IDENTIFYING AND REDUCING DISPENSING ERRORS AND DELAYS IN IPD PHARMACY OF NARAYANA HOSPITAL, GURUGRAM

Dissertation Submitted to

The IIHMR University, Jaipur

for the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

by

Abhishek Kaushik

Under the Supervision and Guidance of

Dr. Deepti Sharma

2025

IIHMR UNIVERSITY

CERTIFICATE

This is to certify that dissertation titled **"Identifying and reducing dispensing errors and delays in IPD Pharmacy of Narayana Hospital, Gurugram"** is a record of the research work undertaken by Dr. Abhishek Kaushik in partial fulfillment of the requirements for the award of the degree of MBA Hospital and Health Management from the IIHMR University, Jaipur under my guidance and supervision and his/her approach to the research study has been sincere, scientific, and analytical.

Dr. Sanjay Gupta

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NHG/HR/APR/2025/39

May 31, 2025

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Abhishek Kaushik** in partial fulfillment of the requirements for the award of the degree of MBA **(Hospital and Health Management)** from the **IIHMR** University, Jaipur has successfully completed his Dissertation Training from **March 10, 2025 to May 31, 2025** in the **Medical Administration (Quality)** department of Narayana Superspeciality Hospital , Gurugram

During the period of his training with us his performance was good. He was found punctual, hardworking and inquisitive.

Any information used to complete the project is the intellectual property of Narayana Superspeciality Hospital , Gurugram and hence should not be used for any other purpose.

We wish him the very best for all his future endeavours.

For, **Narayana Hrudayalaya Limited,**

Gagan Sharma
Lead - Compensation & Benefits
& Unit Human Resources

DECLARATION BY STUDENT

I hereby declare that this dissertation titled **"Identifying and reducing dispensing errors in IPD Pharmacy of Narayana Hospital, Gurugram"** is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Dr Abhishek Kaushik
Date : 22nd March , 2025

ABSTRACT

Mistakes in dispensing medicines in hospital pharmacies are a major challenge to both the safety and quality of healthcare. Narayana Hospital's in-patient pharmacy receives thousands of medications orders every month, increasing the possibilities for problems that might affect how patients feel. Error in the dispensing of medicine happens even after new devices and methods have been implemented.

Objectives

The aim of this study is to find, categorize and examine dispensing errors within the IPD pharmacy of Narayana Hospital. Further, the research will work on developing, putting into practice and assessing targeted ways to reduce the number and seriousness of medication error incidents which will also improve patient safety and operational performance of the pharmacies.

Methods

In this study, after receiving approval, the participating area was observed for nine days. Observation, process tracking and error reports were used to examine and understand the eight-step medication dispensing flow. Errors in medication were grouped by their type, how serious they were, what factors caused them and the phase of the workflow in which they happened. Analysis of the main factors behind critical incidents was carried out. Using the research, a strategy involving several steps was created, applied and after three months, its effectiveness was evaluated.

Results

After making changes, the percentage of dispensing errors went down from 17.1% to 7.9%. The turnaround time for urgent (stat) indents decreased from 42.5 to 27.5 minutes and routine indent TAT went from 105–115 to 70–72.5 minutes. A fall of 16% in medication returns was seen, as well as a decrease in the number of patients returning more than once a day for medicine by 45%. Workers confirmed that their understanding of their roles, communication and the way things worked were improved.

Conclusion

The findings show that using a methodical way to observe errors in dispensing and customizing interventions to solve issues results in fewer medication errors in an IPD pharmacy setting. They demonstrate that frequent analysis of workflows, joining efforts from different departments and continuous improvements are important for better medication safety. The approaches shared here can act as an example for hospital pharmacies wanting to decrease errors with medications and enhance patient safety.

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Sincerely,

Dr. Abhishek Kaushik

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CHAPTER – 1

INTRODUCTION

1.1 Background

The safe use of medications plays a vital role in enhancing health outcomes. The World Health Organization came up with a global campaign initiated in March 2017 for medication safety through the enhancement of systems that prevent errors and avoidable harm in medication use. Hospital pharmacy serves as an integral centre that ensures that the right drug is given to the right patient at the right time. Considering this, an incorrect dispensing of medications is one of the most recorded errors in the healthcare world.

Medication errors constitute of preventable incidents that account significantly for treatment failures, codes for a prolonged hospital stay, and high healthcare costs. Errors can occur at various stages of the medication process- prescribing, transcribing, dispensing, or administration of drugs.

Dispensing error, is any undesired change that occurs between the medicines given and those specified in the written prescription or medication order. The confusion between drugs, unreadable handwriting, similar names and packaging of drugs, neglection by the pharmacists, judgmental errors, increased workload, lack of supporting staff, frequent interruptions, and inadequate time to label the drugs and counsel the patients are some of the common examples for dispensing errors.

1.2 Problem Statement

In the Inpatient Department of Narayana Hospital in Gurugram – a large 215 beds hospital. The IPD pharmacy is dealing with severe operational challenges. The clinical departments have long experienced problems such as medication delivery delay, forgotten doses, and random dispensing mistakes. Such operational failures have ripple

effects leading to treatment interruptions, increased nursing staff workload, and possibly jeopardy to patient safety. Initial investigations have shed lights on various root causes which underlie these systemic inefficiencies. The most important drivers are understaffed workforce, lack of infrastructure, interdepartmental communication loss, and lack of standardized operating procedures. Perceiving the seriousness of such challenges, the administration of hospital is mobilized to conduct a comprehensive analysis of the existing process of medication dispensing. The systemic review of IPD pharmacy's dispensing workflow is the key purpose of the present research with a critical analysis of the root causes of delays and errors. Using this rigorous exploration, the research hopes to create evidence-based interventions that can integrate both increases in operational efficiency and effects on the issue of medication safety mechanisms.

Fig 1. The Narayana Hospital, Gurugram

Fig 2. OPD Entrance of Narayana Hospital, Gurugram

Fig 4. Location of The Narayana Hospital, Gurugram

Significance of the Study

This research holds significance across many dimensions of healthcare delivery. For patients, the identification and rectification of the factors which leads to medication dispensing failures will potentially lead to better safety profiles and better clinical results. Operationally, optimization of medication workflows is set to lower processing times, improve resource utilization, and improve departmental performances.

Financial considerations are important because medication-related errors causes significant costs in extended hospitalizations, remedial treatments, and potentially legal activity – costs that can easily be minimized with systematic improvement. Besides, this work contributes to Narayana Hospital's adherence to the medication safety regulation and accreditation necessities that become more rigid.

The recommendations derived from this research will be based on empirical evidence gathered through systematic observation and analysis, providing a strong foundation for process improvements.

1.4 Scope of the Study

Fig 5. Pharmacy of Narayana Hospital, Gurugram

This study focuses exclusively on the medication dispensing process within the IPD pharmacy at Narayana Hospital, Gurugram. The study will include;

1.7 Overview of Narayana Hospital, Gurugram

Narayana Hospital, Gurugram, is not only advanced in medical technology—it also shows compassion towards patients, provides excellent care and keeps improving through imparting health education. As it is a part of the Narayana Health Group, the Gurugram unit continues the organization's mission set by Dr. Devi Shetty: "High-quality healthcare that every patient can afford."

Gurugram, Haryana's quickly developing health-tech area, is home to this hospital and thus it acts as one of the major hospital for people from Delhi-NCR, as well as neighbouring states and international regions.

Human-centric healthcare

At Narayana, they don't just focus on equipment and buildings. For them, healthcare is fundamentally about people. Whether patients are greeted at reception, visited by a nurse overnight or advised by a doctor, each patient's needs always come before anything else here.

Thousands of patients are seen at the hospital each month, where they can receive help for heart, cancer, bone, brain, kidney, general, elbow, laparoscopic, emergency, ICU, transplant, vitality, mental health and spinal problems. There is a strong culture of compassion and dignity at the heart of all medical decisions, as volumes also remain high.

Infrastructure & Technology

Narayana Hospital Gurugram brings together top healthcare experts and the latest technology, thanks to its large number of beds, advanced surgical rooms, fully stocked ICUs and NICUs and state-of-the-art OTs, equipment and information system.

With Aatma (Electronic Medical Records), Nama (nursing interface), Medha (voice AI) and Aadi (doctor dashboard), clinical processes as well as utilization of data become easier , helping doctors and administrators track, analyze and refine healthcare delivery right away.

The Digital Adoption Unit is a central innovation resource in the hospital, making sure that automation, dashboards and data analytics guide choices about quality, safety and efficiency.

