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A Survey on E-Prescription System

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ABSTRACT: Healthcare industry is revolutionizing with a wide use of digital innovations and technology. The ubiquity of technology is extending into the field of healthcare. This paper presents Electronic Prescribing and developments in pharmacy related to Electronic health Records. One of the key problems faced by health care professionals continue to be the lack of consolidated medication information and an inability to easily share information between healthcare professionals. When patients move between community and hospital, the absence of good quality and up to date data can contribute to these interactions becoming high risk, resulting in medication errors and the critical data being lost. E-prescription can be used to enhance the accuracy and patient safety. Healthcare professionals must use a computerized medication provider tool to record and dispense the prescribed medicines to fulfill the requirements. The principle is to provide an electronic way of prescribing the medications to the patients. At each stage the prescription is verified and signed electronically by the authorized physicians. At each module the database is updated. This ensures accuracy by reducing medication errors. However, there are significant disadvantages like cost, privacy, system error etc.

KEYWORDS: Consolidated medications, e-prescription.

I. INTRODUCTION

Medication errors and adverse drug events occur at most of the medication use phases. It can occur during the prescribing, administering, dispensing and monitoring phase.

Medication safety is the most important responsibility of the healthcare industry. They are putting maximum efforts into the strategies for safe medication use. [2]. It is estimated that around 12.2% of individuals are involved in some form of adverse drug event (ADE). A significant amount of ADE occurs due to the prescription of wrong medication and administering the incorrect drugs to the patient. [3]

Prescription faults and prescribing errors are the major factors contributing to the medication errors. Electronic prescribing is seen as the solution to the prescription errors. Electronic prescribing or *e-prescribing* (e-Rx) is the computer-based electronic generation, transmission and filling of a **medical prescription**, taking the place of paper and faxed prescriptions. [1]. An automated data entry system is used to generate the prescriptions. It allows the physicians, nurses, pharmacists and the patients to transmit the prescription electronically.

In this system the use of mandatory fields such as dose units, order source can eliminate certain major errors such as incomplete prescriptions. [4] The prescribers are allowed to electronically send the patients' prescriptions to the pharmacy. This greatly reduces the manual work and the paper work involved thus reducing the errors. Sending and receiving prescriptions electronically provides patient satisfaction and an effective clinical workflow.

An electronic health record (EHR), or electronic medical record (EMR), refers to the systematized collection of patient and population electronically-stored health information in a digital format. [6].

EHR includes lab results, medication and allergy reports, billing information, radiology reports etc.

Integrating the EHR with the e-prescription systems will help in accessing not only the prescription information but the entire patient information. This technology promotes meaningful use by enhancing the quality of health care by allowing the patients to manage the prescriptions electronically. This increases the safety and reduces the cost and errors caused by the use of handwritten prescriptions. [5].



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II. RELATED WORK

In "Analysis of Prescribers' Notes in Electronic Prescriptions in Ambulatory Practice," researchers performed a retrospective, qualitative analysis of freetext content in the prescriber notes field of e-prescriptions transmitted through the Surescripts network during a 7-day period in 2013. Prescribers in New York state are now required by law to prescribe using an electronic system that is directly connected to pharmacies. In 2012, the New York State Legislature passed the Internet System for Tracking Over-Prescribing (I-STOP) Act, which requires all prescriptions to be submitted to pharmacies electronically[16]

III. PURPOSE OF E-PRESCRIPTION

The process of prescribing medications is the most crucial component of the workflow in every physician's practice. Traditionally, healthcare professionals had to prescribe patient's medication either by writing a script, calling in a prescription to patient's pharmacy, or faxing the prescription to the pharmacy. The traditional approach of prescribing is an inefficient approach.

HANDWRITTEN PRESCRIPTIONS

The prescription charts are written on a daily basis. It should be dated and the patients' details such as name, address are recorded. In each section the prescriber should write the drug name, dose unit, amount and frequency. This prescription is then signed.

In UK, the prescriptions are written into the drug charts which is usually referred by the nurse in order to administer the medicines to the patients. In the USA, a medical record is used which is later transcribed by the nurse onto the administration sheet.

