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ELECTRONIC PRESCRIBING AND ITS IMPLEMENTATION IN THE UNITED STATES

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ABSTRACT

Introduction: *Electronic prescribing (e-prescribing) is an important part of the nation's push to create an electronically accessible national health system. E-prescribing allows providers to send prescriptions electronically to the pharmacy and can be stand-alone systems or part of an integrated electronic health record system.*

Methodology: *The methodology for this study was a literature review. Electronic databases accessed include EBSCOhost, PubMed, and Google Scholar. Additionally, government websites and a semi-structured interview were used. A total of 39 sources were referenced for the review*

Results: *The results of the literature review demonstrated that e-prescribing reduces prescribing errors, increases efficiency, and helps save on healthcare costs. However, there are still significant barriers to implementation.*

Discussion: *The benefits that come with using e-prescribing are numerous. While there are still barriers that prevent many prescribers from implementing e-prescribing systems, incentives and improved patient safety will help increase its utilization.*

Conclusion: *E-prescribing has the potential to increase patient safety and efficiency of care. This supports our hypothesis that e-prescribing has led to improved patient care through meaningful use. More than just a convenient way to send prescriptions, e-prescribing allows prescribers to prescribe safely and cost*

effectively, and is likely to continue to grow in the future.

INTRODUCTION

A key issue in the United States (US) government's plan to create an electronically accessible national health information system has been the lack of willingness by medical professionals to fully adopt electronic prescribing (e-prescribing) (Brown-Wilson Group, 2011). E-prescribing has allowed prescribers of medications to electronically send patients' prescription information to pharmacies. This eliminates the need for patients to carry paper copies and for offices to fax copies to pharmacies. By electronically sending and receiving prescriptions, prescribing medications has become more streamlined and reduced common prescribing errors (Smith, 2006). The hypothesis of this research is e-prescribing increases the ability of healthcare providers to effectively improve the quality of patient care.

E-prescribing systems can be incorporated into Electronic Health Records (EHRs) or can be independent systems. EHRs are set up to enable sharing of medical information among stakeholders, which include patients, providers, payers/insurers, employers, and the government (Garets & Davis, 2006). The source of data for EHRs is Electronic Medical Records (EMRs), which are the legal records created in hospitals or ambulatory environments (Garets & Davis, 2006). When e-prescribing is part of an EHR system, providers are able to access all patient information, not just prescription information (Abramson, Barrón, Quaresimo, & Kaushal, 2011). The Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 proposed that healthcare professionals throughout the U.S. have access to EHRs and use them meaningfully according to standards set by the Centers for Medicare and Medicaid Services (CMS), (CDC, 2012). The purpose of meaningful use is to use technology to coordinate and improve patient care (CMS, 2010). E-prescribing is a way of using EHRs meaningfully because the technology is being used to enhance the quality of patient care (CDC, 2012). Allowing providers access to patient histories, diagnoses, and medication information increases patient safety by reducing medical errors. However, the less expensive and easier to manage option is the stand-alone system for e-prescribing. Medication data that is pertinent for e-prescribing is the only information that is allowed to be stored and updated in this system by providers (Abramson et al., 2011). Any system allowing providers to store and manage prescription information electronically has the capacity to be safer and more cost efficient than written prescriptions (Grossman, Gerland, Reed, & Fahlman, 2007).

In 2011, the U.S. spent \$263 billion on prescription drugs, which was a 2.9% increase from 2010 (CMS, 2013). With this growth in prescribing of pharmaceutical drugs, e-prescribing is expected to have many benefits to enhance the exchange of patient prescription information among many organizations including physician offices, pharmacies in retail settings, Prescription Benefit Management (PBM) companies, and insurance providers. E-prescribing is expected to increase the safety and quality of prescribing (i.e. appropriate medications at correct doses for the desired outcome), enable patients to have more cost-effective medication choices, and enhance the efficiency of workflow in the ambulatory care setting (Wang et al., 2009). By connecting physician and pharmacy systems, there has been less need for telephoning and/or faxing to clarify prescription details. This is both time and cost saving for all parties involved. Despite the benefits that come with e-prescribing, there still exist many providers and pharmacists who are hesitant of completely adopting an electronic system (Smith, 2006).

Growth in e-prescribing came with the passing of the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) of 2003 (Bell & Friedman, 2005). The MMA included the establishment of prescription drug coverage under Medicare as of January 2006 (Lichtenberg & Sun, 2007). This Part D prescription plan supports e-prescribing as a voluntary program for providers and pharmacists. It has the capability to make prescribing through Medicare more efficient and well-organized by reducing prescribing errors and coordinating patients' treatments (Bell & Friedman, 2005). To encourage the use of e-prescribing by Medicare recipients, Medicare Improvements for Patients and Providers Act (MIPPA) of 2008 was passed (H.R. 6331, 2008). Medicare offered payment incentives to prescribers who met a yearly quota for e-

prescribing. Medicare reimbursements for those who do not e-prescribe started to decrease in 2012 starting with one percent, then one and one-half percent in 2013 and two percent in 2014 and later (Friedman, Schueth, & Bell, 2009).

