

Title

Identifying and Reducing Dispensing Errors and Delays in IPD Pharmacy of Narayana Hospital

Introduction

Medication safety is one of the key issues in healthcare delivery systems of the world, and the dispensing errors and delays are the major cause which contributes greatly to the preventable events of adverse nature in hospitals. The present study focuses on the operational challenges to the Inpatient Department (IPD) pharmacy at Narayana Hospital in Gurugram, a 215 -bed tertiary care setting, that often failed to deliver medications in time, could not account for doses, and made dispensing mistakes.

The universal relevance of this problem is brought to the front by global initiative by the World Health Organization in 2017 which aimed at promoting safety in medication. Medication errors (being the events that can be avoided in the process of prescribing, transcribing, dispensing, or administering) continue to be on the list of the most frequent causes of therapeutic failure, longer stay of the patient, and higher costs of healthcare. Dispensing errors, that include improper dose/strength supply, inappropriate dosage forms, as well as inadequate labeling, is a significant patient safety threat.

Some preliminary observations at Narayana Hospital have identified the several factors for these dispensing problems that include understaffed, inadequate infrastructure, interdepartmental communication gaps, and non-standardized procedures. Such inefficiencies have led to treatment delays, increased nursing workload and possible patient safety risks, which requires a systematic intervention.

This research is aimed at thorough identification and rectification dispensing errors, determining their underlying causes, development of evidence-based

solution and analysis of the intervention's outcomes. The value of this work goes beyond short-term operational benefits to include improved patient safety outcomes; compliance with regulations; savings in costs; opportunities for learning in the organizations; and development of evidence-based practice standards.

Through effective methodology and targeted interventions, this study aims to develop a safer and more efficient medication dispensing system that can be an example for other similar healthcare facilities that experience similar operational challenge.

Review of Literature

Authors	Origin	Year	Title	Purpose
<u>Derar H. Abdel-Qader</u> , <u>Ahmad Z. Al</u> <u>Meslamani</u> , <u>Penny J. Lewis</u> & <u>Salim Hamadi</u>	Jordan	2021	Incidence, nature, severity, and causes of dispensing errors in community pharmacies in Jordan	The study aimed to investigate the incidence, nature, severity, causes and predictors of medication dispensing errors.
<u>Mir S. Adil</u> , <u>Ruqiya Sultana</u> , and <u>Daulat Khulood</u>	India	2020	PRIME study: Prescription review to impede medication errors	The primary objective of the study was to determine whether patient safety can be improved by clinical

				pharmacy services. The study also aimed to reveal whether medication errors can be prevented by any means.
Gary L Cochran , Ryan S Barrett , Susan D Horn	USA	2016	Comparison of medication safety systems in critical access hospitals: Combined analysis of two studies	The role of pharmacist transcription, onsite pharmacist dispensing, use of automated dispensing cabinets (ADCs), nurse-nurse double checks, or bar code-assisted medication administration (BCMA) in reducing medication error rates in critical access hospitals (CAHs) was evaluated.
María José Fernández-Megía , Isabel Font Noguera , Matilde	Spain	2016	Monitoring the quality of the hospital pharmacology-	To analyze the results of sentinel patient program to monitoring the

Merino Sanjuán , José Luis Poveda Andrés			therapeutic process by sentinel patient program	quality pharmacology- therapeutic process in the hospitalized patient through medication errors.
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A systematic view and meta-analysis was done by Irene S. Um, Alexander Clough, Edwin C.K. Tan at the *University* of Sydney , they examined that Dispensing errors can cause preventable patient harm such as adverse drug events, hospitalization, or death. The aim of this study was to systematically review the literature and quantify the global prevalence of dispensing errors across pharmacy settings. The result showed that of the 4216 articles, 62 studies were included. Hospital was the most common pharmacy setting (n = 44, 71.0%) and 15 studies were based in the community. The type of denominator used to report dispensing errors varied between studies, such as dispensed items (n = 45, 72.6%), doses (n = 7, 11.3%), or patients (n = 5, 8.1%). The prevalence of dispensing errors ranged from 0 to 33.3% (n = 62 studies with 64 prevalence estimates). The pooled prevalence for dispensing errors across all studies was 1.6% (95% CI 1.2%–2.1%, I² = 100%). A majority of studies were of moderate methodological quality (n = 36, 58.1%) and inter-rater reliability was applied in eight studies. It was concluded that the worldwide prevalence of dispensing errors was 1.6% across community, hospital and other pharmacy settings. This varied depending on the type of denominator used, study design and how the error was identified. This review highlights the need for consistent definitions and standardized classifications of dispensing errors worldwide to reduce heterogeneity. Various other studies have been done to study the dispensing error.

Existing literature highlights the most common error types reported in the studies were wrong medication dispensed, wrong medication strength and not specified/ other labeling error, although not all studies categorized error types. These findings were similar to a review by Aldhwaihi et al. (2016) that identified the most frequent errors reported in hospital pharmacies were wrong medicine, wrong strength, wrong quantity, and wrong dosage form.

