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# An Overview of the Impact of Electronic Prescribing Systems on Medication Errors, for Patients Safety

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**ABSTRACT**

Computerized physician order input and clinical decision support systems are electronic prescription methodologies that are progressively utilized to enhance patient safety. Our purpose was to evaluate the influence of electronic prescription systems on drug mistakes and patient harm to enhance patient safety. Electronic prescribing can diminish prescribing and dispensing errors linked to handwritten prescriptions. An internally designed basic E-prescription system, incorporating frequently prescribed pharmaceuticals, significantly diminished medication errors in a resource-constrained environment where the expenses of advanced commercial electronic systems are unaffordable.

**KEYWORDS:** E- prescription, error, pharma.

## 1. Introduction

Medication errors have been recognized as a significant category of medical errors. The Council of Europe and the British Department of Health characterize medication errors as “any preventable incident that may result in inappropriate medication usage or patient harm.” The Institute of Medicine indicates that a hospital patient can anticipate experiencing over one medication error day [1,2].

Information technology plays a key role in twenty-first century healthcare. Electronic medical records facilitate the adoption of automated physician order input and clinical decision support systems, which are increasingly utilized to enhance the safety of prescribing practices. Computerized physician order entry facilitates order input, while clinical decision support systems correlate patient-specific data with a computerized knowledge base to produce tailored suggestions for patients [3,4].

In the last ten years, information technology and the design of automated order entry and clinical decision support systems have advanced significantly. While computerized clinical decision support systems can operate autonomously to provide drug-related recommendations, contemporary systems are integrated with computerized physician order entry to facilitate weight- and age-based dosing calculations, renal dosing adjustments, drug-drug interaction screening, administration scheduling, and therapeutic monitoring [5,6].

Prior reviews of electronic prescribing indicated that patient outcomes were rarely documented, and the limited studies proposing advantages of computerized order entry and clinical decision support systems regarding prescribing errors and adverse drug events were of exceptionally low quality, with a scarcity of randomized trials [7].

## 2. Review:

Medications are the most common therapeutic intervention in health care, with almost half a million prescriptions issued in the NHS every day. Prescribing is a potentially risky practice, and while some adverse medication events (AEs) are unavoidable (for example, new drug allergies), many AEs can be avoided. Medication errors refer to preventable medication-related damages. All health-care practitioners who prescribe must be qualified to perform the duty, yet education and training cannot remove all errors. Various solutions have been established to combat medication errors (of which prescriber errors are a subset), one of which is the use of ePrescribing systems combined with CPOE systems, plus or minus CDS capabilities. The primary goal of this WP was to assess whether prescribing mistake rates had altered as a result of the adoption of ePrescribing technologies [8].

To assess the effectiveness of ePrescribing systems, we focused on COTS systems, which are more likely to be adopted in NHS hospitals, rather than 'bespoke' systems developed in academic institutes. One of the important lessons learned from past pharmaceutical mistake studies, regardless of the manner of prescribing, is that untargeted prescription evaluation might result in the reporting of a huge number of errors with little clinical significance. Such errors have been demonstrated to be poor predictors of more serious errors. Efforts must thus be directed toward evaluations that focus on errors that are most likely to result in major adverse events [8].

Information technology plays a critical role in 21st century healthcare. Electronic medical records facilitate the introduction of electronic physician order entry and clinical decision support systems, which are increasingly employed to improve prescribing safety. Computerized physician order entry allows for order entry, and clinical decision support systems match patient-specific data to a computerized knowledge base to generate patient-specific suggestions [9].

Over the last decade, information technology and the architecture of automated order entry and clinical decision support systems have advanced significantly. Although computerized clinical decision support systems can be used independently to make drug-related recommendations, newer systems are integrated with computerized physician order entry to help with weight- and age-based dosing calculations, renal

dosing adjustment, drug-drug interaction screening, administration scheduling, and therapeutic monitoring [10].

Previous systematic reviews on electronic prescribing discovered that patient outcomes were rarely reported, and the few studies that did suggest a benefit of computerized order entry and clinical decision support systems on prescribing error and adverse drug events were of very low quality, with very few randomized trials [11].

Previous systematic assessments of automated prescribing procedures versus controls revealed improved care processes, adherence to recommendations, and time to target physiology, but no meaningful differences in patient outcomes. More recent systematic evaluations have revealed that there may be an effect on patient outcomes, albeit these findings are inconsistent [11]. Nuckols et al. investigated the efficacy of CPOE systems and CDSS on errors and adverse drug events in research published prior to 2013, and discovered that they reduced preventable adverse drug events independent of CDSS sophistication [12]. A Cochrane Review was revised in 2011 and indicated that computerized advice improved the target physiology of specific drugs, reduced thromboembolic events in outpatients, and tended to shorten hospital stays but did not impact mortality.

