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# Pharmacy Re-Organization to Improve Patient Safety in A Hospital Setting by Minimizing Dispensing Errors

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**Abstract:**

- ***Introduction:***

**Understanding the kinds of dispensing errors that can arise and how they might happen is crucial. The term "Prevented error" refers to an incident that, if it had not been prevented, may have resulted in such exposure. For instance, the wrong medication might have been chosen for a patient during dispensing, but the error is discovered and fixed before the medication is administered. No recent research has shown that a well-organized pharmacy also helps to prevent medication errors when distributing medications in order to increase patient safety Main Aim is to redesigning pharmacy physical layout is to create necessary work environment with proper identifiable storage space, resources for provide pharmaceutical care. Objectives of the study is to identify the various reasons for dispensing errors, to Measure the impact of Drug dispensing in decreasing errors and to Measure the Quality outcome in the Dispensing errors by comparing pre & post Dispensing process.**

- ***Methodology:***

**A cross sectional study will be carried out in a Hospital setting pharmacy centre for 2 Months. All observations will be recorded from 8 am to 4 pm on week days. At billing section, investigators evaluated all prescriptions before and after they were billed to find out dispensing errors for 1 Month. Based on Hands on skill training to upgrade the knowledge, skill & Good communication & post analysis will be made. The 5-point rating scale was used to examine pharmacy staff satisfaction following implementation or after the pharmacy has been reorganized. Results: The study's findings on pharmacy reorganisation in a hospital context show overwhelmingly favourable results, emphasising notable advancements in a number of areas including staff satisfaction, workflow efficiency, and dispensing mistake rates. The survey data indicates that the adjustments that were put into place have had a positive and significant effect on the working environment and the general operations of the pharmacy.**

***Keywords:*** *Pharmacy Re-Organization, Dispensing Errors, Medication Errors, Patient Safety.*

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## I. INTRODUCTION

Understanding the kinds of dispensing errors that can arise and how they might happen is crucial. The term "Prevented error" refers to an incident that, if it hadn't been prevented, may have resulted in such exposure. For instance, the wrong medication might have been chosen for a patient during dispensing, but the error is discovered and fixed before the medication is administered. No recent research has shown that a well-organized pharmacy also helps to prevent

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medication errors when distributing medications in order to increase patient safety

Reorganizing hospital pharmacy services to reduce dispensing errors and enhance patient safety is a key problem in modern medicine. By looking at the frameworks and tactics that have been put out and put into practice to improve the precision and effectiveness of medicine dispensing, this study seeks to solve these problems. Compliance with regulatory standards, such as those imposed by the Omnibus Budget Reconciliation Act of 1990 (OBRA'90), is crucial to this reorganization. Community pharmacists have faced several obstacles to complying with these laws, even if their intended benefits are also relevant to hospital settings (Barnes, Riedlinger, McCloskey, & Montagne, 1996).

In order to achieve better pharmacy services, quality assurance and assessment procedures are crucial. Christensen and Penna (1995) assert that maintaining high standards of care requires a critical focus on continuous improvement processes and thorough evaluation. Likewise, Curtiss, Fry, and Avey (2004) offer an extensive framework for enhancing the quality of pharmacy services and promote closing current gaps in quality by using best practices and organised approaches.

Service delivery in pharmacy settings is also greatly impacted by the social and physical contexts. Dhital et al. (2022) draw attention to the benefits that well-designed community pharmacy facilities have for both employees and clients, stressing that advancements in these areas can result in improved patient safety and service quality. Moreover, Palomäki (2015)'s exploration of the integration of technology into pharmacy operations shows how instruments such as Enterprise Digital Assistants can dramatically lower dispensing errors and boost overall productivity.

The changing function of pharmacists and organizational changes within healthcare systems are explained by historical viewpoints, such as the feminization of hospital dispensing in late nineteenth-century England (Jordan, 2002). These historical insights are helpful for a knowledge of the long-term trends and changes in pharmacy practice.

Organizational and structural changes are essential for the efficient provision of pharmaceutical services, in addition to environmental and regulatory considerations. The Pharm. Care@ BLED effort, which aims to develop, lead, engage, and disseminate best practices in pharmaceutical care, is covered by Hamedi et al. (2017). Similarly, Rothman (2000) examines the function of multidisciplinary medical teams in outpatient care, highlighting the significance of teamwork in improving patient safety.