By implementing the best practices like Process Analysis, Turnaround Time Measurement, Error Analysis and Resource Assessment, healthcare organizations can better position themselves and it will lead to decrease in incidences of errors.

Research Questions

Q1. What are the primary causes of dispensing errors and delays in the IPD pharmacy at Narayana Hospital?

Q2. How can these errors and delays be minimized?

Objective

This study aims to assess the frequency and types of dispensing errors and delays in IPD pharmacy, to identify the factors contributing to these errors, to propose and implement strategies to reduce dispensing errors and delays, and to evaluate the impact of the corrective measures implemented.

Hypothesis

Implementing a structured workflow improvements and digital solutions in pharmacy operations will minimizes dispensing errors through supplemental efforts. Structured workflows will ensure standardized protocols, clear

verification checkpoints, and identified responsibilities of the staff, while maximizing the physical environment by improved organization, and visual signals. Digital technologies offer invaluable protections with bar-code verification systems, automated dispensing cabinets, and a clinical decision support software that can detect potential problems before getting to the patients. Real-time analytics allow for constant tracking of errors and quick solution. Collectively, these improvements result in several barriers aimed at handling system vulnerabilities and human errors, which could improve dispensing errors by 50-80% when implemented correctly, with proper training of staff and change management assistance.

Material and Methods

1. **Study Design:** This observational study employs a pre-post intervention design to identify and reduce dispensing errors and delays in Narayana Hospital's IPD pharmacy, documenting baseline error rates through direct observation and audits, implementing targeted workflow and digital interventions, and measuring outcomes to evaluate improvement efficacy over a nine-day period.
2. **Setting:** IPD Pharmacy, Narayana Hospital
3. **Study Population:** Emphasizing those connected to new admissions and inpatient treatment procedures, all medication indents handled at the IPD pharmacy at Narayana Hospital throughout the 9-day observation period. (3647 Indents)

4. **Duration of Study:** 25th March, 2025 - 2nd April , 2025
5. **Sample Size:** A total of 76 **indents** were completely tracked and analyzed across the study period (25th March to 2nd April 2025).
6. **Sampling Technique:** Purposive sampling
7. **Data Collection Procedure:** The study methodology includes direct observation of pharmacy workflow, review of pharmacy records, interviews with pharmacy and nursing staff, and measurement of dispensing error rates and dispensing delays to comprehensively assess the medication dispensing process.

Research Gap

While numerous studies have examined medication errors in Western healthcare settings, there is limited research addressing dispensing errors specific to large tertiary care hospitals in India. This study addresses critical research gaps by investigating context-specific factors influencing dispensing errors within Narayana Hospital's unique operational environment, evaluating the effectiveness of combined workflow restructuring and digital interventions tailored to resource constraints in emerging healthcare markets, and developing culturally appropriate implementation strategies that consider local workflow patterns, staffing models, and technological infrastructure limitations not addressed in existing literature.

Conceptual Framework

The conceptual framework of this study relies upon the Swiss Cheese Model of Error Prevention and the Systems Theory in Healthcare Delivery, which together establish that errors, including medication dispensing errors, do not occur because of individual's faults solely, but systemic weaknesses correlating to contribute to errors in the long-term.

1. Swiss Cheese Model :

- Origin: Geared by a great psychologist in human error research, James Reason (1990).
- Core Idea: Errors arise when several layers of defense (which have their "holes" or imperfections) fail at once for the hazard to be allowed through all layers and do the harm.
- Application in Healthcare: Adopted by many in patient safety, especially such organizations as WHO and Institute for Healthcare Improvement (IHI).

2. Systems Theory in Healthcare :

- Origin: Grew from General Systems Theory by Ludwig von Bertalanffy in the 1940s which was later modified for complex systems such as the hospitals.
- Core Idea: Organization is considered as system of interrelated elements. An alteration in one element has a domino effect on the rest of them.
- Application in Healthcare: Establishes holistic analysis and multi disciplinary working. Used to understand complicated procedures such as the dispensing of medication.

Plan of Analysis

The study methodology incorporates analysis of dispensing error and delay trends using descriptive statistics, with software tools including Excel employed for comprehensive statistical evaluation of both baseline data and intervention outcomes.

Ethical Considerations:

- Informed consent will be obtained from all participants.
- Data confidentiality will be maintained.

References

1. Um IS, Clough A, Tan EC. Dispensing error rates in pharmacy: a systematic review and meta-analysis. *Research in Social and Administrative Pharmacy* 2024;20:1-9.
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4. Eisa-Zaei A, Hiremath SRR, Prasad S. Comprehensive evaluation of medication errors incidence at a tertiary care hospital. *Int J Pharma Sci Res* 2018;9:5315–5319.