

Impact of Essential Drug Shortage on Patient Care: A Survey from Hospitals Pharmacists Perspective

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Abstract:

Background:

Essential medicines are defined by the World Health Organization as those that satisfy the priority healthcare needs of the population . They are selected based on disease prevalence, evidenced on efficacy and safety , and comparative cost effectiveness. Ensuring the uninterrupted availability of these drugs is critical for maintaining the quality, continuity , and equality of patient care. However , in recent years, many healthcare systems – including those in low and middle income countries like India – have experienced recurrent shortages of essential medicines.

The impact of such shortages extends far beyond simple inconvenience . they can disrupt established treatment protocols, delay or cancel surgical procedures, increase healthcare cost, and most critically , compromise patient safety and therapeutic outcomes .Shortages also place added pressure on healthcare professionals, often with limited clinical evidence or availability.

Hospital pharmacists play a pivotal role in mitigating the effects of drug shortages. Their responsibilities include managing inventory , coordinating with suppliers and clinicians , suggesting therapeutic alternatives, and ensuring compliance with institutional protocols

This study aims to explore and document the experience of hospital pharmacist regarding the frequency , cause and clinical consequences of essential drug shortages.

Objective:

To evaluate the perceptions of hospital pharmacists regarding the effects of essential drug shortage on patient care, and to identify the key causes and mitigating strategies.

Methods:

A cross- sectional , questionnaire – based survey was conducted among licensed hospital pharmacists across tertiary care institutions .The questionnaire assessed frequency and types of drug shortages, impact on clinical practice, and pharmacist-led interventions. Despite statistics were used for data analysis.

Result:

Out of 120 responses received ,82% of pharmacists reported regular shortages of critical medications, particularly antibiotics, oncology drugs and cardiovascular agents. Approximately 70% observed delayed therapy, while 45% linked shortages to increased medication error. Major causes included supply chain inefficient(67%), delayed procurement (52%), and regulatory restrictions (30%). Pharmacists actively employed strategies such as therapeutic substitution (73%) and physician coordination (80%). Suggestion included improved inventory management (78%) and policy – level reforms (62%).

Conclusion:

Essential drug shortages pose a significant threat to effective patient care . Hospital pharmacists play a central role in managing such crises. Systemic improvements in procurement processes and better integration of pharmacists in policy decisions are essential to ensure continuity of care.

Keywords:

Drug shortage, essential medicines, hospital pharmacy , patient safety , pharmaceutical supply chain

1.Introduction

Essential medicine are those that satisfy the priority healthcare needs of the population . However, despite their critical importance , healthcare institutes worldwide are facing increasing instances of drug shortages. These shortages compromise treatment protocols, delay therapies, and create significant operational challenges for healthcare professionals, especially pharmacists.

In recent years, however, there has been a growing and troubling trend in shortage of essential medicines across both high – income and low- to middle – income countries. Drug shortages- especially of antibiotics, oncology drugs, cardiovascular agents, anesthetics and emergency medications- have become a recurrent challenge fir healthcare institutions. These shortages compromise standard treatment protocols, increase reliance on off – label or less effective substitutes, and can result in severe clinical consequences, including suboptimal therapeutic outcomes, prolonged hospital stays, and even patient mortality.

The causes of drug shortages are complex and multifactorial . Key contributing factors include manufacturing issues (such as raw material shortage or quality control failures), regulatory delays, supply chain inefficiencies, inadequate forecasting, poor inventory management and budgetary constraints .In

developing countries like India, these problem are compounded by fragmented procurement systems ,lack of centralized inventory databases, and inconsistent policy implementation. Rural and semi- urban hospitals often face the brunt of these shortages due to limited purchasing power and weaker supplier networks.

Despite the central role that pharmacists play in managing drug supply , there remains a significant gap in literature documenting their experiences, challenges, and proposed solutions regarding essential drug shortages- especially in the Indian healthcare setting . Most existing research focuses on supply chain data or clinical insights that pharmacists can uniquely provide.

In this context , the present study aims to explore the impact of essential drug shortages on patient care from the perspective of hospital pharmacists. Specially , it investigate the frequency and types of drug shortages encountered , their consequences on treatment outcomes, the perceived underlying causes, and the range of mitigating strategies employed by pharmacists.