Enhancements in hospital pharmacy' logistics are crucial for streamlining processes and cutting down on mistakes. The economic effects of these advancements are examined by Ferretti, Favalli, and Zangrandi (2014), who also emphasise the wider advantages for healthcare organisations. Furthermore, it has been demonstrated that implementing lean healthcare approaches and principles, such as DMAIC (Define, Measure, Analyse, Improve, Control), can improve operational procedures and reduce errors (Rosas-Hernandez et al., 2021).

There are a number of reasons why dispensing errors might occur, including difficulties adhering to regulatory standards like OBRA'90, which requires pharmacists to follow certain guidelines but frequently faces obstacles in real-world application (Barnes, Riedlinger, McCloskey, & Montagne, 1996). Dispensing errors are also highly related to the physical and social components of pharmacy workplaces. According to Dhital et al. (2022), poorly designed environments can have a detrimental effect on patient relationships and staff effectiveness, which can raise error rates. According to Wallace-Blair (2009) and Ramaswamy-Krishnarajan (2002), errors can also be caused by the intricacy of medicine dispensing processes and by poor organisational structures.

Errors in medicine dispensing procedures can be greatly decreased with improvements. It has been demonstrated that integrating technology, such as Enterprise Digital Assistants, improves the precision and effectiveness of medicine delivery, thereby lowering errors (Palomäki, 2015). Dispensing errors are reduced by organisational initiatives such as Pharm. Care@ BLED, which concentrate on developing, implementing, leading, and sharing best practices (Hamedi et al., 2017). Further lowering error rates, logistical improvements in hospital pharmacy can have a substantial positive impact on operations and the economy (Ferretti, Favalli, & Zangrandi, 2014).

In order to assess the effects of modifications to dispensing procedures, quality assurance and assessment are essential. Error reduction and upholding high standards of care depend on systematic evaluation and continuous improvement procedures (Christensen & Penna, 1995). Curtiss, Fry, and Avey's (2004) framework for quality improvement can be put into practice to assist in closing current quality gaps. Analyzing pre- and post-dispensing procedures side by side can reveal important information about how successful these enhancements are. Significant gains in operational procedures and error reduction have been shown with the adoption of DMAIC approaches and lean healthcare concepts (Rosas-Hernandez et al., 2021).

Reducing dispensing errors and increasing patient safety in hospital pharmacy settings requires addressing the causes of dispensing problems, putting organisational and technology enhancements into place, and methodically assessing quality outcomes.

In order to increase patient safety, hospital pharmacy services must be reorganised using a complex strategy that takes into account quality evaluation, regulatory compliance, environmental factors, technological integration, and organisational adjustments. Hospitals may improve drug distribution accuracy and efficiency by addressing these

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different factors, which will ultimately lower errors and improve patient outcomes.

## II. AIMS & OBJECTIVES

- To Identify the various reasons for dispensing errors
- Assess the Influence of correct and structured Storage on Dispensing Errors
- To Measure the Quality outcome in the Dispensing errors by evaluating pre & post dispensing process

## III. SCOPE

To reduce dispensing errors and enhance patient safety by reorganizing pharmacy services in hospital settings through an extensive review.

- *Imporetance of Kaizen Implementation*

Dispensing errors may arise major problem, it may go wrong during administration of medication Prescription, transcription, dispensing, and administration errors all fall under the category of medication errors. Our study was focused on the exact causes of dispensing errors. After observation, we were able to identify that improper storage of medications and non-structured/disorganized storage of medications were major contributing factors. This was indirectly causing human errors when staff members searching for medications at the time of dispensing and staffs were could not find the medications' exact storage locations, which increased dispatching time and also miss selection of medicines.

## IV. METHODOLOGY

Dispensing mistakes can cause serious issues and can occur when giving medication. Medication errors include problems in prescription, transcribing, dispensing, and administration. We concentrated our research on the precise reasons for dispensing errors. Following observation, we were able to determine that two main contributing reasons were the incorrect and unstructured/disorganized storage of drugs. Indirectly, this led to human errors when staff members were looking for medications during distribution and were unable to locate the precise storage locations of the medications. This resulted in longer dispatch times and missed pharmaceutical selection.

