Addressing Challenges in Prescription Management

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Abstract

Electronic prescription management has failed to sufficiently improve physician's knowledge of a patient's current and previous medications. Additionally, prescription management methods have failed at encouraging patients to adhere to medications. Between medication errors resulting from incomplete medication histories and poor patient adherence to drug regimens, significant challenges remain in prescription management.

In this paper, we propose a unique use of quick response (QR) codes that should improve completeness of medication history, allowing patients to more accurately treat a patient's diagnosis. This QR code system outlines a method for patients, physicians, and pharmacists to all view the medication history and for pharmacists to accurately update the history when a patient retrieves new medication.

We also outline a method for incentivizing patient adherence based on redemption codes, a method proven successful in other industries. Between this and the QR code system, physicians should also be able to access important information about a patient's adherence consistency, allowing him or her to better understand the patient and more e ectively
treat a diagnosis.

Keywords: prescription management, QR code, medication adherence

Introduction

The three-way communication between physicians, patients, and pharmacists must be reliable and consistent to ensure successful treatment of patient conditions. Prescription Management is the development of methods for facilitating and improving this communication. Prescription management must overcome many challenges, including distance between the three parties, prescribing the correct medication for the patient's symptoms, getting prescription fills to the patient, financing medication costs, and patient adherence to prescription guidelines.

The introduction of technology has provided an avenue for significant changes in prescription management. Electronic Prescription Management is supposed to overcoming many of these challenges by reducing medication errors, improving physician and pharmacy e ciency, and providing patients more information about medication regimens. These improvements should improve quality of patient care. Unfortunately, however, there remain significant challenges in patient-centric medication that electronic prescription management has yet to overcome.

We will discuss two significant challenges toward meaningful improvement in reduction of medication errors and increasing prescription efficiency then provide detailed methods for addressing these challenges.

Challenges in Prescription Management

Discussing two of the challenges or problems in the current medication process can help us understand how to limit or control inefficiencies. Significant improvements in these two areas could be large strides in the direction of safer and more cost effective patient care.

Unavailable Medication Histories

Core motivation behind electronic prescribing include reducing medication errors, improving physician practice, and supporting coordination among physicians documenting accurate, complete, and legible medication histories, but the overall outcomes fall short (Grossman et al. 2011). According to Grossman et al., physicians using e-prescribing systems store data about medications made by their practice, but rely largely on patients testimony about the other medications he or she may be taking. Only thirteen of twenty-four reporting physician reported implementing this feature to gather third-party medication history, and only four of these reported actually using the feature when prescribing medication (Grossman et al. 2011). Eight of the practices' e-prescribing systems did not even have a feature that allowed for this (Grossman et al. 2011).

Physicians reported a poor availability of useful data. Accessing information from external sources is done through contact of a patient's health insurer or pharmacy benefit manager (PBM), which failed to provide this information twenty percent of the time. Because of this and other complications, Physicians stated around 50% of patients were found in the external search (Grossman et al. 2011).

Even when data was available, much of this data remained useless. Many records were out-of-date or incomplete. Incompleteness included lack of knowledge about quantity, dosage, and refills. More importantly, there was no reported effort by the data providers to make this information more complete. Adjudicated claims data also, a source of much patient history data, does not imply an active medication list (Grossman et al. 2011).

Improving accuracy and availability of medication histories can provide physicians with necessary information to better prescribe patients. Electronic alerting systems can become more

elective by increasing knowledge of possible drug-drug and drug-allergy reactions. Providers could reduce errors and better patient care.

Problems with Patient Adherence

Significant barriers to meaningful use of healthcare can be actualized if patients do not follow physician-suggested medication regimens. A 2011 study on bipolar disorder showed a 38.7% increase in healthcare costs for non-adherent vs. adherent patients (Hong et al. 2011). Nasseh et al. reports that the 2010 national cost for non-adherence among patients diagnosed with diabetes, hypertension, or dyslipidemia was $105.8 billion (Kaymer et al. 2012). Non-adherence to medical therapy can be dangerous, costly, and unproductive, but it is unfortunately common.

According to Bezreh et al., between 30% and 60% of chronic disease patients fail to adhere to physician-suggested therapy. Another study shows 31% of insured patients of diabetes, hypertension, or dyslipidemia are non-adherent and that uninsured patients are even more likely (Kaymer et al. 2012). A 2010 study of electronic prescriptions showed an astonishing 22% was never even filled (Bailey and Kodack 2012).