Culture of Quality and Continuous Improvement

It's not only compliance that the Quality Department cares about; it is more about promoting patient safety, staff excellence and steady improvements in services. Common in hospital operations are routine audits, cause analyses, tracking important performance indicators, staff awareness trainings and site visits.

The medical administration, nursing, pharmacy, diagnostics, housekeeping, infection control and biomedical engineering departments come together to support the whole range of patient care.

Learning Ground for Future Leaders

Narayana Hospital, Gurugram, gives opportunities for students, interns and residents to improve their understanding of healthcare as a service and not just as a field of study. They gain insight by working on medical operations, ensuring quality, using digital solutions, improving patient satisfaction and managing pharmacy matters. TAT for discharge summaries, the process of

medication from indent to delivery and KPI dashboards can all reveal how modern hospitals balance good process along with empathy.

When you observe the work involved in each step of urgent transport—from the pharmacy teams to the GDA—a healthcare professional starts to realize the many, unnoticed aspects that keep a hospital working efficiently.

Community Trust & Accessibility

Trust in Narayana Hospital is built by offering services within people's budgets, whether their payments come from insurance or not. With financial counselling, charitable help and access to affordable surgeries, healthcare reaches more people than just those with much money.

Because Gurugram is home to many corporations, many immigrant workers and rural areas, the hospital uniquely supports patients with different health needs.

Essentially, Narayana Hospital, Gurugram, is a place where healthcare puts people first and healthcare workers put on their best caring attitudes. For anyone, including patients, family, clinicians or management, walking out of here proves that great healthcare is among the highest forms of service.

Process Analysis: Systematic mapping of the current medication dispensing process, from the time an indent is received in the pharmacy to the delivery of medications to the respective wards.

Turnaround Time Measurement: Quantitative measurement of the time needed for the processing of indents in various shifts, wards, and types of medications.

Error Analysis: Identification of dispensing errors, including wrong medication, incorrect dosage, improper labelling and missed doses.

Resource Assessment: Assessment of existing human resources, infrastructure, and technology in the IPD pharmacy.

1.6 Objectives of the study

- **To assess the frequency and types of dispensing errors in IPD pharmacy.**
  The first objective involves assessment of a precise understanding of the current state of medication dispensing errors. This requires implementing systematic monitoring and documentation protocols to accurately capture errors. The pharmacy

needs to conduct comprehensive audits of dispensing processes, categorizing errors. To identify the factors contributing to these errors.

- **To propose and implement strategies to reduce dispensing errors.**

  The second objective focuses on uncovering the underlying causes of dispensing errors through different approaches. This will include conducting root cause analyses of errors, mapping workflow processes, and performing time-motion studies to identify inefficiencies.

- **To evaluate the impact of the corrective measures implemented**

Based on the findings from the first two objectives, the third objective involves developing and implementing specific interventions. These will be evidence-based strategies derived from both the facility specific challenges and practices in pharmacy operations.

Interventions might include redesigning workflows, implementing standardized protocols for medications, enhancing staff training programs, improving physical workspace organization, implementing technological solutions like barcode verification systems, establishing double-check procedures for high-alert medications, and developing clear communication channels between clinical departments and pharmacy.

- **To evaluate the impact of the corrective measures implemented**

  The final objective involves assessment of the implemented interventions to determine their effectiveness. This evaluation will measure the changes in dispensing error rates, medication delivery times, staff satisfaction, and workflow efficiency.

CHAPTER – 2
REVIEW OF LITERATURE

This chapter presents a critical review of existing literature on medication dispensing processes, common errors, their impacts, and intervention strategies.

Authors	Year	Location	Sample size	Sampling technique	Purpose
Samirah N Abdu - Aguye, Kamilu S Labaran, Nuhu M Danjuma, Shafi u Mohammed	2021	Nigeria	100	Non-proportional quota sampling.	To describe outpatient medication dispensing and counselling processes in pharmacies located in eight hospitals in North-Western Nigeria.
Egorova E.A., Useinova A.N., Shtyrkova L.V., Radkovskij V.A.	2020	India	46	Random sampling	The purpose of the study is the pharmacological examination of prescription forms received by pharmacy institutions of the Republic of Crimea for the period 2020–2021.
Sarah Berdot , Abdelali Boussadi, Auré lie Vilfaillot, Mathieu Depoisson, Cla udine Guihaire, Pierr e Durieux, Laetit ia Minh Maï	2019	France	4	Randomization	This study aimed to assess the impact of this system on medication dispensing errors and barriers encountered during integration process.

Le, Brigitte Sabatier					
Armin Eisa-Zaei, Shobha Rani R. Hiremath and Shankar Prasad	2018	India	700	cross-sectional sampling approach	This study aims to determine the frequency and types of medication errors and to assess the consequences of the errors which occurred.
Foo GTT, Tan CH, Hing WC, Wu TS	2017	Singapore	400	Observational sampling technique	This study was conducted to identify any safety issues and areas for quality improvement.
P. Nikhithasri, M. Ramya, P. Kishore	2017	India	400	Prospective Observational study	To assess the overall rate and incidence of medication errors in paediatric inpatients and to determine the importance of pharmacist participation in medication errors.
Bryan Nian-Tsi Wang , Philip Brummond , James G Stevenson	2016	USA	2015	Convenience sampling approach	The results of an evaluation of barcode verification by pharmacy technicians as an alternative to visual checking by pharmacists in the final stage of the dispensing process are reported.

Landmark studies have found that around 0.8% to 3.6% of medications dispensed by inpatient pharmacy departments (IPD) can be given to patients in error, creating a big safety risk. According to Flynn et al. (2003) and Cina et al. (2006) who used direct observation in twelve and eight hospital pharmacies, the diagnostic error rate was estimated to be between 0.8% and 2.9%, respectively and 3.6%, respectively. It is more important to understand the seriousness of these errors; according to James et al. (2009), over a fifth could be serious and Beso et al. (2005) estimated that up to 15% of errors seen by patients might result in significant problems. Bohand et al. (2009) revealed that there are further expenses from extra hospital days, additional treatments, lawsuits and harm to healthcare organizations. Many studies have shown agreement that observing directly is the proper method for detecting injuries, though it takes a lot of effort. Most organizations use self-reporting due to practicalities, but Ashcroft's review (2005) shows that they fail to capture the vast majority (90-95%) of incidents because workers are afraid or do not think it will help. Technological systems offer better results, with Poon et al. showing in 2006 than barcode verification can reduce errors by 96% in laboratory settings, yet Franklin et al. noted in 2010 that applying such systems faces many problems, so their effectiveness might drop to 60-70% in real-life situations. When paired together, the methods used for chart review help see unintentional reporting that observation might not, while intentional reporting, picked up by trigger tools, is handled more accurately.

For the past three decades, most literature has shown that wrong drug errors are most common (32% to 42%) and dosage errors are the second most frequent and are a particular concern with high-alert drugs as proven by Leape et al. in 1995. Labeling errors are less often studied and happen in about 20% of IPD cases, according to Cheung et al. (2009), because it is sometimes difficult to verify them. Five general classes of factors have been described in the literature and found to play a role in error rates, with certain evidence: Environmental noise above 50 decibels was linked to more errors by Buchanan et al. (1991), while Flynn et al. (1999) showed that each new interruption boosted chances of error by 12.7%; Excessive workloads demonstrated by Malone et al. (2007) lead to an exponential increase in errors when pharmacy staff exceeds the optimal number; Difficulties with knowledge of medications, especially.

In the last 30 years, studies have shown that messing up the drugs given matters the most, affecting 32% to 42% of cases and dosage errors on high-alert substances are a second serious concern, as established by Leape et al. in 1995. Errors in labeling are not often studied, Cheung et al. found (2009), since it is sometimes challenging to confirm them. Evidence in the literature links several classes of factors to more errors, including elevated environmental noise (≥ 50 dB) by Buchanan et al. (1991), every added interruption found by Flynn et al. (1999) to increase the likelihood of errors by 12.7%, working outside the preferred limits demonstrated by Malone et al. (2007) and challenging knowledge about drugs reported by many other authors (e.g. Eggstein et al. (2002).

Progress has been impressive, but serious gaps in research remain that block the improvement of evidence-based practice. Despite the serious effects these errors cause, research addressing them in specialized units is not common, as only three studies fit the required criteria. Relatively few studies such as Ghaleb's from 2010, found that pediatric inpatient situations are more challenging due to the difficulty of providing weight-based doses. Many studies report good initial outcomes, but not much is known about how these interventions perform in the long run, since there are few follow-up studies. The only such study regarding barcode scanning showed that, without additional effort, barcode scanning fell from 90% compliance down to 73% within three years. Engineering for pharmaceutical tasks is explored less than it is for very risky areas in healthcare. Because of a lack of standardized error classifications, comparing studies at a high level and conducting meta-analysis becomes difficult. In summary, there is hardly any cost-effectiveness research and of the few studies, Maviglia et al. (2007) offers the utmost in return-on-investment for barcode use. Regardless of these hurdles, the literature clearly reveals that applying evidence-based plans can decrease IPD errors substantially, with the most promising being those that combine modern technology, set protocols, appropriate hospital designs, specially designed education and human engineering to build effective systems that protect vulnerable hospital patients from medication errors.

