Paper Title: THEORETICAL APPROACH TO ELECTRONIC PRESCRIPTION SYSTEM IN WOLAITA SODO UNIVERSITY REFERAL HOSPITAL

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ABSTRACT
WHO has defined health as “a state complete physical, mental, and social well-being and not the mere absence of diseases or infirmity”. It is generally concerned with the anatomical integrity and physiological functioning of the body. It means the ability to perform routine tasks without any physical restriction. The fault in the process of prescription causes many deaths.

The tendency to use advanced technology in Wolaita Sodo University Referral hospital have put forward electronic prescription. Electronic prescription is considered as the main solution to overcome the major drawbacks of the paper-based medication prescription, such as transcription errors. This study aims to provide practical information concerning electronic prescription system to a variety of stakeholders.

Methods: In this review study, The Method and techniques used to analyze the existing system and designing electronic system includes, interview, document analysis, practical observation.

Results: There are many problems with the paper prescription system which, according to studies have jeopardized patients’ safety and negatively affected the outcomes of medication therapy. All of these problems are remedied through the implementation of e-prescriptions.

Conclusions: The sophistication of electronic prescription and integration with EHR will become a reality, if all its stakeholders collaborate in developing fast and secure electronic prescription systems. This will result in widespread adoption of the system.

Keywords: Electronic Prescribing; Utilization; Standards
1. Introductions

WHO has defined health as “a state complete physical, mental, and social well-being and not the mere absence of diseases or infirmity”. It is generally concerned with the anatomical integrity and physiological functioning of the body. It means the ability to perform routine tasks without any physical restriction. The fault in the process of prescription causes many deaths In addition to natural diseases, which I am going to deal it.

I believe that the basis for improving hospital operation is shifting the day to day manual operation of the hospital into computer based system but it is true that the majority enterprises that is found in Ethiopia does not use computer base system as a result I can be a witness for the problem occurred due to the manual system they use and the time it take to perform the day to day operation.

From this perspective when I look at the Electronic prescription process in the Wolaita Sodo University Teaching Referral Hospital and as a general, which is delivered through manual have many errors.

These errors result from a number of factors. The most frequent source of error is miscommunication between the provider and the pharmacist. Communication errors stem most often from illegible handwriting, unclear abbreviations and dose indications, unclear telephone or verbal orders, and ambiguous orders and problems. Unreadable or vague prescriptions result in unsuspected and large amount of patient deaths.

Finally, by observing this problem I am motivated to analyses and works on manual system prescription process to s electronic prescription process in the hospital (EPCS).

Prescription is task of a doctor in which it is the process of giving treatment to the diseases. This process involves analyzing and writing patient history or patient chief compliance, writing diagnose, give appropriate treatment (Rx) to the diagnosed diseases, making some calculation of dosage specially for pediatrics, analyzing drug appropriateness (contraindication, indication, allergy, and extra), and finally transmitting the treatment to the dispenser.

E-prescription is the processing of a drug prescription in an electronic form, starting from the medical professional prescribing the drug and ending with the actual dispensing to the patient, including the process of drug selection and demand, with the data always stored electronically. E-Prescribing can be defined as “entering a prescription for a medication into an automated data entry system (handheld, PC, or other), and thereby generating a prescription electronically, instead of handwriting the prescription on paper”

E-Prescription is a tool for prescribers to electronically send an accurate, error-free and understandable prescription directly to a pharmacy from the point-of-care. It allows the patient to improve the safety through electronically checking patient allergies contraindication etc, security and accuracy of his prescriptions, save his time during handling prescription renewals by making it electronically with his pharmacy.
2. Literature reviews

2.1 Electronic Prescription

2.1.2 The Concept of Electronic Prescription

Electronic prescription is a reality far beyond the simply using computers to write and save prescriptions. In fact, electronic prescription (e-prescription) is a broad term that means using the computer devices to enter, modify, review and generate or transmit medication prescriptions that prepare two-way transmissions between the point of care and the dispenser. This form of technology would safely transmit prescription or prescription-related information between stakeholders (prescribers, dispensers, pharmacies, health plans, and health insurers) either directly or through an intermediary (including an electronic prescription network) using electronic media. E-prescription transfers prescriptions from prescribers to pharmacies, refills and renewals requests from pharmacies to providers, prescription benefit and formulary information and fills status notification for prescribers. Therefore, the utilization of electronic systems in prescription can facilitate the communication of a prescription, aid the choice, and supply the medication by decision support and finally provides a robust audit trail for the entire medication process.

