



(RESEARCH ARTICLE)



Ensuring drug safety in the outpatient department of a tertiary care hospital in Sri Lanka

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World Journal of Biology Pharmacy and Health Sciences, 2024, 20(03), 105–110

Publication history: Received on 21 October 2024; revised on 02 December 2024; accepted on 05 December 2024

Article DOI: <https://doi.org/10.30574/wjbphs.2024.20.3.0973>

Abstract

Background: Medication safety is a fundamental component of patient safety, as highlighted by the World Health Organization (WHO). The Colombo South Teaching Hospital (CSTH), a major tertiary care institution in Sri Lanka, recently transitioned from a paper-based to a computer-based health information management system in its Outpatient Department (OPD) to improve medication safety and operational efficiency. This study evaluates the impact of these interventions on drug safety.

Methods: This interventional study employed a pre- and post-implementation analysis at CSTH. The study combined qualitative methods, including focus group discussions (FGDs), key informant interviews, and direct observations. Participants included medical officers, pharmacists, patients, and hospital administrators. Data collection focused on challenges in the previous paper-based system, the features of the new computer-based system, and improvements in medication safety.

Results: The previous paper-based system exhibited several challenges, such as illegible handwritten prescriptions, limited access to prior patient records, and lack of continuity in treatment plans. Pharmacists faced difficulties interpreting prescriptions, which affected patient counseling and drug dispensing efficiency. The newly implemented computer-based system addressed these issues effectively. Key improvements included:

Accurate and Clear Prescriptions: Standardized and comprehensive prescriptions minimized errors.

Patient Record Accessibility: Enhanced access to medical histories and allergy information facilitated safer prescribing practices.

Medication Safety Initiatives: Pre-packed drugs, detailed labeling, and alert systems for look-alike and sound-alike drugs significantly reduced medication errors.

These interventions improved patient safety, operational efficiency, and adherence to clinical governance principles.

Discussion: The e-based system has demonstrated measurable benefits, aligning with global patient safety objectives. Enhanced prescription accuracy, reduced drug-related errors, and improved patient satisfaction underscore the system's effectiveness.

Recommendations: Scaling these interventions across other healthcare institutions in Sri Lanka and integrating them into national policies is recommended. Regular updates to alert systems, ongoing staff training, and periodic evaluations will ensure sustainability and continued improvements.

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Conclusion: This study highlights the significant improvements in medication safety achieved through a comprehensive bundle of interventions in the CSTH OPD. These findings offer a framework for enhancing drug safety and patient care in broader healthcare settings.

Keywords: Medication Safety; Computer-based System; Patient Safety; Operational Efficiency

1. Introduction

The healthcare system of Sri Lanka features an extensive network of healthcare institutions, encompassing both curative and preventive services. The curative sector consists of 962 healthcare institutions spread across the country (Ministry of Health, 2023). Service provision is universal and free at the point of delivery. The Ministry of Health is the governing body of Sri Lanka's healthcare system. National Hospitals, Teaching Hospitals, Provincial General Hospitals, and District General Hospitals provide tertiary-level care within this system.

Colombo South Teaching Hospital (CSTH) is one of the largest tertiary care teaching hospitals in the country and the second largest hospital in the Colombo district. It serves as a referral center for many smaller hospitals in Colombo and the surrounding districts. CSTH is a 1,293-bed hospital with a total of 2,952 staff members. The Outpatient Department (OPD) of the hospital served around 365,000 patients in 2023, with an average of 1,300 new patients treated daily (Colombo South Teaching Hospital, 2024).

Recently, the OPD at CSTH transitioned to a paperless, computer-based health information management system, enhancing drug safety, a crucial aspect of patient safety. Additionally, several service improvement initiatives were implemented in the patient care management system to further enhance medication safety.

This study aims to evaluate the advantages of the newly implemented system compared to the previous one, specifically regarding patient safety aspects.

Objectives

- To describe the prevailing situation of the OPD at CSTH, focusing on medication safety.
 - To study the computer-based system implemented in the OPD, including measures ensuring medication safety.
 - To analyze the pre- and post-implementation scenarios, emphasizing medication safety measures at the OPD.
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2. Methods

This study is an interventional project with pre- and post-analytical components. The study was conducted at the Colombo South Teaching Hospital (CSTH), Kalubowila. The primary aim was to evaluate the interventions, including a computer-based information management system and medication safety mechanisms, while comparing the pre- and post-interventional scenarios in the Outpatient Department (OPD).