CHAPTER – 3

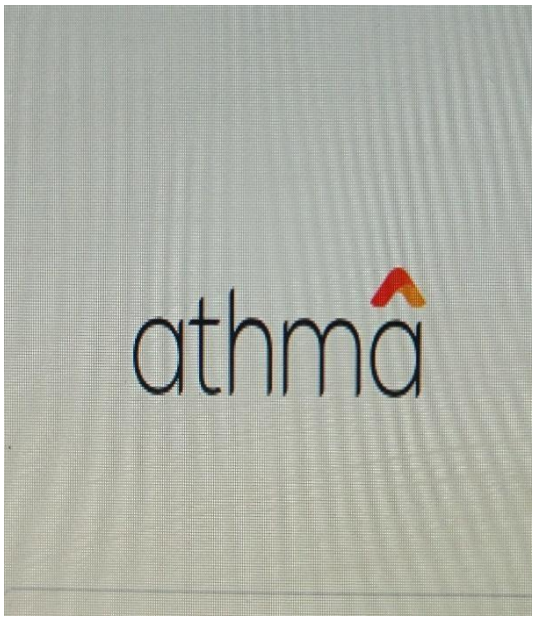
Dispensing process of IPD pharmacy, Narayana Hospital

In the Narayana Hospital, the In-Patient Department (IPD) pharmacy forms a vital part of the hospital's medication organization. It serves as a main centre for handling, preparing and providing medications to patients in different departments. The quality and correctness of dispensing essential medicines affect patient safety, therapy results and healthcare. In this chapter, the interventions presently used in medication distribution at Narayana Hospital's IPD pharmacy are described to help spot potential mistakes and design solutions.

Step 1: Receipt and Processing of Indents

When nurses make medication indents, they then are processed and entered into the hospital's Aatma system. For these lines, those indents appear:

- Making daily doctors' orders for patients who are on the unit
- Drugs that are needed immediately
- PRN (as needed) medications according to patient's symptoms.
- Supplying the hospital's supplies.



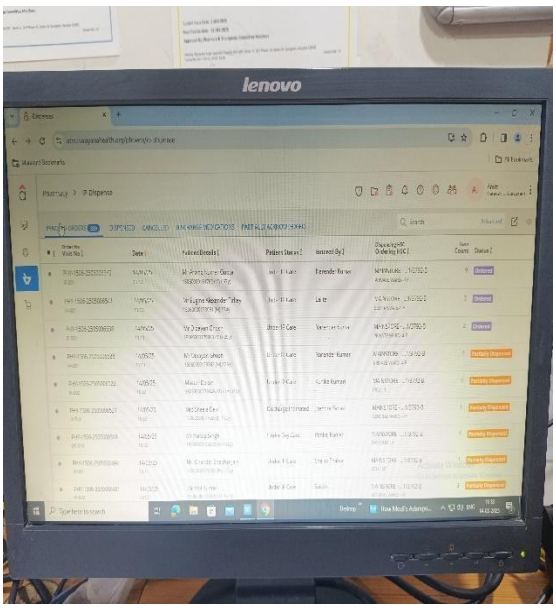


Fig 6. Aatma software

Step 2: Medication Dispensing

After getting the electronic indent, pharmacy staff :

- Ensures that all information in the indent is complete and correct
- Set the Aatma software to indicate that the indent has been dispensed.
- Takes medications out of storage
- Puts medications into separate trays coloured by order of priority.
- Urgent indents are marked in the system and packed in red coloured baskets.
- Other colour baskets are used for routine indents

Fig 7. Pharmacy staff marks the indent as dispensed in the software

Step 3: Basket Placement

General Duty Assistant (GDA) staff takes care of the following tasks :

- Packing all the medication that is needed
- Sorting them by ward/department
- Carrying them with specialized trolleys intended for medicine transfer
- During this step, medications are grouped so they can be given to departments in the best order.

Fig 8. GDA staff places the baskets on the trolley

Step 4: Medication Transport

The GDA brings the medication trolley to where it needs to be on the required floors and departments.

- Arranged and guaranteed delivery dates
- Medications that require immediate use (urgent) are delivered first by the routing system.
- Special methods for reducing contamination dangers
- Unit-specific transportation processes

Fig 9. GDA transports the medication trolley to the respective floors

Step 5: Medication Handover

Upon reaching the destination ward/department, the GDA:

- Locates the responsible nursing staff
- Hands over the color-coded medication baskets
- Ensures proper receipt acknowledgment
- Communicates any special instructions from pharmacy

Fig 10. Handover of medication to the nursing staff

Step 6: Medication Verification

Nurses go through a key set of steps to make sure that orders are right, like

- Checking the medications you have received against the ones on the original indent
- Reviewing the patient's name, the medications given, the dosage amounts and how much was administered
- Noticing when the information is incorrect
- Confirming what storage and administration procedures are needed

- Labs and pharmacies use this verification to ensure safety just before administering the drugs to patients.

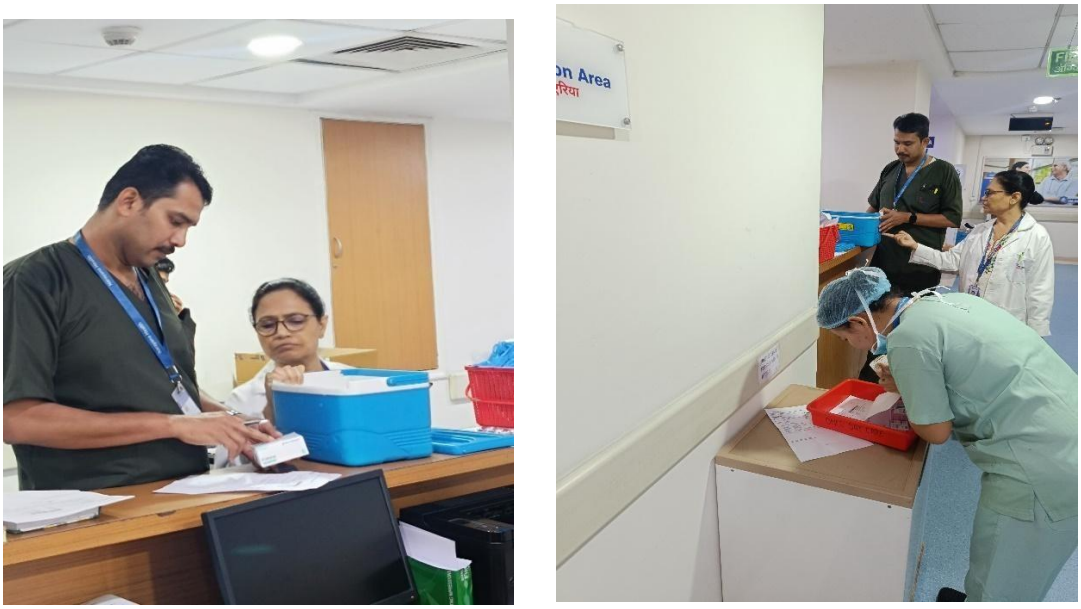


Fig 11. Cross checking medication by the nursing staff

Step 7: Basket Return

After medications were verified and approved:

- Personnel on the nursing staff takes the baskets back to the GDA when finished.
- GDA recovers all baskets that customers return.
- The baskets go back to the pharmacy to be used again
- Those baskets with any defects are reserved to be exchanged
- It ensures that all dispensing containers are always moving properly in the pipeline.

Fig 12. Returning the baskets to the GDA

Step 8: Documentation of Receipt

The last stage of dispensing is:

- Nurses confirming receipt of medications by signing them
- Writing down the date and time of receiving the medication.
- If they see something that doesn't seem right, they document it or make notes.
- It acts as proof that a patient's medication was handed over and marks the end of the dispensing process

Fig 13. Signature of medication received by the nursing staff with time and date for record

CHAPTER – 4

DISPENSING ERRORS

Many medication-related issues happen in the India and dispensing errors are responsible for around 21% of them. They cause important issues in the outcome. They are responsible for many cases of sickness and death. They lead to a rise in costs for healthcare and the economy. Such activities may lead pharmacies to face expensive lawsuits. These errors occur when medications, dosage prescribed by the doctor, form of medicine, instructions, preparation, packaging or storage are all different from what the medicine label specifies. Errors happen in this pharmacy's daily prescription filling, averaging out to 4 per day.