- A cross sectional study was carried out in a Hospital setting pharmacy centre for 2 Months.
- All observations was recorded from 8 am to 4 pm on weekdays. At billing section, investigators evaluated all prescriptions before and after they were billed to find out dispensing errors for 1 Month. Based on Hands on skill training to upgrade the knowledge, skill & Good communication & post analysis will be made
- The 5-point rating scale was used to examine pharmacy staff satisfaction following implementation or after the pharmacy has been reorganized.

- *Inclusion Criteria:*

All the drugs dispensed at central IP Pharmacy which catered to Patients of General Wards, Emergency Department & ICU's

- *Exclusion Criteria:*

The Drugs Dispensed at OT (Operation Theatre) Pharmacy as the double check process was evident.

## V. OBSERVATIONS AND DISCUSSION

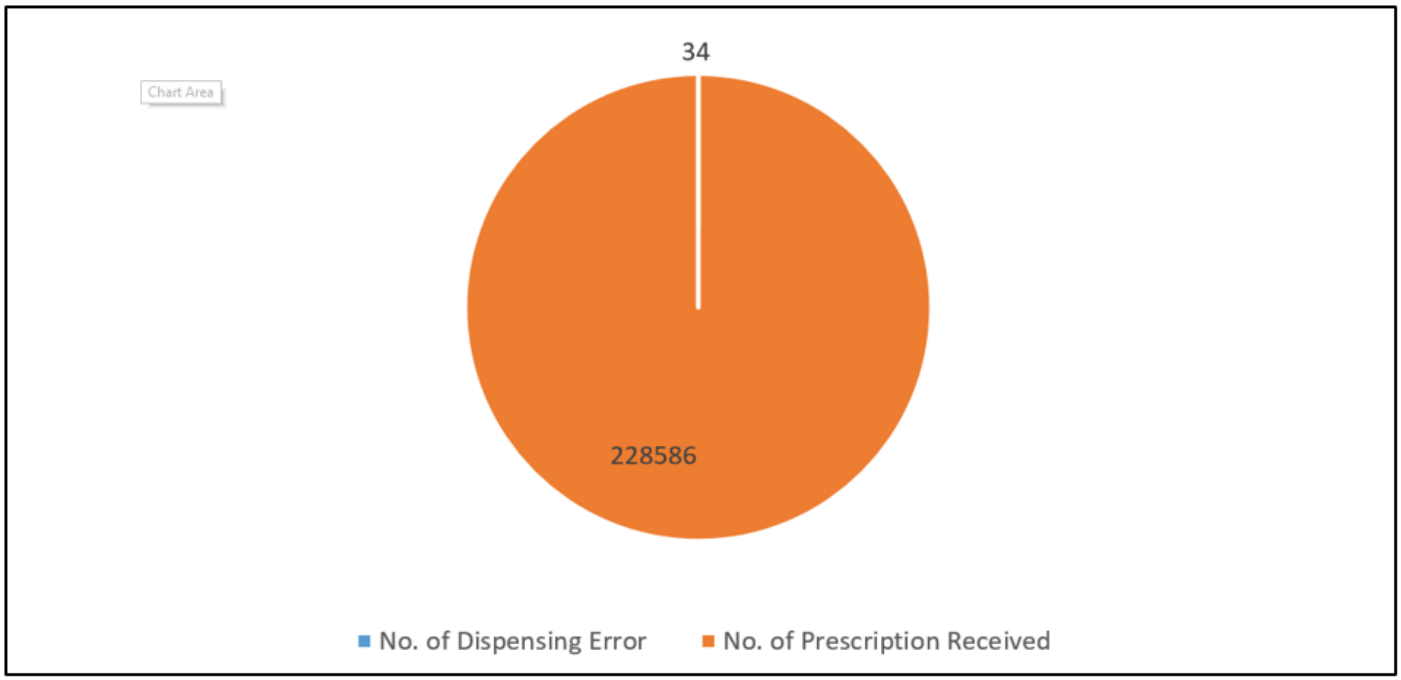


Fig 1 Number of Dispensing Errors Over the Period of three Months

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Figure 1. Shows computed dispensing error rate in order to comprehend the relevance and effect of the dispensing errors for the period of three months. To calculate the percentage, divide the total number of prescriptions received by the number of dispensing errors, and then multiply the result by 100.

$$\text{Dispensing Error Rate} = \frac{\text{Number of Dispensing Errors}}{\text{Number of Prescriptions Received}} \times 100$$

The dispensing error rate is comparatively low at about 0.0149%. This shows that there are only roughly 1.49 errors for every 10,000 prescriptions issued.