2. Material and Methods

2.1 Study design

This study was designed as a cross – sectional , descriptive survey aimed at gathering quantitative and qualitative data from licensed hospital pharmacists. The research was conducted over the period of 3 months (March to May 2025) across multiple tertiary care hospitals . Both private and government healthcare institutions were included to ensure a broader representation of healthcare setting and practices.

2.2 Study Population

The study targeted registered hospital pharmacists working in inpatient care settings with direct responsibility over inventory management , drug procurement , or clinical pharmacy services. Pharmacists were eligible to participate if they had :

- A valid license issued by the pharmacy council of India(PCI)
- A minimum of one year of continuous work experience in a hospital pharmacy,
- Willingness to provide informed consent .

Pharmacists working solely in outpatient pharmacies ,academic institutions, or administrative roles unrelated to clinical or inventory decisions were excluded.

2.3 Sampling and Sample Size

A purposive sampling technique was employed to ensure inclusion of pharmacists with relevant clinical and operational responsibilities. The sample size was calculated based on the expected prevalence of reported drug shortages, with a margin of error of 5% and confidence level of 95%. Based on this estimation , a

minimum sample size of 100 respondents was deemed statistically adequate .Ultimately, 120 pharmacists were surveyed , ensuring data robustness and variability.

2.4 Instrument Development and Validation

A structured questionnaire was developed after an extensive review of exiting literature , WHO guidelines, and previous surveys on drug shortages. The questionnaire was divided into five key domains:

1. **Demographic Information-** Age , gender, qualification, years of experience, and type of institution.
2. **Frequency and Types of Drug Shortages-** Therapeutic classes commonly affected , duration , and frequency .
3. **Clinical Implications-** Effects on patient treatment , medication errors, therapy delays, healthcare costs.
4. **Perceived Causes of Shortages-** Supply chain, procurement , manufacturing , and regulatory issues.
5. **Mitigation Strategies-** Interventions adopted by pharmacists and suggestion for future improvement .

2.5 Data Collection Procedure

Data collection was conducted via both online (Goggle forms) and offline (paper based) methods, depending on the preference and accessibility of the participants. Pharmacists were briefed on the purpose of the study and assured of the confidentiality of their responses. Informed consent was obtained prior to participation.

Participation was voluntary and no incentives were provided . Respondents were given approximately 15-20 minutes to complete the questionnaire

2.6 Ethical Considerations

The study protocol was reviewed and approved . Participants were informed that their responses would be used solely for academic and research purposes and that their identities would remain anonymous.

2.7 Data Analysis

Data collected from the survey were entered into Microsoft Excel and analyzed using SPSS version 25.Descriptive statistics were used to summarize participant demographics and survey responses. Frequencies and percentage were calculated for categorical variables.

3.Result

3.1 Demographic Characteristics of Respondents

A total of 120 hospital pharmacists participated In a survey . Among them, 52% were female and 48% were male . The majority of respondents(68%) were between the ages of 25 and 40 years, while 25% were above

40, and the remaining 7% were below 25 years .Regarding educational qualification , 60% held an M. Pharm degree, 30% had a B.Pharm , and 10% had a Pharm.D.

In terms of professional experience, 45% had 1-5 years, 35% had 6-10 years, and the remaining 20% had over 10 years of work experience The distribution of respondents by type of institution revealed that 58% worked in government hospitals, while, 42% were employed in private hospitals.

3.2 Prevalence and Types of Drug Shortages

An overwhelming 85% of respondents reported experiencing essential drug shortages in their hospitals within the past 6 months. Among these, 63% classified the shortages as frequent , occurring at least once every month.

The most commonly affected drug categories were:

- **Antibiotics** (78%) – including ceftriaxone, piperacillin – tazobactam, and vancomycin
- **Cardiovascular drugs** (61%) – such as metoprolol, amlodipine, and nitroglycerin
- **Analgesics and anesthetics** (52%) – including tramadol, fentanyl, and bupivacaine
- **Anti- diabetic agent** (35%) – especially insulin varieties
- **Emergency drugs** (28%) – such as epinephrine and atropine.

