Effects of Web-Based Survey Tool and Public Health Services for Low-Cost Detection of Vulnerable Medication Errors Using Telepharmacy

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KEYWORDS

Web survey tool, Tele pharmacy, Low-Cost Detection, Vulnerable Medication, Health Errors, Pharmacists

ABSTRACT

Telepharmacy, in which prescription requests are reviewed and approved online by a pharmacist in a different geography, is an effective way to lower the number of mistakes made when giving medicines. However, not enough studies have been done on the benefits of error reduction and the possible cost savings that come with these teleservices. This paper discusses a study examining what happened when a web-based survey tool and telepharmacy solutions were used to find Vulnerable Medication (VM) errors and low-cost Public Health (PH) services. It is very important to get each patient's drug records when they come into the Emergency Room (ER) so that any mistakes in their current medication record can be found. The trained pharmacists were interviewed after using a safe online tool to keep track of drug information. Details about each patient were gathered, along with the amount and type of VM and any PH errors found during the data-gathering procedure. From May 2022 to November 2022, 190 patient files were successfully filled up utilizing the survey instrument throughout the experimental period. Among the 1090 drugs documented, 41.38% were classified as drugs of high risk. 42.33% of possible prescription mistakes were categorized as VM errors. This online survey tool has enhanced the caliber and effectiveness of identifying possible errors during the gathering of medication records by pharmacists. This data may be readily accessed and contribute to debates about the reconciliation of drugs at the management level. It can also positively affect patient care outcomes by facilitating the development of virtual procedures that may reduce drug-related incidents.

1. Introduction

Telepharmacy involves examining and categorizing prescription requests by a pharmacist located at a different location [1]. Investigations and medical error tracking programs have consistently shown that using telepharmacy has significantly decreased prescription errors. Although telepharmacy has been recognized for its advantages, it is seldom utilized in rural entities, which often face challenges owing to a shortage of pharmacists [2]. Telepharmacy systems may improve pharmacy support in smaller communities by effectively lowering prescription mistakes, addressing the significant scarcity of pharmacists, and enhancing patient security in these hospitals and PH centers [3].

Several states have not yet implemented legislation for the use of telepharmacy in entities, particularly rural healthcare facilities, due to their lack of accreditation by the Joint Commission (JC), a nonprofit corporation that endorses healthcare organizations and programs [14]. The use of telepharmacy for after-hours drug order assessment in bigger hospitals is mostly driven by the significant influence of JC on accreditation [10]. After the introduction of telepharmacy services, the processing time for requests fell dramatically at certain hospitals. At the same time, the total number of medical consultations done by pharmacy professionals, including tele pharmacists, rose [4]. The staff pharmacists significantly improved activities like chart evaluations, drug explanations, dose changes, medication-based instruction, discharge training, and anticoagulant follow-up. Additionally, there was a notable rise in nurses' overall satisfaction.

While one research has shown cost reductions after using telepharmacy offerings, there is a shortage of studies examining the possibility of reduction in costs concerning practitioner shortfall rates, Adverse Drug Effects (ADEs), and high-alert drugs [11]-[7]. There are currently gaps in the existing research regarding the cost savings achieved via telepharmacy facilities. Pharmacists possess specialized knowledge in treatments and can conduct thorough pharmaceutical treatment management [5]. Despite recognizing the vital function of pharmacists in reconciling medicines, the availability of resources frequently poses a challenge and limits the ability to expand these services [12]. Using pharmacy workers to keep drug records has quickly become a unique and creative way to provide high-quality care while managing resources efficiently [8]. This method has been shown to be faster and

more accurate than relying on people who work outside of pharmacies, like nurses or medical staff. Some studies have found that having pharmacy techs get medication records while being supervised by pharmacists greatly lowers the number of medication errors and adverse drug responses [9].

The goal of this trial study was to come up with a new survey tool that would set rules for how to record different types of HR drugs and medicine errors that happen while collecting prescription records [13]. The system would also allow for recording throughout the process, so there would be no need for extra time and resources to analyze the data later on. If this system is put in place, it would be possible to report to the network of hospitals once a month [6]. This would make it easier to use data to improve patient care and cut down on the costly mistakes that happen during changes in care. If the survey tool is effectively integrated into the routine of technicians, it could serve as a blueprint for medical facilities to rank the detection and characteristics of drug errors. This, in turn, could positively influence patient therapy results by establishing procedures that may lead to a reduction in medication-related ADEs.