Despite the low error rate, patient safety can still be seriously put at risk by even a tiny number of dispensing errors. A pharmacy may face legal and regulatory repercussions, adverse drug events, poor patient satisfaction, and other consequences if they make mistakes that may harm the health of their patients.

- *Causes of Dispensing Errors:*

Focused actions should be directed towards addressing the root causes of errors, such as improper and unorganized drug storage. The current low mistake rate may be further decreased by addressing these problems.

- *Identification of problems and Reorganization Efforts*

Dispensing error rates Measuring the success of these interventions will be made easier once reorganisation initiatives have been put into place (for as with better storage techniques). Validating the selected strategies would require a notable decrease in the error rate.

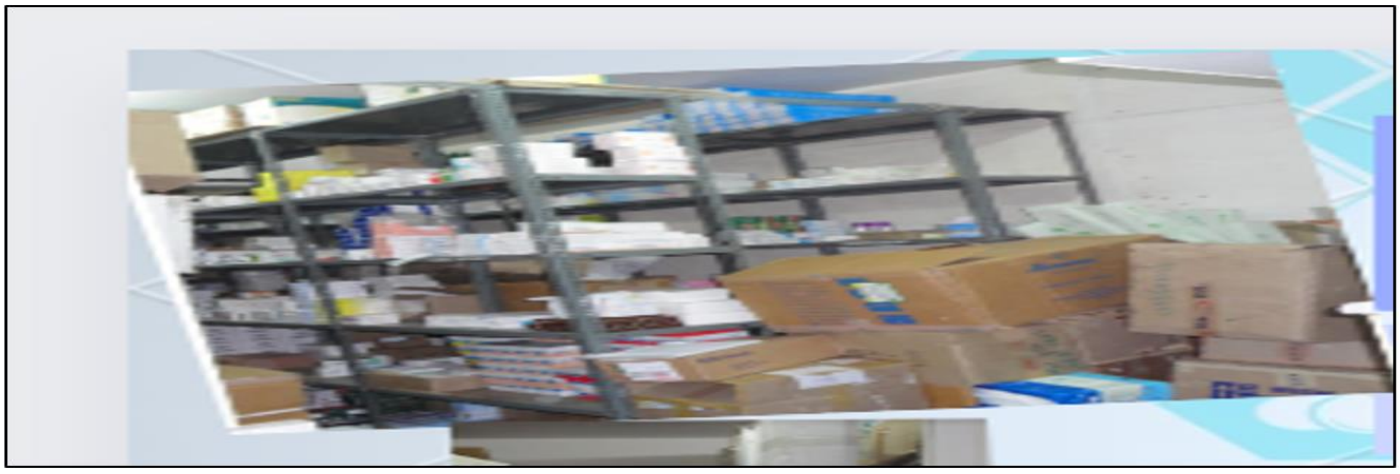

Fig 2 Before Reorganised pharmacy

**REORGANISED PHARMACY & CONTINUOUS MONITORING**

Fig 3 After organized Pharmacy

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- Staff understanding of the storage and labelling standards
- Locked medicine cabinet present?
- Medicine kept in the proper height?
- Outside the cabinet is a list of medications.
- The medicine inventory corresponds to the quantity stated, including emergency
- There is a separate list of medications that are High Alert, Look-Alike, and Sound-Alike medications.
- A list of vaccines is posted on the refrigerator door outside.
- According to manufacturer recommendations, vaccines are stored in the refrigerator.
- A current and complete vaccination log is available.
- "Don't Turn it off" A sticker can be found close to the refrigerator's switch.
- The refrigerator's temperature is kept between 2°C and 8°C, and it is monitored in accordance with the manufacturer's recommendations.
- The room's temperature is regulated and kept between 22°C and 25°C.
- In case of emergency, a backup refrigerator is available for storing vaccines.
- The pharmaceutical refrigerator has continuous power backup
- The staff know the multi dose and expired medicine policies.
- All medications have their expiration dates frequently verified.
- (Date of Opening and Expiry, Tubes & ointments in Use, Multi dose vials, Solutions in Use)
- The procedure for handling medications that are close to expiration is in place.