3.3 Reported Causes of Drug Shortage

Respondents identified multiple causes for the shortages . The most frequently cited reasons were:

- **Delayed supplier delivery and logistical issues** – 68%
- **Poor forecasting and inventory planning** – 59 %
- **Manufacturing disruption** – 54%
- **Budgetary constraints and delayed payments** – 43%
- **Regulatory issues including drug bans or import restrictions** – 27%

Notably , 72% of pharmacists reported lack of a centralized drug procurement systems as a critical factor contributing to shortages in public hospitals.

3.4 Impact on Patient Care

The majority of pharmacists observed significant impacts of drug shortages on patient care:

- **Therapeutic delays or interruptions were reported** by 70%
- **Substitution with less effective or more expensive alternative** – 63%
- **Increased incidence of medication errors due to unfamiliar substitute drugs** – 38%
- **Reduced patient trust and increased complaints-** 41%

- **Increased burden on pharmacy staff and clinicians – 55%**

About 20% of respondent shared that patients had to purchase essential medicines from private pharmacies, including their out –of- pocket expenditure.

3.5 Mitigation Strategies Used

Hospital pharmacists implement several strategies to manage the shortages:

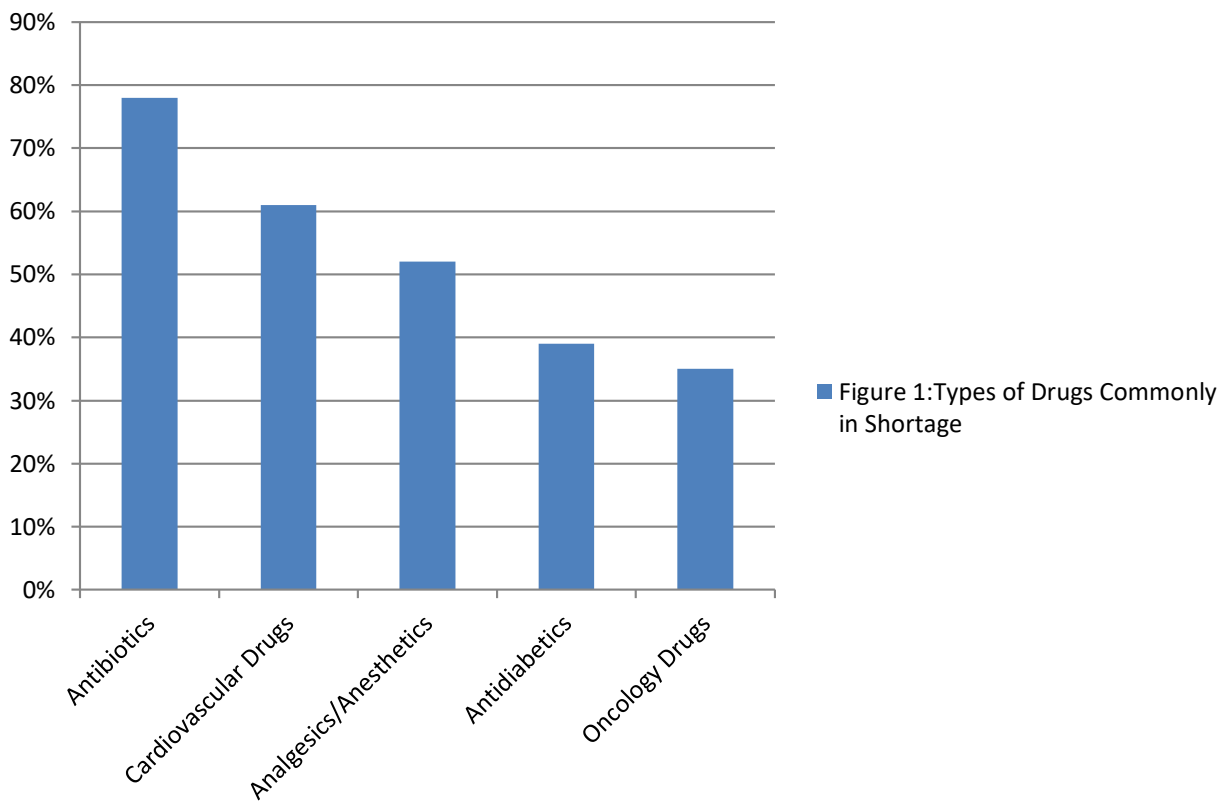
- **Therapeutic substitution after consultation with physicians – 66%**
- **Internal redistribution of stock from other departments – 48%**
- **Maintaining the buffer stock of high risk drugs - 35%**
- **Vendor negotiation for emergency procurement – 29%**
- **Use of local pharmacy networks for urgent needs – 22%**

Only 14% of institutions had a formal policy or SOP for managing drug shortages, indicating a substantial gap in institutional preparedness.