2. Methodology

A high-risk medicine list was created after conducting an extensive literature study using Pubmed. The search engine employed key phrases such as VM, VM mistakes, and drug-related ADEs. The inclusion criteria included systemic drugs administered in PH contexts. The criteria for exclusion included non-systemic drugs (such as topical or aerosol pharmaceuticals), dangerous drugs that are prohibited in specific medical situations (e.g., statins during pregnancy), and drugs only utilized in hospital environments. The parameters for exclusion were established based on the specific characteristics of the call center process. Pharmacists in this setting were only accountable for collecting information about the medicines that patients were currently using on outpatient schedules. However, they were not required to submit any information about the PH problems or potential interactions between different drugs. Finally, combination pharmaceuticals were considered a single medication to prevent overestimating the overall number of medications. The high-risk drugs found were categorized based on their pharmacological class or biological structure.

Recent research efforts have emphasized that more than one-third of individuals aged sixty-five and above are being given drugs that may not be suitable for them (known as Possibly Inappropriate Medicines or PIM). These drugs are linked to negative effects that result in PH use and therapy expenses. These drugs, acute and long-term, were linked to a 21% higher likelihood of encountering an ADE, requiring an appointment to the emergency room, or being readmitted to the hospital. Data for the study was gathered by creating a web-based questionnaire instrument using Research Electronic Data Capture (REDCap) technologies. REDCap is a safe and web-based application platform specifically created to facilitate data collecting for research activities. Pharmacy personnel were able to standardize digital data gathering to gather data on drug categories and mistake kinds found during drug record collecting. The Medication Record Survey (MRS) tool is a web-based application designed as a branched-logic assessment. It consists of filled inquiry boxes depending on the technician's replies.

Using the remote customer service system, the MRS tool was created to be filled out in a few minutes, either during or after acquiring an MRS. The survey gathered the accompanying data: the PH Record Number (HRN), the hospital location, date of birth, date of the hospitalization, and the sources from which the pharmacist acquired the crucial details (patient, caretaker, nurse, etc.) if more explanation had to be obtained. Furthermore, the technician successfully finished the HR drug part by meticulously choosing each VM found throughout the drug history procedure. This was done by ticking boxes on a comprehensive list of more than 400 VMs. Pharmacists can employ the "Ctrl + F" feature on their workstations to conveniently search for pharmaceutical names after gathering a patient's medication record. Following selection, spreading logic would ask if a medicine mistake (skipped, additional, replicate, absent, inaccurate, or other record) was connected to each drug and, if yes, what kind of error. If a pharmacist chooses "oxycodone" as a medicine discovered while gathering the patient's medical history, the survey will generate additional question boxes depending on the technician's answers. The first inquiry will inquire about the presence of a medication mistake linked to oxycodone. If the option

"no" is chosen, no more questions will be shown. If the answer is "yes," the following inquiry box will display, asking the user to specify the kind of drug mistake found.

The poll will proceed consistently for the other drugs that have been chosen, following an alphabetical sequence. If the patient's age exceeds 65, the survey will include a supplementary section for other drugs deemed VM for the senior patient group. The last section of the poll asked about the quantity of pharmaceuticals unrelated to VM. Any medicine that is not included in the VM list is considered to be non-VM. Non-VMs were not categorized into particular pharmaceuticals or pharmacological classes. However, the total number of non-VMs and medication mistakes were considered when calculating the total number of medications and prescription errors. The survey included an automatically computed sum of VM and non-VM drugs and mistakes. This sum was intended to be used as a last verification by the technician before entering the medical record via the survey tool.

After finishing a survey, every response was immediately given a record identifier to encode patient information and then placed in the REDCap repository. The pharmacist could access, modify, and append patient records. The capabilities of REDCap also enabled the creation of customized reports using patient information that had been de-identified. These reports were generated at both the site and network levels, including all six hospitals in the study. Every analysis included comprehensive data about the overall quantity and categorization of drugs, occurrences of medication mistakes, susceptibility to polypharmacy, and vulnerability to falls. A comprehensive instructional manual was created for the medication record technicians, including detailed guidance on effectively using the web-based survey instrument. Each pharmacist trained two pharmaceutical technicians on how to use the web-based survey tool. During this training, a clinical pharmacy technician ensured the data documented on the survey tool was accurate. Subsequently, a clinical pharmacy technician trained the other four workers on the survey instrument. In May 2022, the trial scheme was integrated into the customer service process to evaluate its suitability and results.

3. Results and discussion

From May 2022 to November 2022, 190 patient files were successfully filled up utilizing the survey instrument throughout the experimental period. Among the 1090 drugs documented, 43% were classified as drugs of high risk.