These accumulated costs due to significant non-adherent rates are unnecessary and problematic. Meaningful use seeks patient visits that result in necessary, provided, and adhered to care. Increasing adherence rates could significantly better the overall e ectiveness of healthcare, both in financial savings and increased patient health.

Addressing Challenges

To completely solve all inefficiencies and problems in medication management may be unfeasible. However, it would be beneficial to provide methods that could provide a step in the right direction towards improving physician practice and reduced medication errors.

Quick Response Code History

Ideally, a centralized and simply structured database for maintaining medication history could provide physicians helpful access to accurate prescription data, eliminating the problematic inaccuracy of medication histories. Unfortunately, complications prevent this from happening. For one, insurance providers, e-prescription services, and PBMs would all need to agree on a centralized server. There are reportedly over 50 million current patient databases in the United States, and merging all of them would be extremely difficult and would require unparalleled cooperation (Bizer et al. 2012). Other issues, including patient identification, leave more problems. Consequently, a focus on improving the accuracy of patient provided information could improve physician knowledge of medical history.

Current prescription barcode verification technology provides hospital sta information and instruction for administration of a particular drug, however it does not provide useful information to patients outside of the hospital or any information about other prescriptions a patient may have prescribed (Pool et al. 2010). Quick response (QR) codes could store significant amounts of information about drug history on the side of a pill bottle, allowing patients access to accurate information about their medication.

Storing the information in an HL7 format and describing medication through RxNorm specifications would allow for electronic systems to incorporate the ability to read and write QR codes. Likewise, patient centered mobile applications could scan the barcode of a new prescription and provide patients daily instructions about their prescribed medical therapy.
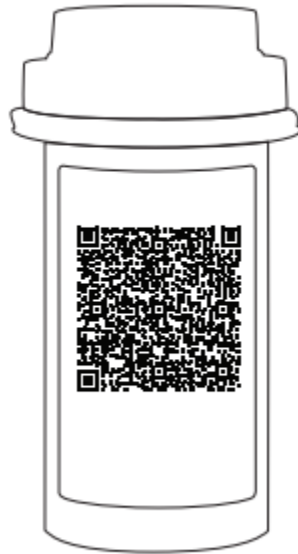
Figure 1: Display of QR code on bottle. Scanning of code will display HL7 data for a sample patient prescription.
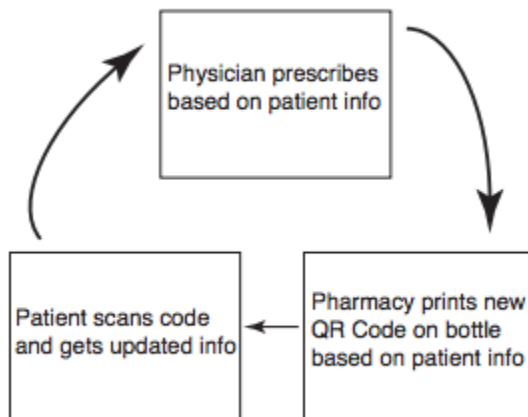
Figure 2: Process of the use and updating of QR codes. Diagrams the QR code's role in the relationship between the three parties.

Patients can either bring recent medications or instances of a mobile app to a physician visit, allowing the physician to scan bottles with QR codes, as shown in Figure 1, or receive detailed information from the application. The application could generate a barcode for a physician's electronic system to scan as well. Looking at timestamps provided in the QR code data, physician systems could easily clarify which code is the most recent and display the code's provided medication history.

Adding new prescriptions would be simple. When a patient picks up medications at a pharmacy, he or she could provide the same information to the pharmacist, whose medication application could easily translate the data and print the newest barcode sticker with the previous medication history plus the new prescription.

The use of the QR code and its effect on the relationship among patients, physicians, and pharmacists is detailed in Figure 2. Discrepancies in QR code data could be obtained when a patient has failed to provide an updated barcode at a point of inquiry by either leaving that medication at home or not having scanned recent information if providing history through a mobile app. This QR code solution would not be perfect at all points in a patients medical treatment, because only a centralized and standardized storage of medication history could provided this accuracy. However, discrepancies could easily be sorted out by merging histories contained within all scanned barcodes. Since no unprescribed medication could be added to the history, merging all information between multiple QR codes would create the most accurate history. Additionally, refills could easily be indicated by receiving a new barcode sticker, adding information about the most recent date of refill.