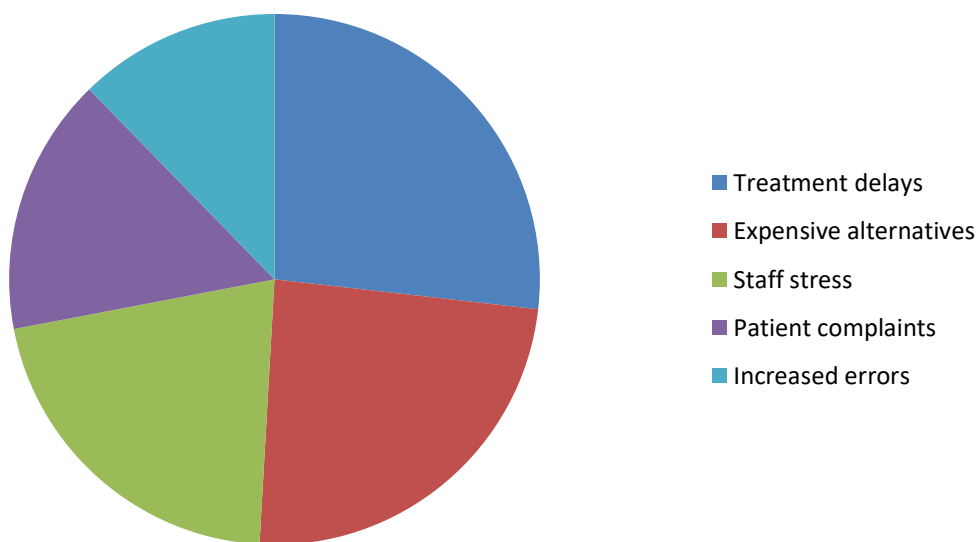
3.6 Suggestions from Respondents

Pharmacists emphasized the need for the following systemic interventions:

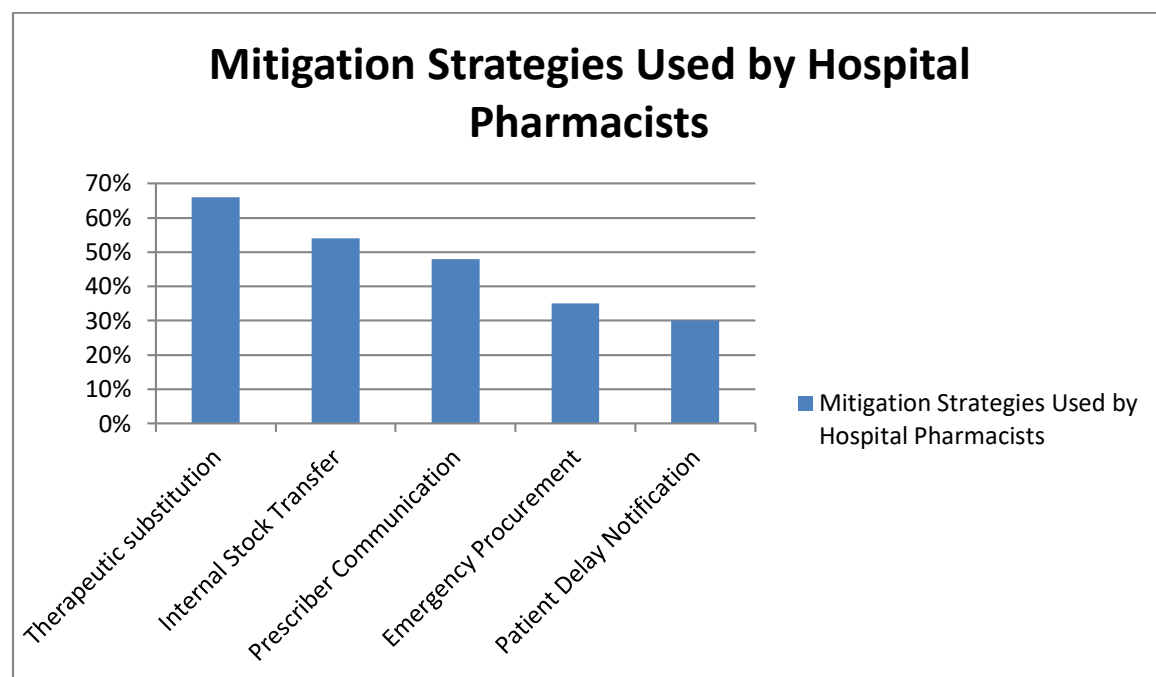
- **Improved forecasting and real time stock monitoring – 74%**
- **Dedicated budgets for essential drug stockpiling – 57%**
- **Training programs on shortage management for pharmacy staff – 43%**
- **Government support for faster drug importation or production approvals – 39%**

