factor causing medicine shortages in Saudi Arabia is the absence of a mechanism for early warning that may send out notifications about impending shortages. There is no penalty for failure to alert the Saudi Food and Drug Administration (SFDA) of any anticipated at a minimum six months prior to any shortages as there are currently no rules requiring such notification from pharmaceutical businesses and importers. Likewise, there are no effective sanctions against authorized importers and distributors of pharmaceutical firms who disregard Saudi government restrictions. Additional causes that cause medicine shortages in Saudi Arabia include inadequate local pharmaceutical production, flawed supply chain management systems, poor profit margins for some essential critical pharmaceuticals, tight regulatory requirements for biological medical goods, and excessive reliance on medication imports.[6]

Ethics and consent

The synopsis for this study has been sent to the IEC (DMIHER (DU)/IEC/2023/1162) in the institute for ethical approval and is currently under consideration. Written consent will be taken from the participants who are participating in the study.

Objectives

- To understand the flow at an outpatient pharmacy.
- To study the unavailability of medications at the outpatient pharmacy.
- To examine the cause of the medications' unavailability.

Study design

This study will be an observational study. The study will be conducted in Acharya Vinoba Bhave Rural Hospital. The duration of the study will be two years.

Sample size

The sample size of the study is 354. The data of this study is going to be conducted from an outpatient pharmacy and self-questionnaires. Questions will be given to the participant for data analysis.

Sample size formula

$$N \geq \frac{Z^2_{1-\alpha/2} \times p(1-p)}{d^2}$$

Where,

$Z^2_1 - \alpha/2$ is the level of significance at 5% i.e. 95%

Confidence interval = 1.96

Alpha (α) = 0.05

Estimate proportion (p) = 0.36 (48 out of 60 were the patient satisfying result as per reference article)

Estimate error (d) = 0.05

$$N = \frac{(1.96)^2 * (0.36) * (1-0.36)}{(0.05)^2}$$

N = 354

N = 354 subjects needed in the study

Inclusion and exclusion criteria

Included in this study will be the Patient willing to give a consent form, Patient having a valid prescription. And the Patient is willing to comply with the study protocol. excluded from the study will be Inpatient Invalid prescriptions.

Survey and questionary development of a verified self-questionary and direct open-ended questionary for outpatients who will be coming to the outpatient pharmacy.

Data collection techniques

The primary data for this study will be collected through an observational approach. This will involve in-depth interviews with patients and pharmacy staff, as well as observations of the pharmacy and its operations. Data will also be collected through hospital records to track the availability of drugs over time. Questionnaire will be provide to the patient and the pharmacists. Variable like availability of brands that are prescribed by the doctors, fewer counters, cost of the medications, etc.

Statistical analysis plan

Statistical techniques, such as Fisher's exact test or chi-square test, may be employed in this observational study to examine categorical factors associated with drug availability. To evaluate group differences for continuous variables, t-tests or ANOVA could be used. Furthermore, logistic regression may be helpful in determining the causes of unavailability.

Data analysis
Data will be analyzed by using simple descriptive statistics. Data will be presented in graphical, tables, charts, etc. Microsoft Excel will be used for data analysis.

Limitations of the study
This study will be only limited in AVBR Hospital, Sawangi (Meghe), Wardha 442001, Maharashtra.

Expected result
It can lead to delayed treatment for patients seeking alternative medication. It can also lead to increased healthcare costs if patients seek alternative treatments that are more expensive or require additional medical care. The unavailability of drugs can also lead to frustration and anxiety for patients who need medication to manage their health conditions. It can also negatively impact the reputation of the hospital.

Discussion
An observational study carried out in Belgium, on 30 October 2015 found that currently, there are more frequent medicine shortages. Although numerous definitions of "drug shortages" are provided in legislation, by various organizations, authorities, and other initiatives, a thorough analysis of the issue is still required. To properly interpret national databases and the findings of scientific investigations and allow for international comparison, it is crucial to understand the fundamental definition of drug shortages. The goal is to establish the many components that should be considered in a standardized definition for drug shortages in the European Union (EU) and to identify the various circumstances in which drug shortages should be reported. The methods employed involved searching scientific databases and grey literature for definitions of drug shortages. Similar subjects were found, and organizations were approached to develop the definitions' supporting arguments. According to the findings, there are over 20 different definitions of medicine shortages. There is a discrepancy between the terminology used for reporting drug shortages and the definitions used in general. The definitions' elements—such as when a supply issue turns into a scarcity of drugs, whether they are permanent or temporary, their typology, and their duration—show both parallels and differences. There are four levels at which a supply issue becomes a shortage: (i) demand side; (ii) supply side; (iii) drug delivery; and (iv) drug availability. Definitions of drug shortages do not usually include permanent drug discontinuations. Some definitions solely consider medications needed to treat serious illnesses or medications for which there is no effective substitute. The observed time intervals ranged from one day to twenty days. The study's conclusion was to enable worldwide benchmarking, a standardized definition of drug shortages must be established, together with a list of the situations in which reporting drug shortages is preferred. A number of studies related to shortages in outpatient pharmacy were reported.[7-11] This essay can be used as a reference to highlight all the various factors that should be considered while formulating a definition that will be used throughout the EU.[3]

Dissemination
The study will be published in an institutional-indexed journal.

Study status
The study is under process with 50% Completion.

Data availability
No data associated with this article.

Acknowledgment
I would like to acknowledge and thanks my guide and faculty of the Hospital Administration department who made this work possible.

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Publisher Full Text

Open Peer Review

Current Peer Review Status: ✔ ✔

Version 2

Reviewer Report 03 December 2024

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✔ **Unyime Israel Eshiet**
University of Uyo, Uyo, Nigeria

Satisfactory.
Please accept for indexing.

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 09 September 2024

https://doi.org/10.5256/f1000research.152787.r294888

? **Unyime Israel Eshiet**
University of Uyo, Uyo, Nigeria

This is an interesting study and well conceived. The authors have however not explicitly presented the specific objectives of the study. The proposed study designed is not clearly described to ascertain suitability. Also the method is not sufficiently described. Authors should kindly provide details of the data collection instrument(s).
What are the possible limitations of the study?

Is the rationale for, and objectives of, the study clearly described?
Partly

Is the study design appropriate for the research question?
Partly

Are sufficient details of the methods provided to allow replication by others?
No

Are the datasets clearly presented in a useable and accessible format?
Not applicable

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 08 Oct 2024

Abhishek Bakare

Thanks for your valuable time and suggestions. 1. We have added the objectives as suggested. 2. The methodology part has been updated and details about data collection instruments have been added. Also, the limitations of the study are added. Thanks for your kind perusal.

Competing Interests: nil

Reviewer Report 24 June 2024

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Trudy Huyghebaert
School of Health and Wellness, Bow Valley College, Calgary, Alberta, Canada

This is a very important topic and I think one of the key aspects of this is with regard to the moral and ethical obligation of drug companies to provide a consistent supply to their medication for patients, which may involve re-evaluating their just-in time approach to inventory as described.

Overall, this is a very well written protocol. It is a study protocol and there are no results to

evaluate Comments are added below for a few minor revisions:
1. Provide an expended definition of parallel trading

2. The authors refer extensively to the United States system and wholesalers and then segway into Saudia Arabia system. If possible, please explain more about the correlation (or similarities) between the two systems.

Is the rationale for, and objectives of, the study clearly described?
Yes

Is the study design appropriate for the research question?
Yes

Are sufficient details of the methods provided to allow replication by others?
Yes

Are the datasets clearly presented in a useable and accessible format?
Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: quality improvement, primary care, evidence based medicine

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.