Handwritten prescriptions have certain disadvantages:

1. poor legibility of handwriting causing the selection of wrong drugs.
2. incomplete prescriptions which results in misinterpretation by the pharmacists.
3. Increase in the manual work and paper work.
4. the process of managing written prescriptions consumes time for the prescribers and the staff.
5. Unintended omissions or failure to withdraw a drug are frequent.
6. The medication history is not maintained which causes inaccurate treatment resulting in patients' harm.
7. Inadequate documentation [7][8][9]

IV. PRESCRIPTION CHARTS

Nevertheless, electronic systems are not yet widely available, are expensive, and require training. Comprehensive interventions aimed at improving patient safety using a systematic approach are progressing in different institutions, with the use of uniform medication charts, on which all the relevant clinical information is shown along with the prescriptions, so that transcription is abolished. This approach has been validated as a relatively simple alternative to electronic drug prescribing and dispensing systems. Furthermore, the use of electronic systems in addition to a single uniform medication chart forces staff to develop interdisciplinary collaboration and procedures that allow immediate feedback control both among prescribers and between prescribers and other staff (e.g. non-prescribing nurses).

The input of a hospital pharmacist has been regarded as a major contribution to the identification and reduction of error and is therefore recommended if it can be afforded. Frequent review of prescriptions with the aid of a pharmacist reduces adverse effects.

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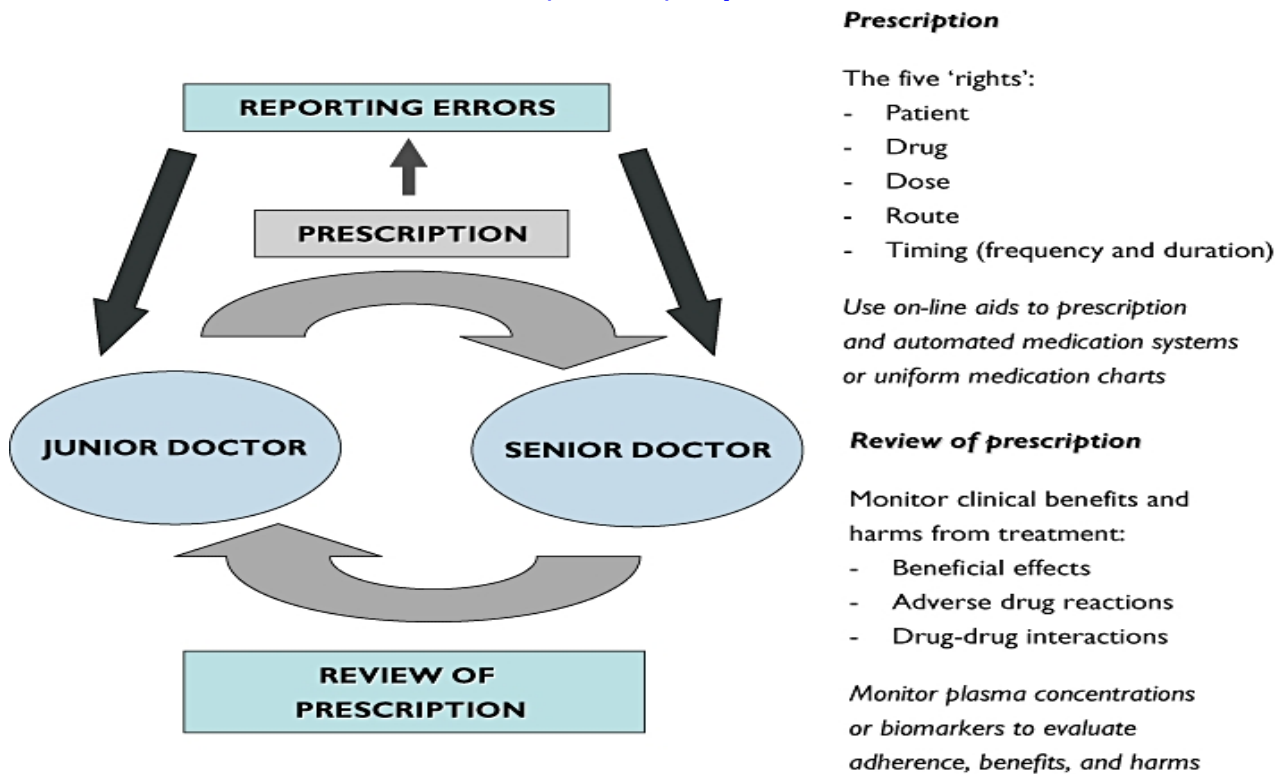


Fig 1: Active intervention aimed at reducing adverse drug related events[8]