- The Sample Medicine method is well-known to the staff.
- The designated storage location is where you can find sample medications.
- Sample medications are kept behind closed doors.
- Sample medications have a proper log in the format required.
- All of the sample medications have their expiration dates frequently verified.

- Inventories of medications exist. Register a stock out?
- Medicines are divided into three categories: general, emergency, and vaccines.
- Look into the causes of medicine shortages

## VI. AFTER IMPLEMENTING KAIZEN AT THE PHARMACY, THE NUMBER OF DISPENSING ERRORS WAS REDUCED TO ZERO, AND TANGIBLE AND INTANGIBLE ADVANTAGES WERE REALISED.

- *Tangible Benefits*

- A well-organized pharmacy reduces human error while dispensing medications to a large extent,
- Reducing staff fatigue.
- It also reduces waiting time for OP patients as well as relatives of IP patients to collect medications.
- increases patient safety
- reducing medication errors & Satisfaction

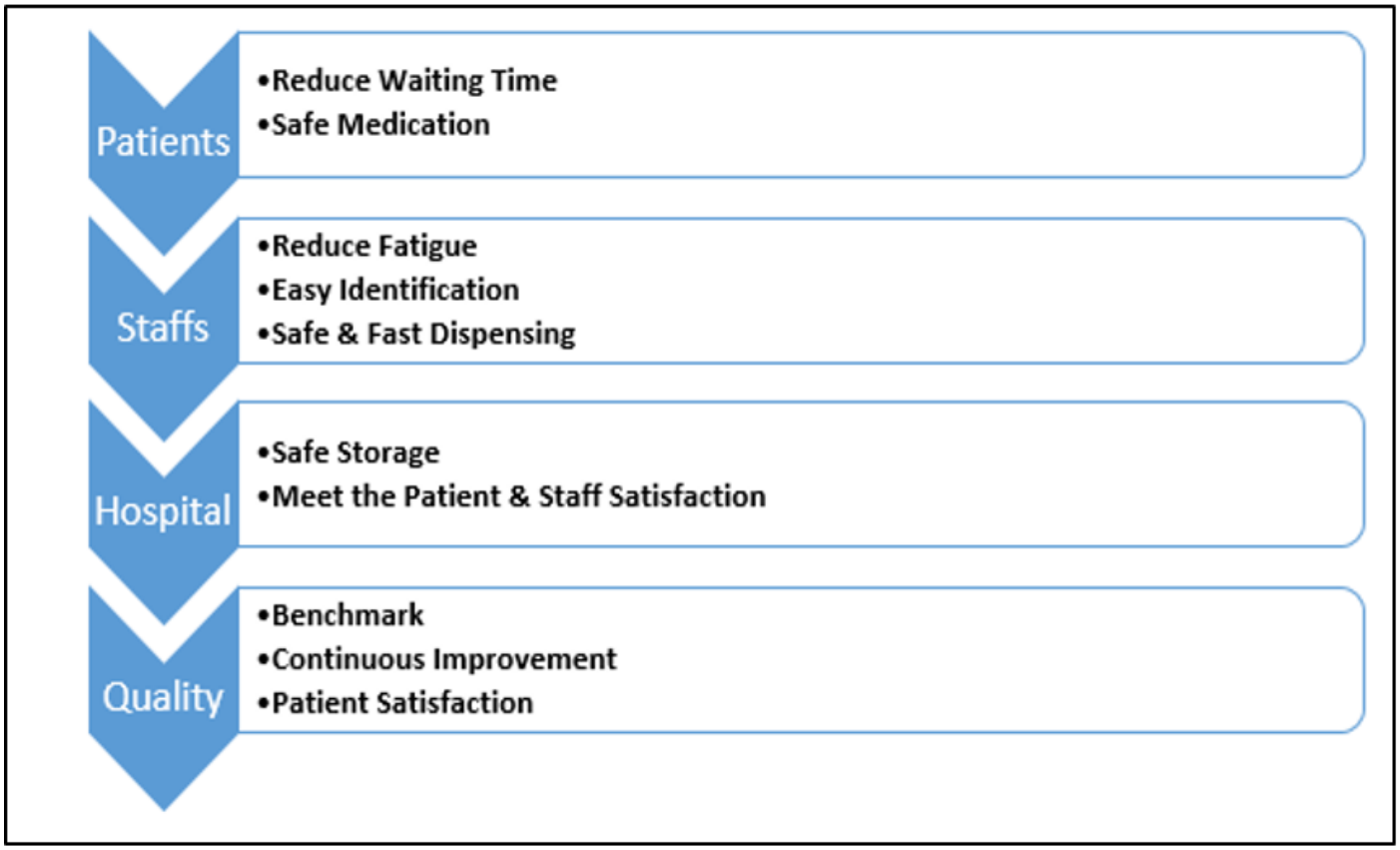


Fig 4 Intangible Benefits

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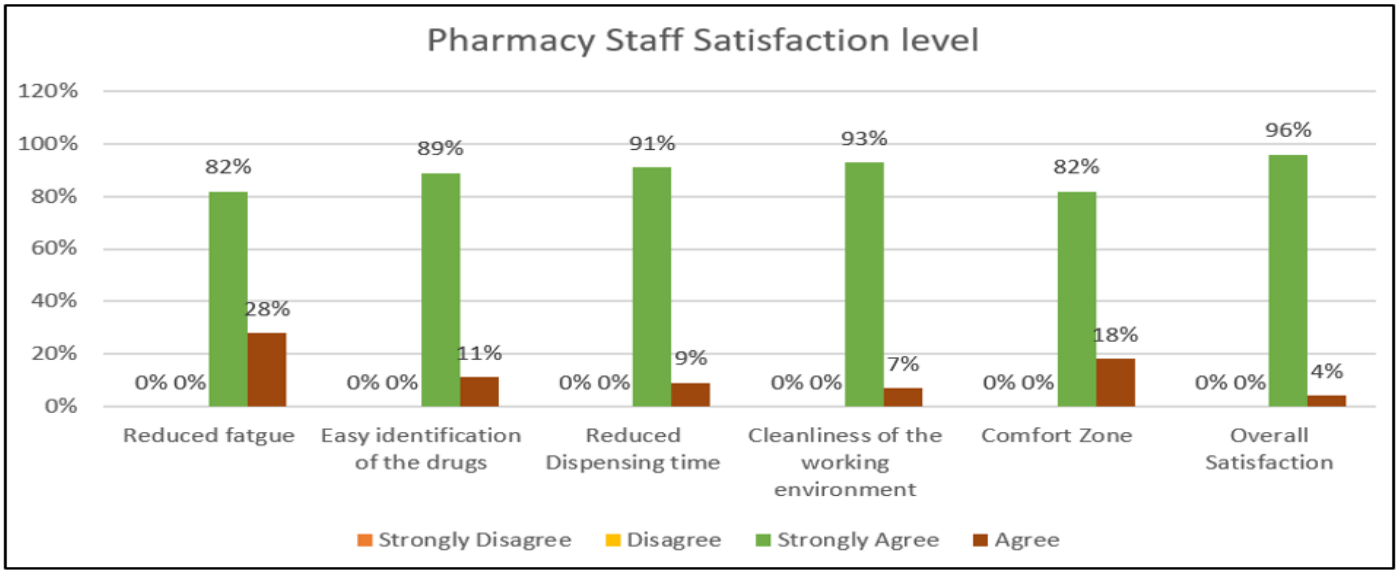


Fig 5 Satisfaction level of Pharmacy Staffs after the Pharmacy Reorganization

Figure 5 Shows A remarkable 82% of participants highly concur, while 28% concur that the reorganization initiatives have considerably decreased staff weariness in pharmacies. This shows that employees' physical, as well as mental workloads, have been lessened by the new workflow and enhanced organisation, which has improved output and increased job satisfaction. Eighty-nine percent of respondents strongly agreed, and eleven percent agreed, indicating that the reorganisation has made it much easier to identify drugs. This enhancement is essential to reducing dispensing errors since choosing the incorrect medication is less likely when drugs are stored neatly and efficiently. Significantly, 91% of individuals strongly agree, and 9% agree that it takes less time to provide prescription drugs now. By cutting down on waiting times, this increase in efficiency not only helps the pharmacy staff by simplifying their work but also enhances patient care. Remarkably, 93% of participants highly concur, whereas 7% concur that the workplace's cleanliness has increased. Maintaining high standards of cleanliness and safety requires a tidy and well-organized workspace, which also helps to lower errors and fosters a happy work environment. Eighty-two percent strongly agree, and eighty-eight percent think that there is now more comfort at the drugstore. Improved comfort can lower the risk of mistakes brought on by discomfort or distractions by improving focus and job satisfaction.