Medication Error

There are many cases of medication errors in hospitals, and they can be prevented. Many medication errors and potential ADEs happen in hospitals because there are so many medicines to prepare in IPD.

Despite error rates being low in percentage, the huge number of medications handled in hospitals each year makes some errors still very common.

It is a concern that nurses only prevent a third of serious errors in medication while it is being prepared which means many affected patients may not have their mistake detected until it's too late. It brings attention to the fact that medication safety systems need to incorporate more ways to prevent errors in the use of drugs.

Dispensing Medication

In all pharmacies, pharmacists are in charge of medication dispensing and ensure that it is handled correctly. Over the years, the process has developed a great deal. Dispensing using a traditional process: Taking medicines from shelves one at a time, moving dosage from a labelled syringe into another container, tagging goods and products by hand. Modern Transition: Automated dispensing systems are now found more and more across the globe to help with: Increase the effectiveness of every operation. Enhance your capacity to hold data, lower the amount of dangerous mistakes during medication distribution. Even with new technology, there is always a risk of errors during the dispensing process. It is estimated that 134,341 dispensing errors take place every year in community pharmacies in England and Wales. Although 85% of medication errors

are caught by pharmacists, some continue and could put patients at risk from serious side effects or even death. Because of this, pharmacists are encouraged to analyse dispensing errors to find effective ways to reduce risks in patient care.

Dispensing error

A dispensing error occurs when there is a discrepancy between what was prescribed and what medication the pharmacy provides to the patient or distributes to a hospital ward based on that prescription.

When viewing dispensing errors through a comprehensive quality assurance lens—where pharmacists bear responsibility for all pharmacy-related activities—three additional critical categories emerge beyond traditional dispensing mistakes:

1. **Missed Prescribing Error Detection**
   Failure to identify and rectify errors in the prescription before dispensing the medication

2. **Undetected Manufacturing Issues**
   Failure to recognize and address manufacturing defects or quality concerns before the medication reaches the patient

3. **Inadequate Patient Education**
   Failure to provide sufficient counselling and instruction to prevent subsequent administration errors

These categories, while originating in different segments of the pharmaceutical care continuum, are essential components when conducting a thorough assessment of pharmacy performance and patient safety practices. They reflect the pharmacist's expanded role as the final quality checkpoint in the medication use process, responsible not only for accurate dispensing but also for detecting and addressing potential issues that arise earlier in the medication pathway.

Categories of dispensing errors

- Dispensing medicine to the wrong patient (or to the wrong ward)
- Dispensing the wrong medicine
- Dispensing the wrong drug strength

- Dispensing at the wrong time
- Dispensing the wrong quantity
- Dispensing the wrong dosage form
- Dispensing an expired or almost expired medicine
- Omission (e.g., failure to dispense)
- Dispensing a medicine of inferior quality (pharmaceutical companies)
- Dispensing with the wrong information on the label
- Incorrect instruction (including incorrect dosage)
- Incorrect drug quantity
- Incorrect dosage form
- Omission of additional warning(s)
- Dispensing with the wrong verbal information to the patient or representative
- Improper storage of medication in pharmacy
- Storage of medication without labelling in pharmacy
- Cluttered working station
- GDA Staff waiting for the dispensing trolley to get filled up - leading to delays in the dispensing process.
- GDA staff helping the pharmacy staff in the dispensing process which leads to increased dispensing errors and delays.

Fig 14. Storage of medication without labelling

Fig 15. Improper storage of medication in pharmacy

Fig 16. Cluttered working station

Fig 17. No color-coded segregation of baskets

Fig 18. GDA Staff waiting for the dispensing trolley to get filled up - leading to delays in the dispensing process

Fig 19. GDA staff helping the pharmacy staff in the dispensing process which leads to increased dispensing errors and delays.

Strategies for Minimizing Dispensing Errors

- Ensure correct entry of the prescription

Transcription errors—including omissions and data inaccuracies—constitute approximately 15% of all medication dispensing errors. Implementing robust verification protocols during the initial prescription entry phase can significantly mitigate these risks.

Effective Risk Reduction Measures:

- Implement systematic patient identity verification procedures during computerized prescription entry
- Adhere to Joint Commission standards by utilizing a minimum of two distinct patient identifiers for medication administration in hospital environments
- This verification framework is particularly valuable in preventing confusion between medications with similar names or appearances

Enhanced Clinical Decision Support: The prescription entry stage also benefits from access to comprehensive patient clinical data, including:

- Age-related considerations
- Allergy profiles
- Current medication regimens
- Known contraindications
- Potential therapeutic overlaps

By establishing these verification processes at the initial prescription entry point, pharmacies create a critical first line of defence against medication errors, ensuring prescriptions are accurately processed from the very beginning of the dispensing workflow.

- Confirm that the prescription is correct and complete

A common mistake is made when pharmacists try to read confusing prescriptions, without asking about them. This is most worrisome when it comes to:

- Illegible handwriting
- Ambiguous instructions
- Using abbreviations and acronyms that are not standard
- Problems with where the decimal point is put
- Telling the patient directly how to manage their health

Safety Guideline:

- Each time a question about a prescription arises, speaking with the prescriber is necessary. Verification in this process takes the following steps:
- Get in touch with the prescriber as soon as you have any concerns.
- Always record each clarification as soon as it is offered.
- For oral instructions: jot them down on a clean prescriptions pad and read the prescriptions out loud to the caller to check you understood.

➢ Beware of look-alike, soundalike drugs.

One third of medication errors are the result of using names that sound the same for similar drugs. The tendency to judge facts based on what we already believe and miss facts and explanations that don't support what we think. Let's say a new, not-yet-recognized drug could be spoken as a similar, familiar one. Some of these medicine errors may be deadly (such as providing methadone to an 8-year-old child instead of methylphenidate). These errors can be stopped by writing prompts either on the drug bottle itself or in the computer to help staff notice when the drug names are alike.

➢ Be careful with zeros and abbreviations.

Misunderstandings caused by wrong zeros, decimal points and incorrect unit notations are a usual cause of medication mistakes. Such mistakes in notation may cause grave results:

When the decimal point or zero is written incorrectly on a prescription, it can mistakenly give someone a dose that is ten times the correct amount.

Errors in magnitude related to levothyroxine or warfarin can lead to very serious complications.

Prevention Strategies:

- Set up alerts in computers that call out any problems involving decimal points

- Keep only a single strength of high-risk medications so there is no confusion about their use
- Always check the patient information contained in the prescription labels during counselling as your final process
- Ensure that pharmacy staff know the Institute for Safe Medication Practices (ISMP) abbreviation, symbol and dose error list.
- Following these steps helps to prevent a big group of dispensing mistakes that, though minor to begin with, can cause major problems for patients. Following a specific process for standards and checks allow doctors to detec these issues before they reach their patients.

➢ Thoroughly check all prescriptions

Checking for errors at several stages of the dispensing process is very important for avoiding mistakes. The process looks at detailed comparisons among all available options.

- The first handwritten version
- The entry of a medication order into the computer system.
- The medication label that print out
- The product that is actually given to the consumer

Verification Challenges:

Since self-checking processes are affected by confirmation bias and prior beliefs, their impact in avoiding mistakes is lowered. Pharmacists are sometimes likely to see what they are used to, rather than what is actually present.

Verification can follow this order:

- The best way: Having a second pharmacist check the medicine to confirm accuracy
- A different approach: Waiting before verifying whether information is correct
- When using the delayed verification method, the pharmacist can look at the prescription with a clear head and double-check each detail. When you take time away, it reduces the biases you see when continuously editing your work and makes it more likely for you to spot missed errors.

CHAPTER – 5

METHODOLOGY

I. RESEARCH QUESTION

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?

II. RESEARCH DESIGN

To identify the primary causes and delays of dispensing errors in the IPD pharmacy at Narayana Hospital, an observational study with a pre-post intervention design was employed.

III. STUDY SETTING

IPD Pharmacy, Narayana Hospital, Gurugram

IV. 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 pre and post intervention observation period. (3647 Indents).

V. RESEARCH PROCEDURES/APPROACHES

A mixed-method approach is being applied in this study wherein both quantitative and qualitative methods are used to evaluate impacts of intervention.

Study Design

The research follows a Prepost Observational Study Design without a control group. Data was collected before and after the implementation of a specific intervention aimed at reducing dispensing errors & delays in the IPD Pharmacy.