V.E-PRESCRIBING

E-Prescribing is defined as a process of electronically generating and sending a prescription order, so that physicians and other medical practitioners can transmit and electronic prescription to a pharmacy directly from the point of care. E-Prescribing or electronic prescribing improves accuracy, enhance patient safety and quality of care since there is no handwriting for the pharmacist to interpret or calling in prescriptions.[5]

E-prescribing occurs in two forms:

- 1.e-prescribing software is loaded into the handheld devices .
- 2.Ambulatory electronic medical record (AMR) systems which is done using a PC.[10]

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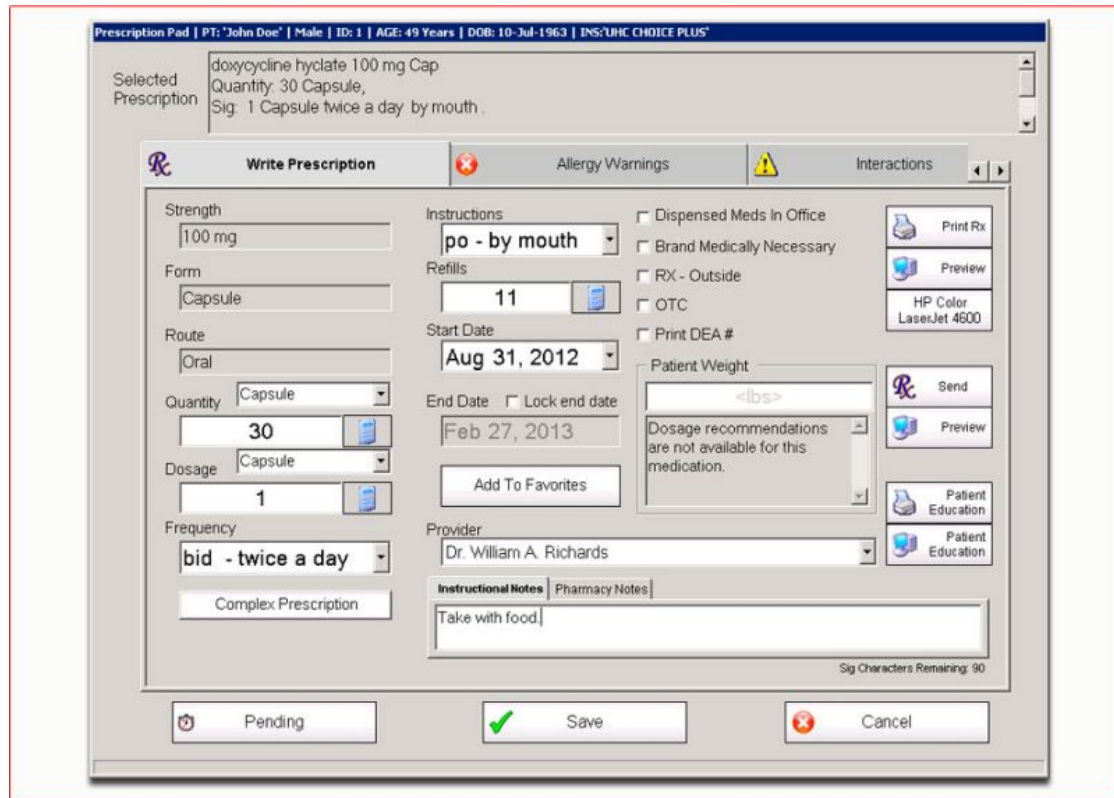


Fig 2 Encite's Electronic Prescription Writer[12]

VI.SYSTEM ARCHITECTURE

The system architecture consists of an application server that authenticates the logon credentials. A username, licence number and password is used. It consists of a database where the patient information, drug related information is stored. The prescription database stores the prescribed medication information such as the place where the drug is sent to, the pharmacist details etc.

The registered patient visits the hospital. When the patient is diagnosed with a particular disease, the physician logs in to the e-prescription system. The physician's credentials are verified. Since the EHR is integrated with the e-prescribing software the physician first verifies and checks the patient's record for the medication history, allergies if any. After careful observations of the EHR the prescription is composed and sent to the pharmacy.

The pharmacist then logs in to the similar e-prescription application and accesses the patient prescription. This prescription is electronically acknowledged by the pharmacist. The mentioned drugs are then gathered and dispensed. If the drugs are not available in the pharmacy then the pharmacist might give a printed copy to collect the drugs from another pharmacy.