96% of respondents strongly agree, and 4% agree that they are satisfied with the modifications, making for an incredibly high overall satisfaction rating. With a more positive and productive working atmosphere as a result of the reorganisation efforts, the high degree of satisfaction indicates how well those efforts went.

The outcomes clearly show that the pharmacy's reorganisation was successful in achieving its objectives of reducing dispensing errors and enhancing patient safety. A safer, more effective, and more efficient pharmacy operation can be attributed to the notable decrease in fatigue, simpler drug identification, shorter dispensing times, tidier workspace, enhanced comfort, and high levels of overall satisfaction. These favourable results highlight the importance of ongoing improvement and methodical reorganisation in raising employee productivity and improving patient care

## VII. DISCUSSION

Reorganising pharmacy services in hospital environments is essential to reducing dispensing errors and enhancing patient safety. Errors in prescription, transcribing, dispensing, and administration are referred to as dispensing errors, and they can seriously affect patient safety and health. Drawing on a range of studies and professional viewpoints, this debate examines the varied strategy for resolving these errors through enhanced organisational procedures, technological integration, and quality assurance.

Environmental influences and difficulties with regulatory compliance are two common causes of dispensing errors. OBRA'90 laws present challenges for compliance, as noted by Barnes et al. (1996), who pointed out that although the regulations have the potential to improve pharmacy practice, real-world implementation issues may result in mistakes. This is especially important in hospital settings because upholding rules is essential to preserving good quality of care. A big part is also played by environmental factors. According to Dhital et al. (2022), service delivery is significantly impacted by the social and physical characteristics of pharmacy environments. Dispensing errors can arise from poorly organised and congested settings that make it difficult to locate pharmaceuticals. Such errors can be minimised by making physical layout improvements and guaranteeing a better organised storage system.

Dispensing errors have been effectively reduced by technological developments. Palomäki (2015) showed how the accuracy and productivity of medicine dispensing might be greatly increased with the use of enterprise digital assistants. By giving exact information and assistance during the dispensing process, these instruments aid in streamlining processes and lowering human error. Promising

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organisational initiatives include Pharm. Care@ BLED. The goal of this effort, according to Hamedi et al. (2017), is to develop, lead, involve, and spread best practices in pharmaceutical care, which can improve the precision and security of medication delivery.

Error reduction is further supported by advances in logistics. Ferretti, Favalli, and Zangrandi (2014) investigated the effects of logistical improvements in hospital pharmacy and discovered that these modifications greatly lower dispensing errors in addition to increasing operating efficiency. Pharmacy procedures can become more dependable and secure by putting systematic techniques to managing drug distribution and storage into practice.

Evaluating the efficacy of pharmacy service enhancements requires careful consideration of quality assurance and assessment. In order to uphold high standards of care, Christensen and Penna (1995) stressed the significance of rigorous evaluation and ongoing quality improvement processes. Hospitals can assess the efficacy of their initiatives by comparing quality outcomes and mistake rates before and after making changes. Curtiss, Fry, and Avey (2004) offered a thorough framework for pharmacy service quality improvement and promoted systematic approaches to close current quality gaps. Hospital pharmacy can systematically address and eliminate dispensing errors by implementing this methodology.

Effectiveness has also been demonstrated by the DMAIC (Define, Measure, Analyse, Improve, Control) approaches and lean healthcare concepts. According to Rosas-Hernandez et al. (2021), these methods could greatly improve operating procedures and lower mistake rates. Hospitals can maintain steady improvements in patient safety and service quality by closely observing and refining procedures.

Regulatory compliance, technology integration, environmental enhancements, and ongoing quality assessment are some of the many strategies used in the restructuring of pharmacy services to reduce dispensing errors. Patients' safety and hospital pharmacies' operational efficiency can be greatly improved by addressing the different causes of errors and putting tailored treatments into place. Success in lowering errors and raising the standard of pharmacy services over the long run depends on continuous efforts to observe and enhance dispensing procedures.