2.1. Study Design and Setting

The study was carried out at CSTH, one of the largest tertiary care hospitals in Sri Lanka. The OPD, a critical unit in the hospital, served as the focal point for the implementation of the intervention.

2.2. Study Participants

To collect comprehensive data, a diverse group of participants was included:

2.2.1. Focus Groups

- Medical Officers working in the OPD.
- Pharmacists managing drug dispensing and patient counseling in the OPD.
- Patients seeking treatment at the OPD.

These groups provided valuable insights into the challenges and benefits of the previous and new systems.

2.2.2. Key Informants

- The Hospital Director.
- The In-Charge Medical Officer of the OPD.
- The Medical Officer of Health Informatics.
- The Chief Pharmacist.
- The Nursing Officer In-Charge.
- These individuals were selected for in-depth interviews due to their leadership roles and familiarity with the hospital's operational and administrative aspects.

2.3. Data Collection Methods

2.3.1. Focus Group Discussions (FGDs)

- FGDs were used to gather diverse perspectives on the effectiveness of the interventions.
- Participants shared their experiences regarding the old paper-based system and the newly implemented computer-based system.
- Discussions explored issues such as prescription clarity, drug dispensing efficiency, and overall medication safety.

2.3.2. Key Informant Interviews

- Structured interviews were conducted to obtain detailed information about the intervention design, implementation challenges, and observed outcomes.
- These interviews also highlighted the leadership perspective on sustainability and scalability.

2.3.3. Direct Observations

- The principal investigator and the research team conducted direct observations of the OPD workflow to assess the practical functionality of the new system.
- Observations included patient registration, record management, prescription generation, and drug dispensing processes.

2.4. Focus Areas

The study focused on three key aspects

- The prevailing situation before the intervention.
- The new computer-based health information management system and its impact on medication safety.
- Improvements and challenges in the system post-implementation.

2.5. Data Analysis

The collected data were analyzed using qualitative methods to draw meaningful conclusions:

3. Results

3.1. Prevailing Paper-Based Information Management System of Csth

The previous system relied on manual, paper-based registration for both new and returning patients seeking treatment at the OPD. This process involved a designated counter where patients had to queue, often for extended periods, due to the time-consuming nature of the process.

3.1.1. Lack of Patient Records Accessibility

- Doctors were unable to access prior medical records while treating patients.
- There was no mechanism to trace previous records, resulting in a lack of continuity in treatment.
- Clinical decisions were often based solely on the patient's complaints, clinical examination, and investigations conducted during the visit.

3.1.2. Handwritten Prescriptions

- Prescriptions were handwritten, often leading to issues such as illegibility.
- Doctors were not provided with information about the hospital's drug availability while prescribing medications.

3.1.3. Issues Related to Drug Safety in the Prevailing OPD System

Insights gathered from FGDs and key informant interviews highlighted the following challenges:

3.1.4. Prescription Issues

- Prescriptions were often incomplete or unclear.
- Properly written prescriptions should include the patient's name, age, gender, drug names (in generic form), dosage, frequency, duration, and the doctor's name and signature (Department of Health and Aged Care, Australian Government, 2024).
- Handwritten prescriptions led to errors such as dispensing incorrect medications (due to look-alike/sound-alike drug names), following incorrect drug regimens, and wasting pharmacists' time in deciphering illegible writing.
- Doctors' lack of awareness regarding drug availability further contributed to incomplete treatments.

3.1.5. Lack of Information for Patients

- Pharmacists often spent excessive time interpreting prescriptions, reducing the time available for counseling patients.
- Insufficient patient education led to improper drug use, wastage, and the development of drug resistance.

3.1.6. Issues with Continuity

- There was no system to trace prior prescriptions or patient histories, causing difficulties in maintaining consistent treatment plans.

3.2. Computer-Based Information Management System in the OPD of CSTH

The newly implemented computer-based system introduced several improvements:

3.2.1. Patient Registration and Record Accessibility:

- Patients are now registered digitally and issued an access card with a barcode. This card allows them to access treatments, investigations, drugs, and retrieve their medical records within the hospital.
- Alternatively, patients can register through a QR code displayed at the hospital.