The administrator, physician and the pharmacists are allowed to perform the operations such as adding patients, documenting patient information, checking prescriptions etc.

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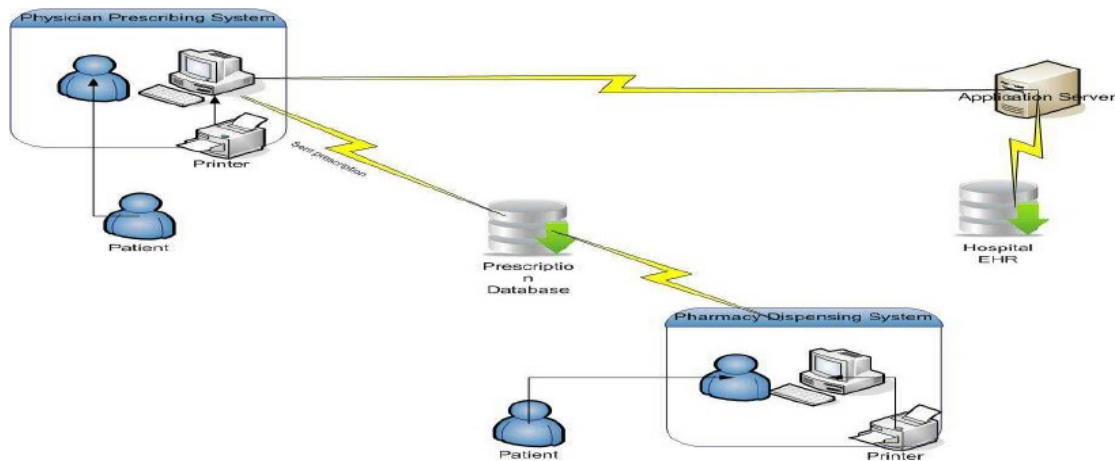


Fig 3: System architecture for E-prescription system [13]

VII. BENEFITS OF E-PRESCRIBING

- **Legibility and Completeness:**

The prescriptions were printed out from the system and hence there was no need for the pharmacists to decipher the written prescriptions. The prescriptions were dated and signed by authorized physicians. There was no missing information as the complete patient details were recorded in the e-prescription application. [14]

- **Patient safety :**

The patient safety is improved by e-prescribing because of the prescription legibility, the time taken to prescribe medications. With the EHR being a part of the e-prescription software the patient medication history, allergies and drug-drug interactions are verified thus providing the right medications. The National ePrescribing Patient Safety Initiative started to provide physicians with a free e-prescribing web-based tool called eRx to encourage them to learn how to write prescriptions electronically in order to reduce preventable medication errors.

- **Efficiency:**

The automated prescription entry helps in reducing the time taken in resolving issues such as refill requests and authorizations. Prescribers can pick the right medication and reduce any call backs from the patients. This not only reduces the preventable errors but also helps in providing the right medications to the patients.

- **Automated clinical decision support:**

E-prescription removes the guesswork by prompting the prescribers to fill out all the mandatory fields such as dose, dose unit, frequency etc. This helps in alleviating the risks associated with filling prescriptions.

- **Prevents the loss of prescription :**

There is more probability of losing a handwritten prescription. The prescription should be re-written which is an overhead. With e-prescription the prescription is directly sent to the pharmacy. [5][15]

VIII. DRAWBACKS OF E-PRESCRIPTION SYSTEM

1. E-prescribing system errors:

The software should be designed in such a way that it should be efficient and easy to use. There can be a lot of issues like hardware problems, software problems, workflow problems causing increase in cost, time and connection issues.

2. Privacy and security :

Privacy and security of patient information is the most important concern. The EHR information are delivered wirelessly and it might be stolen if there is no proper firewalls installed. [5]



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X.CONCLUSION

With the evolution of technology most of the medical errors and faults in prescribing is preventable. Needless loss of life of a patient can be easily avoided by using a new technology like electronic prescription. It not only reduces the manual work involved but also maintains the patient record efficiently. It has the potential to increase the patient safety and privacy.

The vision is to have a fully electronic process for prescribing, involving all physicians, patients and pharmacists, allowing the patient increased influence, with improved quality in drug utilisation and better cost-effectiveness. Like any other electronic health technologies e-prescribing has its own limitations. However, the benefits of e-prescribing are remarkable. Therefore, multiple strategies should be provided to encourage the e-prescription initiatives.

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