In addition to the foregoing, new findings from a recent meta-analysis [13] suggest a positive outlook on the potential of computerized systems. They looked at papers over the last decade, assuming that advances in prescribing technology had resulted in gains in patient outcomes that had not been seen in previous systematic reviews. This notion was reinforced by the discovery that more modern automated prescribing systems have a stronger impact on reducing medication and dose errors. Furthermore, the novel prescribing techniques included in this research had a significant influence on adverse medication events, as well as a potential impact on preventable adverse drug events, implying that they will lead to better clinical outcomes [13].

The mechanism by which modern electronic prescribing systems reduce medication mistakes and adverse drug events is not well known. The following factors may contribute to increased error reduction: advances in ordering and decision support technology, improved electronic health data to which clinical decision support rules are applied, more sophisticated implementation and widespread adoption of these technologies, or a combination of all of these. The reduction in medication and dosing errors appears to be linked to better dosing for renal impairment, prescription completeness, and drug-drug interactions. Regardless of the mechanism of error reduction—already demonstrated in individual research and meta-analyses spanning several decades—the increasing scale of error reduction with newer technology may now be used to harm reduction. Further knowledge of the contributions of these putative mechanisms of action may aid in the design of future systems [13].

From a clinical standpoint, the reported effect sizes appear to be quite large. However, medication mistakes and ADEs are simply proxy outcomes that are not always directly associated to changes in patient-relevant medical outcomes. Quantitative, controlled trials have not yet adequately examined actual benefits in

medical outcomes (e.g., reductions in mortality rates or hospitalisation days). One exception is the study by Han et al. [6], which found an increase in mortality after using a CPOE system. Overall, more systematic trials that examine patient-relevant medical outcomes should be done in the future. Furthermore, more research should be undertaken to determine the costs associated with any potential benefits [15].

According to studies, at least one error occurs throughout each patient interaction. Because of the exposure to new patients, time limits, frequent interruptions, and little patient history, emergency departments (EDs) are thought to be more vulnerable to drug errors. Furthermore, prescriptions are more common in this setting, with more than 75% of ED visits involving drug administration or prescription dispensing.4 Errors at discharge are particularly common, ranging from 15% to 38%. Of the patients discharged from the hospital, 23% experienced at least one adverse event, with medication errors accounting for 72% of the adverse events [13,15].

As expected, there were significant improvements in procedural errors across all locations, including increased legibility, completeness, allergy and weight reporting. Additionally, the documentation of dose unit mistakes was eliminated. This is typical of the improvements found in every CPOE installation, regardless of whether CDS is engaged.

Although we initially intended to investigate variations in effectiveness between more complex 'alerting' CDS-based systems and simpler 'non-alerting' CPOE-based systems, this dichotomy of system types did not hold strictly true. In fact, when we evaluated our prescription indicators on test patients in both systems, we found variable levels of CDS at each site. However, the inclusion of any active CDS resulted in a reduction in prescribing errors. In particular, where sites applied a'restrictive' degree of CDS, associated mistakes were removed, regardless of their kind. Each site claimed that they were concerned about alert fatigue and hence installed minimum levels of CDS (about 25% of the error opportunities under consideration). We detected five different levels of CDS, and while two sites used the same system, we discovered variances in local configuration that resulted in varied CDS warnings and obvious error rates. The organisation's culture, and thus how they set their ePrescribing systems, is critical, because applying a technology that has resulted in greater safety elsewhere does not guarantee a reduction in error rates due to configuration differences [16].

## 3. Conclusion:

The current analysis indicated that electronic prescription techniques significantly diminished medication errors and adverse drug events in patients, in contrast to the absence of such tactics, inside hospital settings. Furthermore, it should be noted that computerized prescription appears to be an effective measure for mitigating the risk of pharmaceutical errors. There is substantial data indicating that electronic prescribing with sophisticated decision assistance features has a beneficial impact in hospital environments. Inadequate implementation planning or lack of integration with overarching information systems may adversely affect both the process and outcomes of care. Upon complete implementation, ePrescribing systems correlated

with a decrease in significant prescribing errors, and our model indicates that this effect is likely to be more cost-effective when clinical decision assistance is accessible. Meticulous system configuration, taking into account clinical processes and workflows, is crucial for realizing these potential benefits; hence, our findings may not be applicable to all system implementations.

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