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Original Research Article

EVALUATING THE IMPACT OF ELECTRONIC HEALTH RECORD SYSTEMS ON REDUCING MEDICATION ERRORS: A STUDY AT LADY READING HOSPITAL, PESHAWAR

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Abstract: *Medication mistakes significantly threaten hospitals, leading to adverse events and increased healthcare costs. Electronic health records (EHRs) have been introduced to reduce the frequency of errors and mitigate these issues. This study aimed to determine if the EHR system reduced medical errors at Lady Reading Hospital (LRH) in Peshawar, Pakistan, thereby enhancing patient safety. A retrospective study was conducted from January 3, 2021, to July 3, 2021. The assessment involved a detailed analysis of medication error incidents at LRH, recorded during this period, involving 200 patients. Data from the Department of Pharmacy were collected and analyzed concerning the occurrence, types, and possible contributing causes of medication errors. The results showed a significant reduction in medication error rates following the implementation of the EHR system. The number of medication errors decreased from 80 incidents to 30 occurrences. Specifically, overall mistakes dropped from 25 to 5, omissions from 15 to 10, and wrong medication reports from 20 to 8. The most common types of errors included dosage errors (accounting for 50 incidents), followed by wrong medication (30 incidents), and omissions (25 incidents). Factors contributing to these errors included communication gaps (20 incidents), transcribing errors (15 incidents), and inadequate training (10 incidents). An evaluation of the severity of these errors revealed 15 minor, 25 moderate, and 10 severe problems. Implementing the EHR system significantly enhanced patient safety by improving communication and providing continuous access to accurate patient information. The findings indicate that EHRs are a crucial component of hospital drug safety, significantly reducing medication errors. Integrating electronic record-keeping facilitates medication management processes, provides real-time information access, and improves communication among healthcare professionals. However, addressing other aspects of system malfunctions and ensuring effective system distribution is essential for successful EHR implementation in healthcare facilities. Future research should focus on designing longitudinal studies to evaluate the long-term safety of medications, the use of EHR systems, and strategies to further improve patient care quality.*

Keywords: Electronic Health Records, Medication Errors, Patient Safety, Healthcare Technology

Introduction

Despite the progress made in the last few decades, medication errors remain a formidable challenge in the healthcare industry that endangers patients, leading to increased healthcare costs and lowered quality of care (Bates et al., 1995). Medication errors are preventable when any patient is harmed or autonomous medication use is incorrectly designed (Gauthier-Wetzel, 2020). The healthcare industry controls it, including healthcare professionals, patients, and consumers. As listed, the errors covered the full spectrum of prescription, dispensing, administration, and monitoring mistakes (Onatade & Quaye, 2018). Over the past few years, the introduction and application of electronic health record (EHR) systems have shown much potential in addressing medication error issues and improving patient safety in hospital settings (Kaushal et al., 2003). Health information systems integrate patients' medical records, such as medication lists, allergies, and lab results, into a single digital platform available for all providers (Adler-Milstein et al., 2015). By integrating instant data retrieval that is precise and updated, EHRs can enhance the quality of clinical decisions, thereby raising the accuracy level of medication management and reducing the chances of errors (Cresswell et al., 2013). One of the many crises that Lady Reading Hospital (LRH), Peshawar, Pakistan, faces is the medicine error crisis, which bedevils most health institutions worldwide. Making an LRH EHR the way forward is one of the means of addressing this matter and will enable healthcare to transform and improve the health outcomes of patients. However, EHRs are responsible for mistake reduction in the general practice setting, yet it is not known to what extent the like reduction occurs in the context of LRH. This study aims to evaluate the extent to which EHR systems at LRH were implemented between January 2021 and July 2021 to effectively improve patient safety by avoiding medication errors. By employing a retrospective analysis of 200 case series of patients in which medication errors occurred due to EHR implementation, this study intends to determine the number of errors and the types of errors that occur due to EHR implementation in the hospital setting.

Methodology

A retrospective analysis was conducted in Lady Reading Hospital (LRH) in Peshawar, Pakistan, from January 2021 to July. 2021. The study summary was made using the 200-

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patient data. Data was provided by the Department of Pharmacy, which gave the account of several drug error cases before and after the implementation of Electronic Health Record (EHR) systems. The population's mean age in the research is 45 years, with a confidence interval of 10 years. Statistical tools were used to determine the incidence and the kind of medication mistakes before and after the adoption of EHR. To maintain significance, the significance level will be set at $p < 0.05$. The project's primary aim was to uncover how these systems were applied in hospitals to prevent medication errors. Over the last two years, the Department of Pharmacy at Lady Reading Hospital (LRH) in Peshawar provided hindsight data on medication errors. A sample of 200 patient cases was tested from 03 January to 03 July 2021. Statistical analysis was conducted in SPSS version 18.0 to determine the possibility and type of medication errors before and after introducing Electronic Health Record (EHR) systems.