## VIII. RECOMMENDATIONS

The recommendations that follow are made to improve patient safety in hospital settings by reducing dispensing errors, based on the study's findings and the literature review

➢ *Adopt Methods for Organised and Structured Drug Storage*

- Reorganise Storage Layout: Create a methodical, labelled drug storage system to guarantee pharmacy staff has correct and simple access (Dhital et al., 2022).
- Frequent Upkeep and Audits: To keep things organised and guarantee that best practices are being followed, conduct routine audits and maintenance on storage rooms (Curtiss, Fry, & Avey, 2004).

➢ *Adopt Technology to Help with Accurate Dispensing*

- Employ Digital Tools to Help Pharmacists Identify and Dispense Medication Accurately: By utilising digital tools, pharmacists can reduce human error and increase efficiency (Palomäki, 2015).
- To guarantee that the correct drug is administered to the proper patient, implement barcoding systems and electronic verification procedures (Ferretti, Favalli, & Zangrandi,2014).

➢ *Strengthen Employee Education and Training: Constant Professional Development*

- To keep pharmacy staff members updated of best practices and legal requirements, provide them with continual training and professional development opportunities (Christensen & Penna, 1995).
- Workshops on Error Prevention and Simulation: Organise training sessions and role-playing games that emphasise error-prevention strategies and appropriate medicine handling and dispensing practices (Hamedi et al., 2017).

➢ *Strengthen the processes for continuous improvement and quality assurance:*

- Conduct Routine Quality Audits: To track dispensing accuracy and pinpoint areas for development, conduct routine quality audits (Christensen & Penna, 1995).
- DMAIC with Lean Healthcare Methodologies: To systematically minimise mistakes and streamline operations, apply lean healthcare principles and DMAIC (Define, Measure, Analyse, Improve, Control) approaches (Rosas-Hernandez et al., 2021).

➢ *Boost adherence to regulatory standards:*

- Compliance with OBRA'90 Guidelines: To reduce errors and improve patient safety, make sure that OBRA'90 and other pertinent regulatory criteria are strictly followed (Barnes et al., 1996).
- Frequent Compliance Training: To keep employees educated and responsible, conduct regular training sessions on regulatory compliance (Curtiss, Fry, & Avey, 2004).

➢ *Improve Cross-Field Collaboration:*

- Encourage multidisciplinary collaboration between chemists, doctors, nurses, and other healthcare workers to enhance coordination and communication during the pharmaceutical administration process in order to promote team-based treatment (Rothman, 2000).
- Put Multidisciplinary Health Care Teams into Practice: To reduce dispensing errors through cooperative problem-solving and shared responsibility, create and support

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interdisciplinary healthcare teams (Rothman, 2000). Utilise Analytics and Data to Support Constant Monitoring

➢ *Employ Data Analytics:*

- Make use of data analytics tools to keep an eye on trends in dispensing errors, pinpoint the underlying reasons, and evaluate the success of adjustments that have been put into place (Curtiss, Fry, & Avey, 2004).
- Feedback systems: To support efforts for continuous improvement, set up feedback systems to collect and evaluate data on dispensing errors (Nair, 1999).

Hospital pharmacies can improve patient safety and service quality by reducing dispensing errors, improving organisational procedures, and improving patient outcomes by implementing these guidelines. A successful pharmacy reorganisation strategy must include staff participation, ongoing monitoring, and adherence to best practices and regulatory standards.

## IX. SUMMARY AND CONCLUSION

Reorganising pharmacy services in hospital settings is essential to reducing dispensing errors and enhancing patient safety. According to the study, environmental variables, disordered storage, and problems with regulatory compliance are the main causes of dispensing errors. The adoption of technical solutions, personnel training, quality assurance processes, and the implementation of structured storage systems were found to be successful measures in addressing these problems. Barcoding systems and enterprise digital assistants are two examples of technological solutions that can dramatically lower human error in the dispensing process. Error reduction is greatly aided by organisational initiatives that concentrate on enhancing workflow and logistics. Upholding strict regulatory requirements and conducting ongoing quality assessments are necessary to keep patient safety and service quality at high levels. Hospital pharmacies can successfully lower dispensing errors and increase patient safety by implementing a complete strategy that includes regulatory compliance, environmental improvements, technological integration, and ongoing quality assessment. Achieving long-term gains in pharmaceutical services requires constant monitoring, assessment, and process improvement.

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