The e-prescribing provisions in Medicare increased its overall use in the U.S., the number of electronically routed prescriptions increased from 570 million in 2011 to 788 million in 2012 (Surescripts, 2012). The EHR Incentive Program will provide Medicare bonus payments to providers demonstrating meaningful use through 2014; and starting in 2015 eligible providers failing to demonstrate meaningful use will receive reduced Medicare reimbursements (HHS, 2010). Many government groups, pharmacies, companies and other stakeholders worked to increase its use through legislation, funding for e-prescribing systems and software, and incentive programs separate from Medicare programs (Friedman et al., 2009). Though these efforts increased the use of e-prescribing from 38% of prescriptions dispensed in 2011 to 44% in 2012, most prescriptions are still sent to pharmacies outside of an electronic system (Surescripts, 2012). Policies and financial rewards are numerous yet fail in providing incentive for all prescribers to adopt e-prescribing. Providers cite issues with the complex technology and lack of complete patient record availability through e-prescribing systems (CHRT, 2011).

The main purpose of this research was to explore the effect that e-prescribing has had on the efficacy and accuracy of prescribing in ambulatory or clinical settings throughout the U.S. in an effort to improve patient quality of care. A secondary purpose was to examine the reasons for its slow growth.

METHODOLOGY

The hypothesis of this research was: e-prescribing increases the ability of healthcare providers to effectively improve the quality of patient care. Figure 1 shows the conceptual framework of this research, created by the authors.

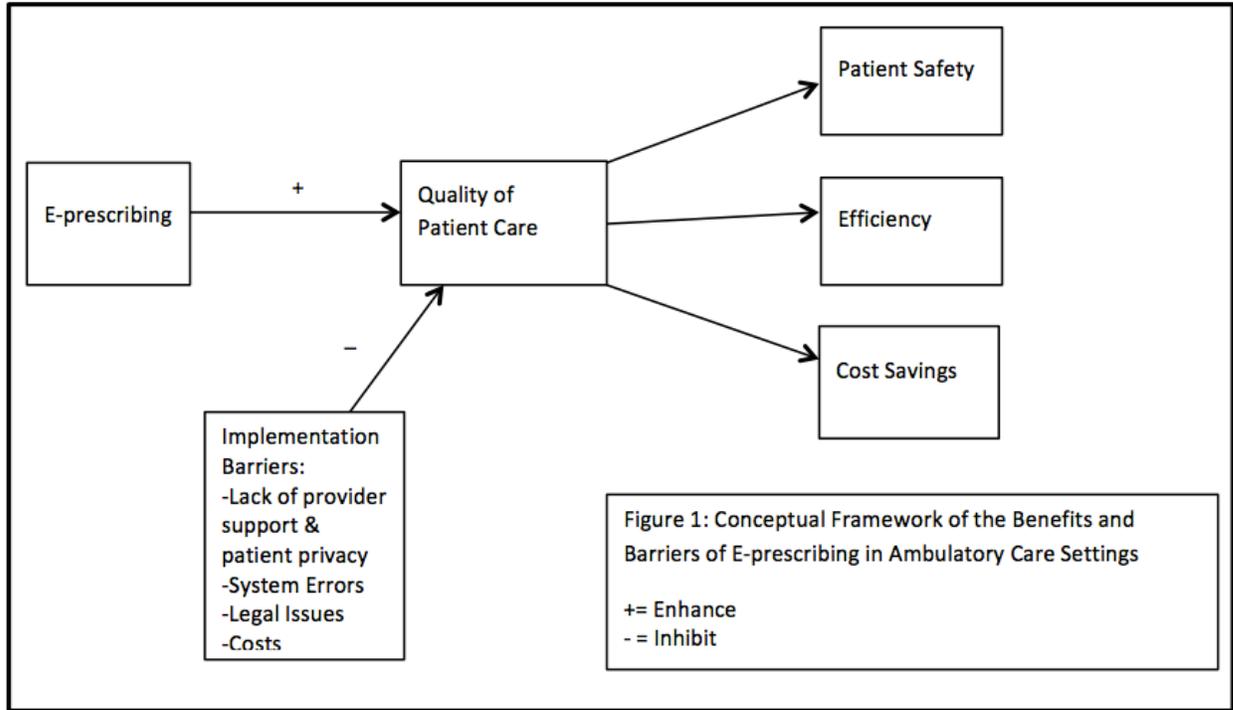


Figure 1

The framework illustrates how e-prescribing in ambulatory care settings affects patient safety, efficiency, and cost effectiveness to enhance the quality of patient care. Barriers to implementation, such as lack of provider support and patient privacy, system errors, legal issues, and costs are likely hindrances to the growth of e-prescribing; resulting in a compromise of patient quality of care.