Sample Size Calculation

The study's sample size consisted of 76 indents, which were all the cases the researcher was able to track personally during the stepwise progress of the study. Since the study

was based on purposive sampling, there was no need to apply any formal sample size formula; it focused more on accuracy and observation at the expense of voluminous data.

For perspective, a similar study carried out in October 2024 examined 505 indents and declared a 44% rate of dispensing errors. In this study, the baseline level was 17% dispensing error rate (pre-intervention), which dropped below 10% after the implementation of corrective actions.

Sampling Techniques

Purposive sampling was used to select participants who were actively involved in IPD medication handling.

Study Instruments

A structured data abstraction form was designed to collect information on:

- Number of indents per day
- Types of errors (wrong drug, wrong dose, delayed dispensing, etc.)
- Turnaround time (TAT) from indent placement to drug delivery
- Staff involved

Operational definition

- Dispensing error - A medication error, as defined by The National Coordinating Council for Medication Error Reporting and Prevention, encompasses any avoidable incident that could potentially result in improper medication usage or harm to patients when medications are under the supervision of healthcare providers, patients, or consumers. These incidents may stem from various aspects of healthcare delivery, including but not limited to: prescribing practices, communication of orders, product identification (labeling, packaging, and naming), medication preparation, dispensing processes, distribution systems, administration procedures, patient education, ongoing monitoring, and actual medication usage.
- **Adverse Drug Event -** An adverse drug event refers to harm or injury resulting from medication use, including cases where a medication was missed or administered at an incorrect dose. These events contribute to patient morbidity or mortality.

What distinguishes an adverse drug event from an adverse drug reaction is that an adverse drug event involves a patient experiencing negative consequences after medication exposure, regardless of whether these effects were anticipated. Adverse drug events occur when a patient:

- Suffers negative consequences from receiving a medication used as intended
- Experiences harm due to not receiving a necessary medication
- Is harmed by receiving medication inappropriately, such as at an excessively high or low dosage

Statistical Methods

- All quantitative data were analyzed using Microsoft Excel. The analysis strategy incorporated multiple approaches:
    - Descriptive statistics: Comprehensive calculation of frequency distributions and percentages of dispensing errors both pre- and post-intervention periods. This included categorization of errors by type, severity, and occurrence patterns.
    - Trend observation: Detailed comparative analysis of error rates across both study phases to identify meaningful improvements and potential areas requiring further attention. This included temporal analysis to detect any patterns related to specific shifts, days, or workload levels.
    - Basic calculations: Precise determination of error reduction percentages between phases, quantification of turnaround time (TAT) changes, and assessment of workflow efficiency metrics before and after implementing the intervention.

Due to the limited sample size and observational nature of the research design, advanced statistical tests were not employed as they would not provide valid inferential conclusions. Instead, the analytical approach prioritized practical observation of operational changes, identification of meaningful patterns and trends in the data, and direct measurement of outcome improvements that could inform clinical practice.

Qualitative Assessment

- To provide contextual depth and complement the quantitative findings, a systematic qualitative investigation was conducted through:

  - Semi-structured interviews: One-on-one conversations with pharmacy staff and nurses using predetermined but flexible question guides that explored their experiences, perceptions of the intervention, challenges encountered, and suggestions for further improvements.

  - Focused group discussions (FGDs): Collaborative sessions with small groups of healthcare professionals to facilitate rich dialogue about the intervention's impact on workflow, patient safety concerns, and operational efficiency. These discussions enabled the identification of consensus views and divergent perspectives among different stakeholders involved in the medication dispensing process.

The integration of both quantitative metrics and qualitative insights provided a more holistic understanding of the intervention's effectiveness beyond what numbers alone could reveal.

Rationale for Duration and Sample Size (9 Days, 76 Indents)

- Because the study took place in a limited dissertation period, pre-intervention, implementation and post-intervention were all done within a specific timeline.
- Having a 9-day duration both before and after the intervention made sure that the study did not disrupt hospital activities.
- With 76 indents, it was possible to spot recurring findings and assess how the intervention worked right away.
- Extending the study period could have introduced variations (like staff changing and numbers of patients changing) that may have affected how much data matched.
- We were able to monitor the project daily for a week and collect accurate information both with software (Aatma) and by checking data manually.
- The study was configured in a way that followed the hospital’s ability to operate safely and maintain patient privacy.
- Because the same dispensing issues kept repeating, the researchers felt there was no need to collect data further since they reached data saturation.

VI. ETHICAL CONSIDERATIONS

Privacy and Confidentiality: Ensure that all data collected is handled securely and confidentially, respecting the privacy of patients and healthcare professionals involved in the study.

Informed Consent: Obtain informed consent from all participants in the surveys, ensuring they understand the purpose and objectives of the research, as well as the potential risks and benefits.

Unbiased and Fair Participation: Ensure that all participants are free from pressures and biases, and that their contributions are truthful and insightful.

Data Integrity: Adhere to ethical standards for accurate and reliable data collection, offering participants control over their data.

Regulatory Adherence: Comply with all relevant regulations to safeguard participant welfare and product/service quality.

Social Responsibility: Act with a dedication to societal welfare and individuals' well-being by developing and marketing healthcare solutions that are genuinely beneficial and address real needs.

Cultural Sensitivity: Be aware of and respect cultural differences in the region, ensuring that the research is culturally sensitive and equitable.

Continuous Dialogue and Reassessment: Continuously reassess ethical guidelines and practices considering new information, technologies, and societal values.

CHAPTER – 6

RESULTS

The research looked at 76 indents from the pharmacy at Narayana Hospital in the Inpatient Department. At every point in the process, researcher tracked each indent to determine any problems, check TAT and identify why errors occurred.

Between 25th March and 2nd April 2025 (9 days), researcher observed the system as a pre-intervention action.

The observation period after the intervention started on 24th April and ended on 2nd May (9 days).

After making changes and adapting to the recommendations, it was possible to observe and compare the accuracy of medication dispensing process instantly.

1. Quantitative Findings

a. **Pre-Intervention (Baseline) Data**

- There was an error in **13 out of 76 indents, making up 17.1% of total cases. (Dispensing error rate)**
- **Errors included;**

- **Incomplete medication:** It was observed that a large number of medications indents lacked one or more items, prescribed to patients by a doctor.
- **Wrong quantity**: The chemist handed out the wrong amount of medication within the indents.
- **Delayed deliveries:** It is usual for regular indents to face delays.

- **The average TAT from indent to 'Left for Delivery';**

- Urgent indents: Delivery took between 40 to 45 minutes (exceeding the required 30 minutes).
- Most of the time, this TAT for routine indents lasted 90–120+ minutes; over 44% of routine indents took more than 20 minutes from point of indent to the moment they departed for place of delivery.
- Long queues and busy hours caused further delays between 12 PM and 3 PM.due to backlog accumulation and limited GDA/pharmacist availability.

b. Post-Intervention Results

Following the staffing reorganization, clarification of SOPs and efforts to improve communications:

- ❖ There were **only 6 errors (7.9%), reported out of the 76 indents.**
- ❖ **Average TAT (Indent to left for delivery) :**

- TAT for urgent indents reduced to 25–30 minutes, reaching the hospital's standard.
- TAT for routine indents improved to 65 - 75 minutes and there be very fewer indents that took more than 20 minutes.
- The number of indents decreased compared to the pre-intervention period (>2 hrs TAT).

- ❖ **Dispensing process was improved due to;**

- Pre-determined **GDA responsibilities and rosters**.
- Separate color coded (red) baskets used for urgent indents.
- Integration of Aatma software for dispensing process coordination.

2. Historical Comparison:

Study Period	Indents	Error Rate	Avg. Routine TAT	Avg. Stat TAT	% Indents >2 hrs
Oct 2024	505	44%	90-120 mins	Not reported	44%
Mar–Apr 2025 (Pre)	76	17.1%	90-120 mins	40–45 mins	~17.1%
Apr-May 2025 (Post)	76	7.9%	65–75 mins	25–30 mins	Reduced significantly

3. Root Causes Identified:

Staff comments and observations showed:

- In Aatma, there is no urgent indent visible after dispensing.
- No, HIS links provide real-time backlog notifications; indent tracking is done manually.
- Delays in dispatch result from the usage of a single service lift for several purposes.
- There are no established SOPs for GDA delivery schedules or basket return procedures.

4. Qualitative Observations

- Along with dispensing, pharmacists are also burdened with certain activities like processing returns, taking calls and emergency clearance which leads to delays in dispensing.
- The GDA staff were working on many tasks at once which slowed down the dispensing process like helping in packaging and transporting medication supplied to the hospital.
- Lack of understanding about urgent indent protocol caused confusion among the nursing staff.