Figure 1:Types of Drugs Commonly in Shortage

This figure shows the percentage of respondents reporting shortages in key drug categories such as antibiotics, cardiovascular drugs and others.

Impact of Drug Shortages on Patient Care

This figure illustrate the perceived impacts of drug shortage on patient care, including treatment delays, cost burden and medication errors.



This figure shows the mitigation strategies employed during shortage, such as therapeutic substitution, internal stock transfer and prescriber communication.

Discussion

The findings of this study highlight the significant impact of essential drug shortages on the delivery of patient care from the perspective of hospital pharmacists. A majority of respondents reported frequent shortages of critical therapeutic categories, particularly , antibiotics, cardiovascular medications, and analgesics. These findings are consistent with global trends reported in recent literature, which identify antimicrobial and life saving drugs as being among the most frequently affected by supply chain disruptions.

The primary factors contributing to drug shortages in this study included delayed supplier deliveries, poor forecasting and inventory planning , manufacturing issues, and financial or procurement – related constraints. These root causes align with those reported in similar studies conducted in developing nations, where healthcare infrastructure and regulatory enforcement are still evolving . In particular, the issue of supplier delays suggests potential weaknesses in local distribution networks or over- reliance on a limited number of vendors.

Hospital pharmacists overwhelmingly reported that drugs shortages negatively influence patient care. Delayed or interrupted treatment , the need for more expensive alternatives, and higher risks of medication errors were among the most cited consequences. These disruptions not only affect treatment efficacy but may also erode patient trust and satisfaction.

Therapeutic substitution and internal stock redistribution were the most common mitigation strategies adopted by pharmacists. While these measures provide temporary relief, they are not sustainable long term solutions. There is a pressing need for systemic interventions such as enhanced supply chain transparency, real time inventory tracking, and improved communication between procurement departments and hospital pharmacies.

The current studies reinforce the critical role of hospital pharmacists not only as dispensers of medication but as key players in identifying and mitigating drug supply issues. It also underlines the need for policymakers and hospital administrators to implement robust procurement strategies, diversify supply sources, and invest in pharmacist training related to shortage management.

Strengths and Limitations

A strength of this study is its focus on pharmacists' frontline experiences, offering a practical perspective on how shortages manifest in real clinical settings. However, limitations include the self-reported nature of the data, which may be subjected to response bias. Additionally, the study was geographically limited and may not reflect national level trends.

Conclusion

This study underscores the critical and multifaceted impact of essential drug shortages on patient care in hospital settings. The results reveal that the drug shortages are not only frequent but also involve essential therapeutic categories such as antibiotics, cardiovascular agents, and analgesics. These shortages significantly compromise the quality of healthcare delivery by causing treatment delays, increasing the use of costly alternatives, and elevating the risk of medication errors.

Hospital pharmacists, as frontline healthcare professionals, play a vital role in identifying, managing, and mitigating the consequences of such shortages. The most commonly adopted strategies – therapeutic substitution, internal redistribution, and communication with prescribers – are reactive and short-term in nature. The findings highlight the urgent need for systemic solutions such as better supply chain management, real time inventory systems, policy reforms, and capacity – building initiatives for pharmacists.

Addressing drug shortages requires coordinated efforts from healthcare institutions, policymakers, suppliers, and regulatory bodies. By prioritizing the availability of essential medicines and empowering pharmacists in the procurement and decision – making processes, healthcare systems can improve resilience and safeguard patient care.

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