The methodology for this examination of the benefits of e-prescribing was a literature review. Research was conducted using online scholarly database search. Databases included PubMed, Medline, Academic Search Premier, and Google Scholar. The key phrases 'electronic prescribing' or 'e-prescribing' were combined with the terms 'meaningful use' or 'ambulatory' or 'quality' as inclusion criteria to search databases for articles. A review of the abstract of the articles determined the relevancy of the data to the study. Information from the government websites of CMS, CDC, and from the non-profit organization of Center for Healthcare Research and Transformation (CHRT) was used for updated statistics and data regarding e-prescribing. Sources were limited to those written in English and published between 2000 and 2013, containing data from the U.S. Primary and secondary data from articles, reports, reviews, and research studies were included in this research. Thirty-nine sources were referenced including a semi-structured interview with a professional.

RESULTS

An important factor in the quality of patient care is whether medical errors are present (Ammenwerth, Schnell-Inderst, Machan, & Siebert, 2008). In the U.S., there are an estimated 200,000 deaths yearly from preventable medical mistakes and hospital infections (Hearst, 2009). Errors in medication prescribing and filling are some of the more common types of medical errors. Medication errors are preventable incidences created by

healthcare professionals, patients, or consumers, resulting in medications being misused by patients or patients being harmed (Pizzi, Suh, Barone, & Nash, 2005). These errors can occur in any part of the medication use process, which includes mistakes from prescribing, to dispensing of the drug, and monitoring of how it is taken (Kaushal, Kern, Barrón, Quaresimo, & Abramson, 2010). An Adverse Drug Event (ADE) can result from preventable or non-preventable medical interventions related to medications. ADEs are considered preventable if they are caused by medication errors and potential ADEs are caused by errors that could result in harm to the patient (Hug et al., 2009).

Patient safety and use of E-prescribing

Patient safety can be improved through e-prescribing by increasing prescription legibility, decreasing the time it takes to prescribe medications and get them to patients, and decreasing medication errors and ADEs (Kannry, 2011). Submitting a prescription through an EHR system allows prescriptions to be checked for interactions with current patient medications, health conditions, and/or allergies (Amirfar et al., 2011). Most e-prescribing systems include Medication Decision Support (MDS), which helps providers avoid errors in prescribing and ADEs. This program checks for drug-drug, drug-allergy, and drug-disease interactions, as well as, drug costs and dosing recommendations. Physicians using an EHR integrated e-prescribing system are more likely to use the MDS program. However, there is little evidence that MDS used in this manner is more beneficial to patient safety and reduction of medication errors than when part of a stand-alone system (Kannry, 2011).

Efficiency of E-prescribing

E-prescribing improves efficiency in the prescribing process. Workflow studies demonstrate computer entry of a prescription takes about 20 seconds longer than writing the prescription. Another study based on family practices determined physicians spend approximately 0.14 hours per day writing prescriptions (Schade, Sullivan, Lusignan, and Madeley 2006). Offsetting this time difference is the time saved by an electronic prescription (eRX) needing to clarify the information on a written prescription. (Devine et al., 2010). Prescribers will spend more time on a computer, but less time on written notes and orders; on average an extra 5.4 minutes an hour for nursing staff (Hollingworth et al., 2007). If implemented correctly there should be minimal disruption in workflow particularly in ambulatory settings (Hollingworth et al., 2007).

At the pharmacy, entering of prescriptions becomes streamlined when the software allows automated processing. An expert stated an increase in efficiency was seen after implementing e-prescribing, mainly due to less paperwork and fewer issues to resolve (Expert in e-prescribing, 2013). Patient and prescriber names are matched up automatically by the system, while other fields are generally auto-populated, but often require manual manipulation; the main fields are drug name, quantity, and patient instructions, also known as a “Sig” (Grossman, Cross, Boukus, & Cohen, 2011).

Providers find less time is spent resolving issues with pharmacies, including prior authorizations and refill requests (Lapane, Rosen, & Dubè, 2011). With a patient’s prescription formulary and eligibility information available prescribers can chose an appropriate medication and reduce the probability of receiving a call from the pharmacy to change the medication to an alternative (Lapane et al., 2011).

Cost savings associated with E-prescribing

The potential for cost-savings is great with e-prescribing systems. An analysis, by Surescripts in 2010, estimates \$140-240 billion in costs savings and improved health outcomes over 10 years (E-prescribing shown to improve outcomes, 2012). The largest savings occur with the reduction of ADEs, mostly due to reduced visits to primary care offices and emergency rooms. A 2006 study, in Massachusetts, calculated with each hospitalization due to an ADE the average cost was approximately \$9000, each emergency room visit \$427, and each visit to the doctor's office \$111 (Weingart et al., 2009).