Merging all prescription history repositories remains logistically di cult. Patient testimony about medication history accounts for a significant proportion of physician knowledge. Just under 50% of physicians rely solely on patient testimony for prescriptions provided outside his or her practice, and the remaining percentage relies heavily on patient provided information because external patient histories are largely incomplete (Grossman et al. 2011). Consequently, patients access to accurate data would benefit the prescription process. Providing the detailed and unbiased information to patients via pill-bottle QR code could significantly increase the accuracy of patient attestation.

Incentivized Patient Adherence

Bailey and Kodack report a list of "barriers to medication adherence." Among those barriers, remembering dosage, complexity of regimen, and adverse events could all be lessened through careful implementation of the aforementioned QR code. Accurate medical histories would reduce adverse events and mobile application to analyze provided drug histories could help with patient understand of medical therapy specifications. Many of the other barriers are more behavioral: fear, lack of confidence in medical benefits, health belief, and distrust in the health system (Baily and Kodack 2011, Bezreh et al. 2012).

Some of the behavioral barriers to effective medication adherence may be difficult to remove, but perhaps financial incentives would encourage patients to follow medical regiments. Through financial benefits for lowering admissions rates, physicians already receive incentives to promote adherence among their patients (Epstein 2009), however there still needs to be personal incentive for a patient to actually follow his or her therapy.

Implementing financial redemption codes in pill containers, similar to soda bottle-cap codes, could encourage patients to routinely take their pills. The pills could be provided in pill sheets where the inside of the individual pill container have a numeric code for entry on a mobile device or a bar code for scanning. The code must correspond to the type of pill, and there must be a unique id for each pill in a prescription fill so the patient cannot reuse codes, and the code entry should only be rewarded if the pill were taking at the scheduled time. This strategy may not result in perfect adherence, but it would certainly encourage them to remember which pills they needed to take.

Additionally, this could be further added to the discussion of value-based insurance presented by Young et al.. Although pulling the pill out of the container does not necessarily imply a patient is taking the medicine, it is surely more indicative than the opposite.

Tracking Patient Adherence
The aforementioned service for rewarding patient adherence also has a unique ability to track and store information on patient adherence. By storing the information about when patients are taking medicine, physicians can better learn how to care for patients.

Also, the previously planned QR code implementation could be used to track if patients even picked up their medication. For example, if a physician prescribes a medicine and the medicine is in his or her practice's e-prescribing system and the patient does not have the medicine listed in his or her QR code medication history, the likely scenario is the patient did not retrieve the medicine from a pharmacy.

Bezreh et al. reported that many patient responses indicated a worry among patients to inform their doctor about nonadherence. One patient complained that questions whether he or she had adhered to regimen felt like "'confession or inquisition.'" Consequently physicians often do not know their patients' habits.

Providing physicians with knowledge about patient adherence or nonadherence can return the focus to a "'shared decision making'" (Bailey and Kodack 2012). The term adherence is used to refer to a patient following an "agreed upon treatment." Many patients are instead complaining it feels that an "'all-powerful doctor'" is forcing treatment upon a patient, but patients would prefer to be "'in charge'" (Bezreh et al. 2012). Other patients complain "'I can choose to do whatever I want'" (Bailey and Kodack 2012, Nair et al. 2011). The current patient-physician communication on medication is poor. Bezreh et al. reports that its even difficult to manage safe pharmacological care of patients when communication is good (Bailey and Kodack 2012).

Communication through patient adherence tracking may not be the ideal scenario of patients' open honesty, however it would provide a means for physicians to receive more

information about patients and promote a discussion about the reasons behind nonadherence in e ort to seeking what beneficial therapy a patient may or may not adhere to. This facilitated discussion would strengthen the '''shared decision making''' approach (Bailey and Kodack 2012).

Conclusion

Current prescription management is not flawless, and will likely never be. Significant problems with physician care for patients come from inadequate information provided to physicians about a patient's medical history and patient non-adherence to recommended medical therapy. Without knowledge of what prescriptions patients are taking, it is difficult for physicians to offer their best, professional help. Perhaps methods of eliminating these problems completely are unachievable, but the proposed methods of implementing a medical history QR code for prescriptions and tracking patient adherence through a financially incentivized program could significantly assist a physician in providing the best care possible (Young et al. 2010).

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