There are several main steps in creating and managing prescriptions electronically. Firstly, a user of the system signs in by some sort of authentication to prove his or her identification. In the next step, a clinician identifies a patient within the electronic prescription system and the electronic prescription process begins. These data should be readily available to the clinician prior to entering new prescriptions. Different devices in multiple environments are used in three activities of the electronic prescription process, such as selecting a medication, entering parameters and signing the prescription. Also, clinical decision support is utilized through reviewing alerts and reminders in these activities. Then, the verified prescription was directly or indirectly transferred to pharmacy for dispensing. Prescription Refill and renewal requests are also automated in e-prescription cycle, illustrated in Figure 1. Moreover, prescription claims are transmitted electronically from pharmacy to payers.
Fig 1. Modeling diagram of Electronic Prescription System.
2.4 The Role Player of the E-Prescription System

Player represents anything or anyone participates in the system. This may include people, external system, and other organization. In the existing prescription system there are different players namely patient, prescriber or doctor or dispensers and porter. The above-mentioned players are discussing below:

- **Patient**

  The patient tells the porter about their basic demography to be registered as history and describe their chief compliance to the doctor, and also tells whether they have taken any drug, any history of allergy or hyper sensitivity to a certain drug if any and if they know. After this they will buy the drug prescribed for them from pharmacy.

- **Prescriber**

  The prescriber will go over the contra indications and drug-drug interactions, checking dosage of the drug being prescribed, consider cost of the drug and potency of the drug and consider all patient history to write prescription.

- **Dispenser**

  They read the prescription and they will give prescribed drug and tell patients or their attendants how to take the drug. If they have questions, vague prescription, and refill request they will return it to the prescriber. If the prescribed drug is not available he informs his patient to by the drug from outside.

- **Porter**

  When the patient comes to the hospital the porter will attends him and take his patient demography and assign appropriate OPD depending on his case.

2.5 Class Diagram for Practical Approach

The researcher used this diagram to identify the Classes and its attributes and the operation as follows which helps for design level of class diagram.
Fig 2. Class diagram
3. Methodology

3.1 Fact finding Techniques

The Method and techniques used to analyze the existing system and designing electronic system includes, interview, document analysis, practical observation. Those methods which help me to gather the required data to analyze my project and those methods selected due to the time and the organization’s willingness.

- **Interview**
  
  I conduct the interview for different stakeholders in the hospital

- **Questionnaires**
  
  In order to get information about the existing system of hospital, I prepare questionnaires for analyzing the process of prescription so as to understand the current system process.
Data collection

Observations were conducted by a Medical, Nursing and pharmacy student, aiming to collect data across a range of scheduled drug rounds, and to be as unobtrusive as possible. Nurses gave verbal consent prior to being observed. The study was approved locally as a service evaluation; research ethics approval was not required.

4. Results

Table 1

Drug rounds observed

<table>
<thead>
<tr>
<th>Drug round</th>
<th>Before ePMA</th>
<th>After ePMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning</td>
<td>7 (35 %)</td>
<td>7 (50 %)</td>
</tr>
<tr>
<td>Noon/2 pm</td>
<td>7 (35 %)</td>
<td>4 (29 %)</td>
</tr>
<tr>
<td>Evening</td>
<td>4 (20 %)</td>
<td>2 (14 %)</td>
</tr>
<tr>
<td>Night</td>
<td>2 (10 %)</td>
<td>1 (7 %)</td>
</tr>
<tr>
<td>Total:</td>
<td>20 (100 %)</td>
<td>14 (100 %)</td>
</tr>
</tbody>
</table>

Generally, the morning round (pre-ePMA mean 75 min and range 39-125 min; post-ePMA mean 76 min and range 50-115 min) was slightly longer than other drug rounds. Fig 1 presents the duration of morning drug rounds over time, as a time series, and shows wide day-to-day variation.
Fig. 1