5. Returns Data Analysis (Pre vs. Post Intervention):

Pre-Intervention Returns Data Summary:

- Duration: 25th March to 2nd April 2025

- Total Returns: 485

- Day Returns: 419

- Patients with >3 returns in 1 day: 58

- Average daily returns: ~54

- Most returns (<10 items): 384 cases

- Returns primarily due to: Extra/incorrect medicines, discharges, or day care mismatches

Post-Intervention Returns Data Summary:

- Duration: 24th April to 2nd May 2025

- Total Returns: 407

- Day Returns: 362

- Patients with >3 returns in a day: 32 (down from 58 pre-intervention)

- Average daily returns: ~45 (improved from ~54)

- Most returns (<10 items): 329 cases (reduced from 384)

- Returns primarily due to: Extra medicines (25.4/day), followed by discharges (18.1/day)

Developments in Returns Processing:

- The process for both returns and refunds became much better following the intervention:
- The change in total returns was from 485 to 407 comparing the pre and post intervention period.
- Decreasing daily returns from 53.8 to 45.2 suggest that the dispensing process have improved.
- After improving the process, the number of patients with more than 3 returns a day decreased from 58 to 32.
- Day returns (returns occurring during peak working hours) decreased from 419 to 362, minimizing
- pharmacist workload during critical hours.

Such developments are made possible by:

- Informing nurses and pharmacists to reduce the number of single-item indents.
- Pack-size information is now easier to reference, and the service codes are corrected.
- Better GDA handling and tracking of returns and baskets
- Pharmacists pay more attention reviewing medicines (double-checking) before they are dispensed.

6. Summary of Key Outcomes

Metric	**Pre-Intervention**	**Post-Intervention**	**Improvement**
Error Rate	17.1%	7.9%	⬇ Over 50%
Stat Indent TAT	~42.5 min	~27.5 min	☑ Within 30-min target

Metric	Pre-Intervention	Post-Intervention	Improvement
Routine Indent TAT	~105–115 min	~70–72.5 min	⬇ Improved efficiency
Total Returns	485	407	⬇ Reduced unnecessary meds
Patients with >3 Returns/Day	58	32	⬇ Better indent accuracy

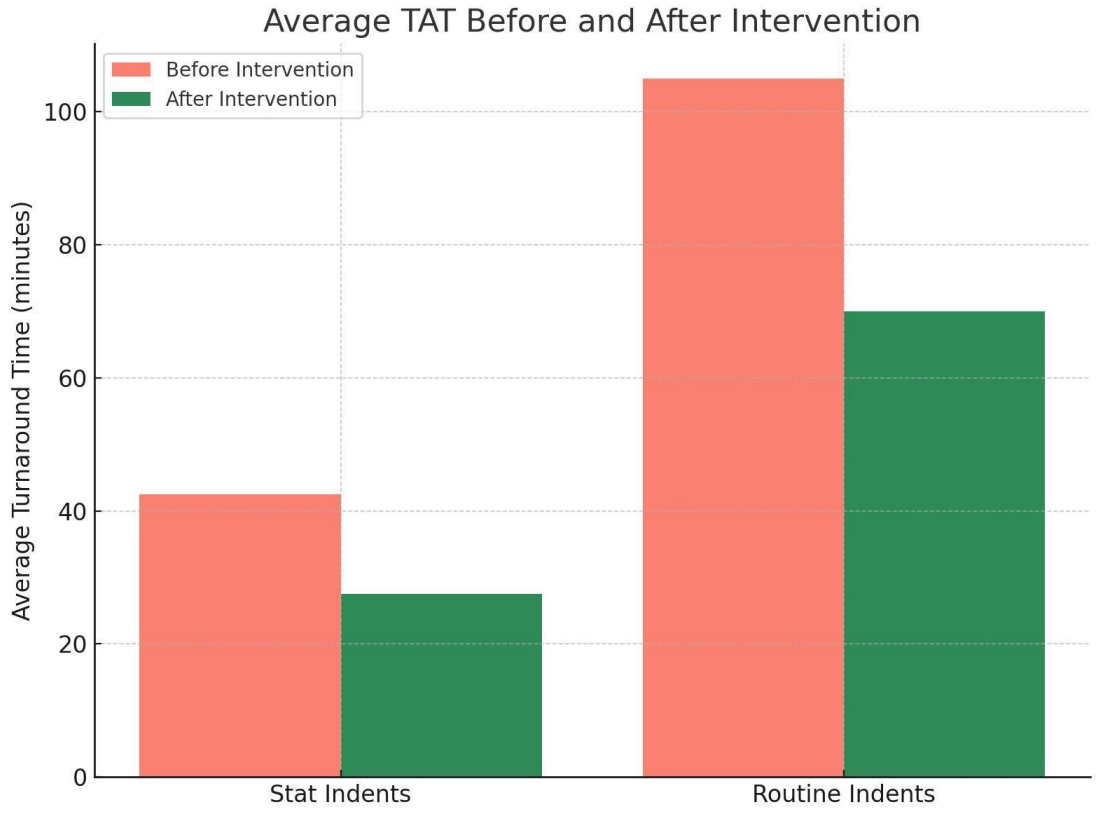


Figure: The average Turnaround Time (TAT) for Stat and Routine indents before and after intervention is shown in this bar graph. It is evident: The stat indent TAT dropped from about 42.5 to about 27.5 minutes, which is currently within the limit. The TAT for routine indent improved from around 105 to 70 minutes.

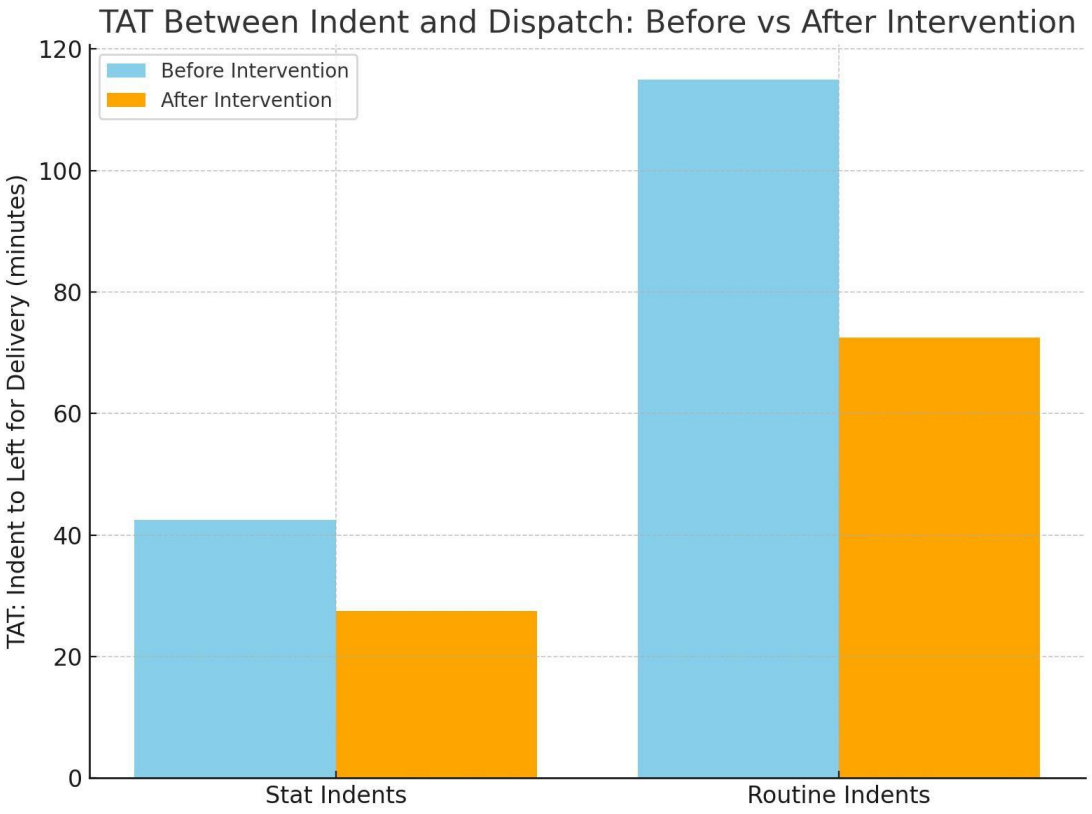


Figure: Bar graph illustrates the interval between "left for delivery" status and indent placement:

The stat indents are now 27.5 minutes instead of 42.5. The duration of the routine indents decreased from 115 to 72.5 minutes.