3.2.2. Enhanced Prescription Process:

- The system generates complete, clear, and standardized prescriptions.
- Doctors can easily access essential patient information, including medical history and allergies, ensuring safer prescribing practices.
- The user-friendly interface simplifies the process for healthcare professionals.

3.2.3. Medication Safety Initiatives:

- **Pre-Packed Drugs:** Medications are packed before being dispensed, reducing errors.
- **Clear Labeling:** Drug packets are labeled with detailed instructions, ensuring proper usage.
- **Alert Signs for Look-Alike/Sound-Alike Drugs:** Warnings for similar-sounding or -looking drugs have been implemented to prevent confusion and dispensing errors.

The introduction of this system represents a significant step toward improving patient safety, reducing medication errors, and streamlining OPD operations at CSTH.

4. Discussion

Medication safety is a critical aspect of patient safety, and this study evaluated its improvement at the Colombo South Teaching Hospital (CSTH) following the implementation of a series of targeted interventions. These measures included the introduction of an e-based information management system, enhanced drug packing and labeling protocols, and alert systems for look-alike and sound-alike drugs.

The World Health Organization (WHO) defines patient safety as “*the absence of preventable harm to a patient and reduction of risk of unnecessary harm associated with health care to an acceptable minimum level*”. Medication safety, as emphasized by WHO, is a cornerstone of patient safety and represents a crucial focus area for minimizing preventable harm in healthcare systems (World Health Organization, 2023). Clinical governance principles highlight the importance of identifying and mitigating risks to enhance healthcare outcomes (Strarey, N., 2021).

4.1. Key Findings

4.1.1. Implementation of an E-Based Information Management System

- The introduction of an e-based information management system in the OPD of CSTH has significantly improved the accuracy, completeness, and efficiency of prescriptions.
- This system allows doctors to access comprehensive patient records, including medical histories and allergies, reducing the risk of errors associated with incomplete or missing information.
- The system has minimized errors such as prescribing the wrong medication, incorrect dosages, or overlooking allergies. These improvements are supported by findings from Porterfield et al. (2014), who demonstrated that e-based systems enhance prescription accuracy and efficiency in ambulatory care settings.

4.1.2. Cost and Resource Savings

- The adoption of electronic prescribing has reduced incidences of allergic reactions and other medication-related complications, ultimately lowering healthcare system utilization and costs (Weingart et al., 2009).

4.1.3. Addressing Look-Alike and Sound-Alike Drug Errors

- The inclusion of alert systems for look-alike and sound-alike drugs has further enhanced medication safety.
- Confusion due to similar drug names or packaging has been recognized as a significant cause of medication errors (Linda K. McCoy et al., 2005). Implementing measures to mitigate these risks ensures safer drug dispensing and administration for patients at CSTH.

4.1.4. Improved Patient Safety and Clinical Governance

The combination of interventions has fostered a safer healthcare environment at CSTH, aligning with global patient safety goals. Mitigating medication errors enhances the hospital’s overall clinical governance framework, reinforcing its commitment to high-quality care.

4.2. Recommendations

4.2.1. Scaling Up the Interventions

The success of these interventions at CSTH suggests they could be scaled up and implemented across other healthcare institutions in Sri Lanka. By standardizing medication safety practices, the healthcare system can achieve broader patient safety improvements.

4.2.2. Expanding the Alert Systems

Alert systems for look-alike and sound-alike drugs should be continuously updated and expanded to address new risks as they arise.

4.2.3. Ongoing Staff Training

Continuous training for medical and pharmacy staff is crucial to ensure effective use of the e-based system and adherence to medication safety protocols.

4.2.4. Periodic Evaluation and Feedback

Regular evaluations of the implemented measures should be conducted to identify areas for improvement. Feedback from staff and patients should inform iterative improvements to the system.

4.2.5. National Policy Integration

The Ministry of Health should consider integrating these successful interventions into national healthcare policies to ensure consistent implementation across all healthcare institutions.

5. Conclusion

In conclusion, the implementation of a comprehensive bundle of interventions at CSTH has demonstrated significant improvements in medication safety, patient safety, and clinical governance. The lessons learned from this initiative provide a framework for broader application in healthcare settings, ensuring the minimization of preventable medication errors and the enhancement of patient care quality.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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