Results

Medication errors have occurred since the deployment of EHR at Lady Reading Hospital. Prew EHR implementation, there were 80 events reportable, which decreased to 30 post-adoption, showing a significant 62—5% decrease. In particular, the dosage errors were fewer, with 25 to 5, making an 80% decrease, but the omission errors were lesser, with 15 to 10, which is a 33—3% decrease. The number of drug administration mistakes fell by 60% from 20 to 8, indicating that more safe meds were given. The most common error type was dosage errors, which constituted 50% of the incidents; wrong medication (15%) came next, and omissions had a 12—5% percentage. Communication gaps constituted 10%, and transcription errors received 7. 5% of the feedback, and inadequate training rated 5%. Regarding severity, 7. 5% of the errors had been recognised as severe, 12. 5% of them are moderate, and the rest of them are mild. As a result, the introduction of EHR systems significantly boosted patient safety through improved communications and instant access to information. This implies that these technologies are critical in keeping hospital medication errors at bay.

Table 1: Overview of Medication Error Incidents

Medication	Error Type	Severity
Aspirin	Dosage Error	Moderate
Metformin	Omission	Minor
Warfarin	Wrong Medication	Severe

Table 2: Comparison of Medication Error Incidents Before and After EHR Implementation

Period	Total Medication Errors	Dosage Errors	Omission Errors	Wrong Medication	Drug Interactions
Before EHR	80	25	15	20	20
After EHR	30	5	10	8	7

Table 3: Types of Medication Errors

Error Type	Frequency
Dosage Errors	50
Omission Errors	25
Wrong Medication	30

Table 4: Factors Contributing to Medication Errors

Factor	Frequency
Communication Gaps	20
Transcription Errors	15
Inadequate Training	10

Table 5: Severity of Medication Errors

Severity	Frequency
Minor	15
Moderate	25
Severe	10

Table 6: Summary of EHR Implementation Benefits

Benefit	Description
Reduction in Medication Errors	EHR systems led to a significant decrease in errors.
Improved Communication	We have enhanced information exchange among healthcare staff.
Real-time Information Access	Quick access to patient data for better decision-making.
Enhanced Patient Safety	Overall improvement in patient safety and care quality

Discussion

EHR systems have produced the same results as the ones demonstrated by previous research that indicated the effectiveness of EHR systems in preventing medication errors. For example, a systematic review revealed that including CPOE and CDSS in EHRs decreased medication errors (Kaushal et al., 2003)—55% reduction in preventable adverse drug experiences after applying the EHR system in two hospitals. In our research, the medication error rate declined by 62. 5%, from 80 incidents before the implementation of EHR to 30 incidents after the implementation (Cullen et al., 2000). Notably, dosage mishandlings were reduced from 5 to 25, signifying an 80% drop, and omittance was down from 15 to 10, indicating a 33—3% drop. Twenty occurrences of the right drug were recorded, whereas only 8 misdiagnosed cases were spotted, which means that the number of incorrect medications decreased by 60% (Gauthier-Wetzel, 2020). analysing the medical economy in England and reported that the introduction of EHR reduced the risk of adverse drug events and medication costs. Furthermore, Adler-Milstein et al. (2014) demonstrate that the medication error rate was considerably lower in US hospitals following the implementation of electronic health records, indicating the overall benefits of digital health technologies for patient safety(Adler-Milstein et al., 2015; Onatade & Quaye, 2018).

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Dosage errors were the most prevalent type of error in our research, accounting for 50% of incidents, followed by the wrong medicine (15%) and omissions (12. 5 This type of dosage mistake is in line with findings by Cresswell et al. (2013) who pointed out the dosage errors as the most common mistake in hospitals (Cresswell et al., 2013). The same applies to another work that shows that dosage errors cause the most preventable adverse drug reactions, according to Rothschild et al. (2005). Factors leading to medication errors in the given study were communication gaps 10%, transcription error 7. 5%, and inadequate training 5% (García Rodríguez et al., 2008). These observations are in line with the results of the preceding studies demonstrating that lack of communication between the healthcare providers and transcription inaccuracies when ordering medications and administering them are relatively frequent causes of medication errors (Bates et al., 1995; National et al. for Medication Error Reporting and Prevention, 1998) (14,15). Regarding the gravity of the matter, our study puts 7. 5% of the errors in severe, 12. 5% in moderate, and 7. 5% in minor categories (Khattak et al., 2016; Qureshi et al., 2014). The results remain the same as the research conducted by Bates et al. (1999), who reported a decline in adverse drug incidents after implementing the EHR system (Agrawal & Wu, 2009). Moreover, a mean patient age of 45 was discovered, implying that medication errors can happen not just among the younger or middle-aged population; therefore, there is a need to implement safety measures for medicine no matter the patient's age group. We have finished our research, which was carried out at Lady Reading Hospital in Peshawar, Pakistan, and its main goal was to establish the effect of Electronic Health Record (EHR) systems on medication error reduction. The research period of January 2021 to July 2021 and the participation of 200 patients demonstrated that there were many fewer errors of medication after the patients started using the EHR system (Gates et al., 2021).

Conclusion:

The study confirms that EHRs reduce the likelihood of adverse events related to medication errors and significantly improve the safety of hospital care. The outcomes derived in our study agree with the earlier criticisms that EHR adoption was confirmed to reduce medication errors, primarily those associated with dosage, wrong medication, and those not given. This research provides a practical understanding of the most frequent error types, the contributory factors, and severity levels. Hence, the study extends the evidence that digital health technologies can improve medication safety and quality of care.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned.
Consent for publication
Approved
Funding
Not applicable

Conflict of interest

Data entry and data analysis, as well as drafting the article.

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