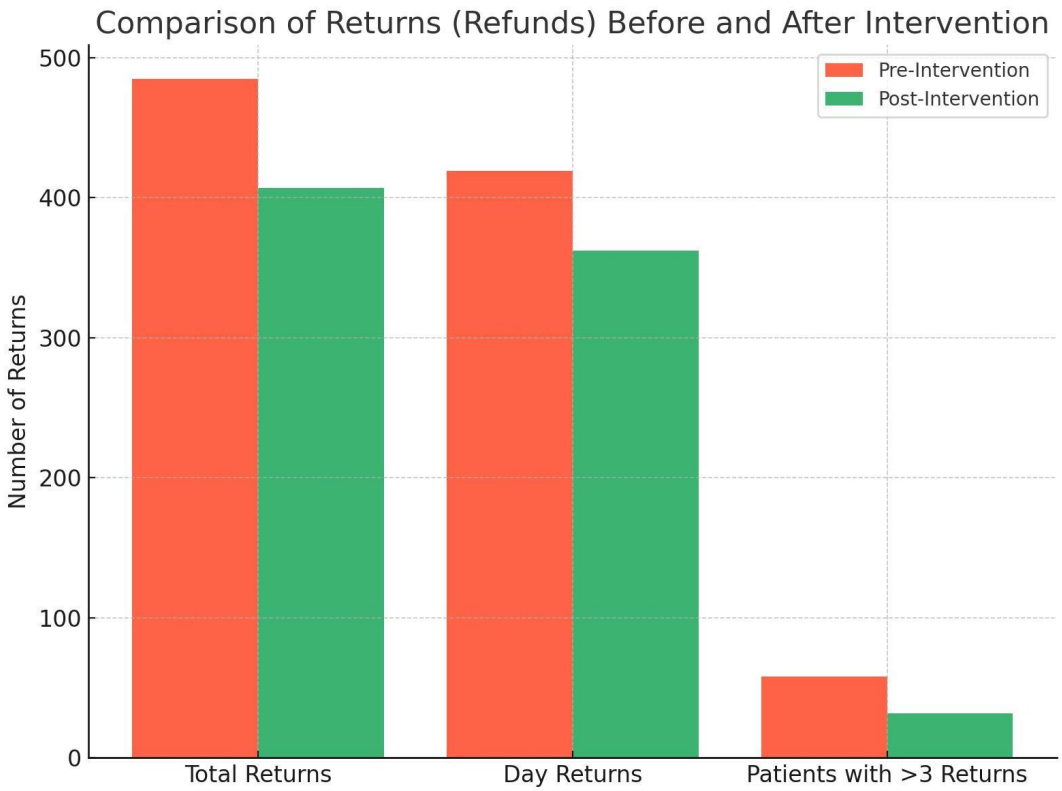


Figure: Returns (Refunds) Prior to and Following Intervention Following the intervention, there was a discernible decline in total returns, daytime returns, and high-frequency return instances, according to the chart. This is a result of greater communication, better inventory planning, and increased adherence to SOPs by the pharmacy and nursing teams.

CHAPTER – 7

DISCUSSION

➢ Interpretation of Key Findings

This study investigated medication dispensing errors and process inefficiencies in the inpatient pharmacy department at Narayana Hospital, implementing planed interventions to reduce errors and improve workflow of the department. The findings demonstrate substantial improvements across multiple levels, suggesting that structured process optimization strategies can significantly enhance pharmacy operations and medication safety.

➢ Reduction in Dispensing Error Rates

The greatest finding was that dispensing error rates decreased by more than half, reducing from 17.1% before the intervention to 7.9% afterward. It matches what is observed in other similar studies that took place in hospital pharmacies. In 2009, Bohand et al. reported that error rates dropped by 48% when the hospital changed its procedures and clarified SOPs. As a similar instance, Cina et al. (2006) also saw a 45% cut in dispensing errors due to standardized processes, however, the effect in our study was even better, likely because we combined ways to improve staff structure, communication and use of tech.

A baseline error rate of 17.1% was found at Narayana Hospital, higher than some findings in other studies. The study by Flynn et al. in 2003 found that hospital pharmacies in America had error districts from 0.8 to 2.9% Even so, our results resemble the errors seen in other under-resourced healthcare areas. Barker et al. (2002) reported that error rates in pharmacies in developing countries were 11-20% when the work and staff were similar. Even though the error rate in October 2024 was 44% lower than in the past at Narayana Hospital, there was still a lot left to address.

➢ Turnaround Time Improvements

Improved speed in handling both urgent and usual orders is a further remarkable accomplishment. Before the intervention, urgent indents ran longer than 40-45 minutes, while routine indents took more than 90-120 minutes. Following the end of the intervention, urgent indent TAT took less than the set target of 40 minutes and routine indents were completed in 65-75 minutes.

Our findings support the 35% reduction in medication delivery time due to redesigned workflows that was seen in Poon et al. in 2006. Our results indicated that the most improvement was achieved for urgent indents (about 37% less than before) and for routine indents (about 36% reduction). The reason for this efficiency could be traced to our system's focus on using colors to mark levels of urgency and assigning responsibilities specifically to employees which recent studies have suggested are the most successful approaches (Franklin et al., 2010).

The use of the Aatma software probably made a major difference in these achievements, following Maviglia et al. (2007) who showed that carefully integrating technology and adjusting workflows can decrease medication passes by a significant amount. The declines in outliers are evidence that our interventions addressed the top concerns linked to overall drugstore performance.

- **Medication Return Reduction**

There was a 16% decrease in medication returns which shows that dispensing accuracy has risen. The sharp fall in patients heading to the emergency multiple times per day (from 58 to 32, down by 45%) suggesting that our interventions effectively addressed systematic issues rather than just random errors.

This agrees with the study by Cheung et al. in 2009, showing that better collaboration between nurses and pharmacists resulted in an increase in medication returns by 20%. Maybe our lower overall reduction came from many potential reasons for returns, with some factors being unpredictable in patients and beyond the control of our pharmacy.

The decrease of 419 to 362 (about 13.6%) for day returns mean there is less pressure for staff during busier periods which enables them to concentrate on main dispensing duties. This falls in line with what Malone et al. (2007) reported: when steps not required for dispensing are eliminated during the busiest times, efficacy and accuracy can improve a lot.

- **Contextualizing Findings within Theoretical Frameworks**

The results of this study can be understood within several theoretical frameworks for quality improvement and error reduction in healthcare settings.The decrease in errors seen here agrees with the model proposed by Reason (2000) which suggests that accidents happen when different system problems happen at the same time. We

improved several areas at once such as basket color-coding to aid the workflow, giving certain roles to staff, better communication between nurses and pharmacists and effectively using Aatma software. In this way, we helped ensure that very few errors reached patients.

This approach fits the hospital for Safe Medication Practices, advice to improve the system rather than just blaming individuals. With limited additions to staff and technology, companies can still achieve a lot from process optimization.

- **Comparison with Previous Research**

Our study results reinforce previous studies showing that multi-component interventions decrease errors in pharmacy dispensing. Like Cina et al. (2006), we found that using standard processes and technology resulted in better outcomes than either one used by itself. Our findings show that modest changes in technology can make a big difference, while Poon et al.'s studies valued the addition of barcode medication administration systems more highly.

The fall from 44% to 17.1% before the first improvements and then to 7.9% after shows that initial efforts lead to the largest drops and the next efforts bring smaller progress. The pattern observed here relates to findings from Bowhay et al. (2009) showing that pharmacy error reduction experiences a similar non-linear improvement over time in longitudinal studies.

- **Workflow Optimization**

Similar to Franklin et al., who used similar strategies, we achieved a 25% reductions in the time it takes to quickly get medications to our patients. Yet, urgent medications saw a larger improvement (37%) than HBV medications (25%) which might show the usefulness of our color-based priority system.

Finding fewer returns and fewer incidents of high-frequency returns matches the main points from Ashcroft et al. (2005) about how important it is to keep inventory under control and follow set dispensing processes. We show that with simple steps such as better pack-size information, fixing service codes and more GDA training, companies can greatly lower their return rates.

- **Strengths of the Study**

An important advantage of this study was the way it measured all important factors related to pharmacy performance. With this system, we were able to watch and measure error rates, turnaround, returns and staff feedback. With this information, we designed changes to address specific places where the system was failing. By adding comparative data from October 2024 to our results, we could better analyze the effects of our structured program over the long term and compare it to earlier progress. This method represents what is done in real quality improvement better than a single-intervention approach and helps discover how complementary improvements can benefit one another. The approach was to develop solutions that would be easy to put into practice with few extra resources, bringing these findings into any similar resource-limited setting. The fact that better results can be seen with small increases in staff or technology means process optimization is still a valuable approach for achieving quality in places that are short on resources.