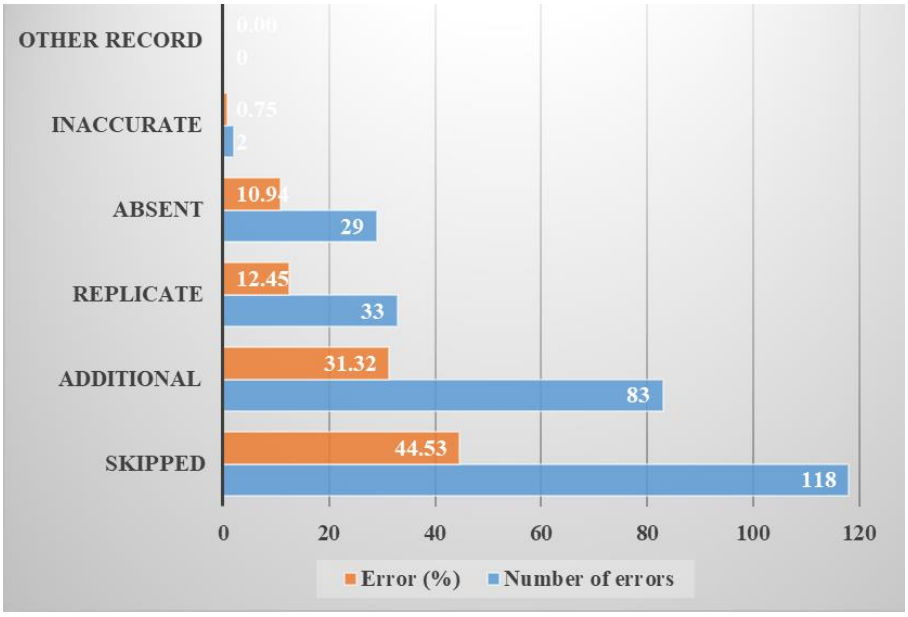

Figure 1. VM errors and PH services characterized by error category

Fig. 1 depicts the VM errors characterized by error category. The category with the highest frequency of mistakes is "Skipped," which has 118 errors, making up 44.53% of the total errors. These findings suggest that over 50% of the medication mistakes were due to complete omission of doses. The

"Additional" category, which accounts for 31.32% of the total, is the second most common category with 83 mistakes. These errors occur when patients are given more dosages than indicated. "Replicate" mistakes, referring to instances when the same drug was provided several times within a brief timeframe, makeup 12.45% of the total with a total of 33 events. The occurrence of "absent" mistakes, which refers to situations when a prescription drug was not provided, accounts for 10.94% of the total, with 29 occurrences. "inaccurate" mistakes, including incorrect drug or dose administration, are infrequent, accounting for just 0.75% of cases, with two recorded VM errors. No errors were documented in the "Other record" category.

Table 1 Frequency of VM and VM errors for PH services

Total number of medications for PH services	**1090**
Total number of VM	451
% of VM	41.38
Total number of all medication errors for PH services	626
Total number of VM errors	265
% of VM errors	42.33

Table 1 shows the frequency of VM and VM errors for PH services. Among the 1,090 drugs examined, 451 were classified as VMs, representing 41.38% of the total. This suggests that around half of the medicines possess an elevated risk profile. In addition, out of the total 626 reported VM errors, 265 were explicitly associated with VM, accounting for 42.33% of all errors. This underscores that many errors are linked to VMs, highlighting the need for targeted approaches to reduce errors in this category and enhance medication safety.

4. Conclusion and future scope

This paper includes research on the effects of using a web-based survey tool and telepharmacy solutions to identify VM errors and PH services at a reduced expense. Collecting individual medication records upon Emergency Room (ER) admission is essential for identifying any mistakes that could be overlooked in the patient's prescription record. After receiving training, the pharmacists performed a survey using a secure online platform to gather medication details. The collected data included patient-specific information, the amount and kind of VM, and the discovered PH problems during the data collection phase. During the trial period from May 2022 to November 2022, a survey instrument was used to complete 190 patient files. Among the 1,090 drugs examined, 451 were classified as VMs, representing 41.38% of the total. This suggests that around half of the medicines possess an elevated risk profile. In addition, out of the total 626 reported VM errors, 265 were explicitly associated with VM, accounting for 42.33% of all errors. This online survey tool has improved the quality and efficiency of spotting potential mistakes in the collection of medication information by pharmacists.

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