Duration of morning drug rounds over time, pre- and post-ePMA. ePMA = Electronic Prescribing and Medication Administration

Nurses’ activities and workflow relating to medication administration

Pre-ePMA, the 22 h observed resulted in 497 work sampling points. Post-ePMA, the 18 h observed resulted in 438 sampling points. The percentage of these sampling points during which the observed nurse was engaged in each type of activity is shown in Fig. 2.
Fig. 2

Nurses activities during drug rounds. ePMA = Electronic Prescribing and Medication Administration. * = Statistically significant based on calculated 95 % confidence intervals

Both pre- and post-ePMA, the highest percentage of time was spent preparing medication. The main difference following introduction of ePMA was a statistically significant increase in the percentage of time spent on documentation, which increased from 9.5 % (95 % CI 6.9 %-12.0 %) to 20.3 % (95 % CI 16.6 %-24.1 %) of nursing time. The following changes were also statistically significant: ‘Searching for patients’ drug charts’ which reduced from 1.2 % (95 % CI 0.3 %-2.2 %) to zero, ‘counselling on medication’ which reduced from 1.6 % (95 % CI 0.5 %-2.7 %) to zero and ‘supervision/education of a student’ which reduced from 2.8 % (95 % CI
1.4%–4.3%) to zero. The change in time spent supervising students is due to the student nurses’ rotations changing over the course of the study which meant that no students remained on the wards following ePMA implementation.

Activities were mainly carried out by the nurse by him or herself, followed by ‘other nurses’ and ‘healthcare assistants’, there were no statistically significant changes in this respect (Fig. 3).

Fig. 3
Who the activities were undertaken with during drug rounds. ePMA = Electronic Prescribing and Medication Administration

4.1 Problems Related to the Paper-Based Prescription Systems

There are many problems with the paper prescription system which, according to studies have jeopardized patients’ safety and negatively affected the outcomes of medication therapy. All of these problems are remedied through the implementation of e-prescriptions. Examples of prescription problems are mentioned below:

• Errors in drug name, dose, formulation, frequency of dosing, dosing regimen, strength and route
• Illegibly written prescriptions
• Ambiguous order and incorrect interpretation of the prescription
• Unclear telephone or verbal orders
• Prescriptions issued to the wrong patient
• Missing prescriber or patient data
• Omission of medication, high rate of prescription fraud imposing costs on pharmacies
• Rewriting prescriptions in physicians’ offices and pharmacies
• Re-entering all the prescription details into pharmacy and paying system by hand
• Giving potential rise to re-keying errors
• Incompleteness of information on patient medication histories
• Repetitive medication treatment
• Miscommunication due to illegible handwriting in ordering, distributing and administering of medications
• Unclear abbreviations and dose designations
• Poor tools for managing adverse drug interactions
• High rate of adverse drug reactions
• Complexity of medication selection due to wide variety of pharmaceutical products
• High cost for handling prescriptions
• Risk of losing, damaging and hefting a paper prescription

5. **Conclusions:**

The sophistication of electronic prescription and integration with EHR will become a reality, if all its stakeholders collaborate in developing fast and secure electronic prescription systems. It is plausible that the required infrastructure should be provided for implementation of the national integrated electronic prescription systems in countries without the system. Given the barriers to the implementation and use, policymakers should consider multiple strategies and offer incentives to encourage e-prescription initiatives. This will result in widespread adoption of the system.
5. Recommendations and Suggestions
The related studies performed in Wolaita Sodo University Teaching Referral Hospital have highlighted a high frequency of medication error, quantitative and qualitative problems and imperfections in the current prescription system. Moreover, these studies have emphasized on the impact of computerized provider order entry (CPOE) on reducing medication error and improving patient safety, and also the patients' willingness to refill their prescriptions electronically and obtain more information about the administration of medication via information technology.

6. Reference


15. Ekedahl A. Problem prescriptions in Sweden necessitating contact with the prescriber before dispensing. *Res Social Adm Pharm.*


To do this system starting from the requirement analysis to the implementation I used the following materials.

**Glossary**

- **CPOE** computerized provider order entry
- **SQL**: Structural Query Language
- **ID**: Identification Card
- **UML**: Unified Modeling Language
- **UI**: User Interface