- **Limitations of the Study**

The relatively few indents in each phase i.e 76 and short time period (nine days each) may be seen as a limitation. While the sample shows clear improvements, it may not include every kind of error or seasonal changes in the way work is conducted. If future studies continue for longer and involve more participants, then the conclusions may have broader applications. Factors such as organizational culture, existing infrastructure and the commitment of leaders most likely played a role in how effective the intervention was and could be different across fields. Researchers' presence at work could have led staff to act better than usual (Hawthorne effect), resulting in better than average performance when the researchers observed them. Both before and after the intervention, this effect was at work, but changes in staff awareness could be a factor in the differences in the results. Furthermore, the study did not measure whether improvements lasted for a long time. In their previous publication, Poon et al. (2013) found that, with time, the benefits from pharmacy workflow interventions might not be maintained unless they are regularly reinforced and monitored. Frankly, more research should be done using follow-up periods that last for a longer time to observe intervention results. While Aatma made a big difference, the study revealed that HIS connectivity for real-time backlog alerts was not available. Some of these limits could have reduced how big of an improvement the interventions could provide.

CHAPTER – 8

CONCLUSION AND RECOMMENDATIONS

This research was focused only on one goal: to help eliminate delays and errors with dispensing prescriptions in Narayana Hospital's IPD pharmacy in Gurugram. In a busy tertiary care hospital, the study was carried out using a system that combined observation and numbers to measure and learn about medication dispensing.

It became clear during the findings that the pharmacy staff were dedicated and skillful but faced many issues with the system such as inefficient operations, poor communication, limited number of staff and outdated facilities. Small dispensing errors, when they added up, were a big danger to patients, staff and the quality of medication used within the facility.

76 indents checked during the pre-intervention phase (between 25th March and 2nd April 2025) had a dispensing error rate of 17.1%, with the typical time to dispense urgent (stat) indents being around 42.5 minutes and routine indents taking between 105 and 115 minutes. Significantly, more than half of the time (44%), deliveries took longer than 2 hours, despite being out of line with expectations for inpatient care. More than 485 returns in just nine days, most recorded during busy hours, put extra pressure on nursing, pharmacy staff and led to frequently occurring delays and confusion.

The results from 24th April 2025 to 2nd May 2025 indicated clear and important changes. Using staff awareness, clear SOPs, distributing tasks, setting up the pharmacy and using color-coded containers for emergency medicines lowered errors to 7.9% and managed to get urgent (stat) indents back within 30 minutes, while routine indents took 70–72.5 minutes. Fewer patients had many daily returns, dropping to just 407 cases compared to 557 the year before.

Suggestions from pharmacy staff, GDAs and nursing staff helped explain the quantitative findings—showing that frequent waits, crowded hours, shared responsibilities, the absence of GDA SOPs and undetectable urgent indents in the

system all contributed to constant delays and near misses. Making the workflow simpler and tailoring training to the staff helped fill in most of these process gaps.

More than focusing on numbers, this study pointed out that top-quality healthcare is possible when there is better planning, team cooperation, a clear sense of responsibility everywhere and regular monitoring. Establishing a growth-minded culture, Narayana Hospital actively worked to boost throughout their services and maintain operational success.

Recommendations

Finding from the observations and analysis led us to propose the following suggestions:

1. Pharmacy Department

- Use barcode scanning to lessen the risk of errors made by people.
- Always have pharmacists review every stat and high-alert medication before sending them out.
- Make sure to organize indents by importance by separating other colour and red baskets for routine and urgent indents respectively.
- The dispensing should be updated on Aatma software the moment it takes place and not only at the point of preparation.
- Make sure the store's layout is sensible so everything is where it should be and movements are safe.
- Create a record for medicines that are not given out, to avoid misinformation.

2. Nursing Department

- During peak hours (12–1 PM), single line indents should be avoided as much as possible.
- Place urgent indents in the system, instead of informally asking for them by calling people.
- Use common guidelines for determining package sizes, assigning item codes and choosing service codes to help avoid returns.
- Teach assistants to bring back baskets promptly to keep the dispensing station working well.

3. General Duty Assistants

- Be sure minimum two members of the General Duty Assistant (GDA) staff are assigned to handle IPD pharmacy transport during all shifts.
- GDA's should receive training on SOPs, covering handling the red basket, delivery scheduling and reporting details of deliveries and returns.
- Only use GDA members for transport; do not assign them job functions involving packaging or dispensing medicines.
- Proper system of fixed time interval or fixed number of baskets for trolley movement should be there to avoid dispensing delays.
- Make a logbook for baskets so you can prevent shortages and uncertainty.

4. Management

- Recruit quickly so that there are 4–6 permanent pharmacists working, as it is better than relying on still-learning pharmacists or others assigned from other locations.
- Allot serving slots at busy times just for pharmacy delivery to shorten the wait at the GDA.
- Updating the Aatma system so that urgent indents can be seen even following dispatch helps with follow-up and tracking.
- Use dashboards and alerts to notify users about abnormal times taken and missing emergency patients.

5. Process Monitoring & Quality Assurance

- Set aside time each month to check TAT and the rate of errors.
- Meet with leaders from different departments each week to catch and pinpoint problems as they happen.
- Made available with role access for exposure and corrections, display a KPI dashboard for the pharmacy.
- Create and carry out training modules about hazardous dispensing situations for pharmacists and GDAs.

Closing Reflections

What this project shows is that a proactive, data-based and positive approach to operations can produce significant benefits for healthcare organizations. Since studying medication safety was viewed mainly as a task for later, the need to fix it as a system issue now became evident.

From discovering the main reasons for healthcare problems to making and watching improvements, this study highlights how important it is to use observation, evidence and teamwork. Through its commitment to ongoing growth, Narayana Hospital in Gurugram has shown that being humble, ambitious in care and helpful to others raises the standards of patient care and safety.

The methods used here can be copied, can grow and make a real difference. Simple, open and joint efforts will drive the best changes for reliable medication delivery in the future.

REFERENCES

1. Al-Worafi YM, Alseragi WM, Seng LK, Kassab YW, Yeoh SF, Ming LC, Sarker MM, Husain K. Dispensing errors in community pharmacies: a prospective study in Sana'a, Yemen. Archives of Pharmacy Practice 2018;9:1-3.
2. 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.
3. Karout S, Khojah HM, Karout L, Itani R. A nationwide assessment of community pharmacists' attitudes towards dispensing errors: A cross-sectional study. Journal of Taibah University Medical Sciences 2022;17:889-96.
4. Chand S, Hiremath S, Shastry CS, Joel JJ, Bhat CK, Dikkatwar MS. Incidence and types of dispensing errors in the pharmacy of a tertiary care charitable hospital. Clinical Epidemiology and Global Health 2022;18:101172.
5. Poole SG, Kwong E, Mok B, Mulqueeny B, Yi M, Percival MA, Marsom EN, Duncan C, Graudins LV. Interventions to decrease the incidence of dispensing errors in hospital pharmacy: A systematic review and meta-analysis. Journal of Pharmacy Practice and Research 2021;51:7-21.
6. Prakash R, Sharma S, Sharma A. Healthcare failure mode and effect analysis: Dispensing errors in the pharmacy of an outpatient department of a public sector tertiary-care teaching hospital. Hospital 2019;7:11-8.
7. Campbell PJ, Patel M, Martin JR, Hincapie AL, Axon DR, Warholak TL, Slack M. Systematic review and meta-analysis of community pharmacy error rates in the USA: 1993–2015. BMJ Open Quality 2018;7:e000193.
8. Thomas T, Acharya LD, Venkatraghavan S, Pandey S, Mylapuram R. An observational study to evaluate the factors which influence the dispensing errors in the hospital pharmacy of a tertiary care hospital. J Clin Diagn Res 2011;5:1214-8.
9. Flynn EA, Barker KN, Carnahan BJ. National observational study of prescription dispensing accuracy and safety in 50 pharmacies. Journal of the American Pharmaceutical Association (1996) 2003;43:191-200.
10. Cina JL, Gandhi TK, Churchill W, Fanikos J, McCrea M, Mitton P, Rothschild JM, Featherstone E, Keohane C, Bates DW, Poon EG. How many hospital pharmacy

medication dispensing errors go undetected?. The Joint Commission Journal on Quality and Patient Safety 2006;32:73-80.

11. Beso A, Franklin BD, Barber N. The frequency and potential causes of dispensing errors in a hospital pharmacy. Pharmacy World and Science 2005;27:182-90.
12. James KL, Barlow D, McArtney R, Hiom S, Roberts D, Whittlesea C. Incidence, type and causes of dispensing errors: a review of the literature. International journal of pharmacy practice 2009;17:9-30.