Another cost savings measure is the increase in patient medication adherence. Increased adherence to medication therapy can promote better health outcomes and theoretically reduce costs. In 2011, a Surescripts study found patients, on average, picked up 10 percent more prescriptions when those prescriptions were e-prescribed compared to written prescriptions (E-prescribing shown to improve outcomes, 2012).

Substitution of generic medications or less costly formulary alternatives can reduce the cost to patients. E-prescribing systems that employ MDS can help physicians choose a low cost option that may be clinically better for the patient by eliminating prescriber bias. A study by McMullin et al, in 2001-2002, involving 19 clinicians, found a 17.5% decrease in prescriptions for high-cost drugs among the intervention group compared to the control group (McMullin, Lonergan, & Rynearson, 2005). This led to savings of \$109,897 on new prescriptions in 12 months or an average of \$482 per prescriber per month during the follow up study done by McMullin et al in 2002-2003 (McMullin et al., 2005).

Barriers to implementation of E-prescribing

With many benefits to e-prescribing, some providers are still reluctant about implementing their own e-prescribing systems. A major barrier, with >80% of primary care physicians reporting, was the lack of financial support (Anderson, 2007). New technology requires training and IT support for installation and maintenance, both of which are costs a practice must take into account when deciding whether to implement an e-prescribing system or whether to choose a stand-alone system or one that is integrated into an EHR (Anderson, 2007).

Improperly designed e-prescribing systems can cause new types of errors to occur. A major error is lack of alert specificity and overload; when presented with loads of alerts each time they enter a prescription, prescribers tend to stop reading each one and just click quickly through them (Brooks & Sonnenschein, 2010). By ignoring the alerts, a major interaction can be missed, therefore systems need to be able to prioritize alerts into categories related to severity of the interaction (Brooks & Sonnenschein, 2010).

Privacy of patient information can be a concern for providers and patients. Most EMR systems are Web-based and some deliver information wirelessly. There are numerous points where information can be leaked, and if proper firewalls and intrusion prevention systems are not in place, there exists the opportunity for protected patient information to be stolen (Nataraj, 2011). Most information breaches actually occur with internal employees, so continuous training on security is imperative and can incur additional costs (Nataraj, 2011). According to HHS, as of February 7, 2013 there have been 682 breaches of protected health information affecting 500 or more individuals (HHS, 2013).

Legal issues arise when providers want to prescribe controlled substances. The Drug Enforcement Agency (DEA) made a final ruling on e-prescribing controlled substances on March 31, 2010, the ruling took effect June 1, 2010 (AMA, 2010). This particular ruling made it legal to transmit controlled substance prescriptions electronically, though there are many standards that make it cumbersome to implement. These standards included identity proofing, two-factor authentication, digital certificates, monthly logs, third party

audits of software, and a requirement to keep two years of records (AMA, 2010). In 2010, the DEA estimated the potential costs of implementing these systems to be between \$43 million and \$1.54 billion for different options (DEA, 2010).

DISCUSSION

The purpose of this research was to explore the effect that e-prescribing may have on the efficacy and accuracy of prescribing in ambulatory or clinical settings throughout the US. A secondary purpose was to examine the reasons for its slow growth and acceptance in the delivery of health care. The results of the literature review have shown that increasing use of e-prescribing results in better patient safety through a reduction in errors. Additionally, e-prescribing has shown the potential for cost savings.

The number of medications being prescribed is continually increasing; this is also creating an increase in the number of potential errors. E-prescribing eliminates some of the possibilities for mistakes, and can potentially help prevent more than 2 million ADEs a year, 130,000 of which are life-threatening (Leavitt, 2007). It takes illegibility out of the equation and helps providers make more informed decisions concerning what medications to prescribe, based on patient histories and allergies, all of which are available in systems that are integrated with EHRs. These systems alert prescribers when there is a detected allergy or interaction with other medications or health conditions. A problem with the alerts is in some cases alerts pop up when there is little risk or when there is not a true complication. Prescribers may be overloaded with the alerts and rather than read each one, ignore them potentially missing an important interaction.

E-prescribing helps make patient care more efficient by streamlining the process of delivering the prescription to the pharmacy, the dispensing of the medication, and obtaining refills. By not supplying the patient a hardcopy of the prescription, the potential for the patient losing the script is eliminated. The instances of pharmacy initiated clarifications are decreased, reducing the amount of time pharmacists and providers spend on the phone, thus reducing the time it takes to fill the prescription and get it to the patient. Increased compliance and monitoring of compliance are results of implementing e-prescribing.

Cost savings estimates for implementing e-prescribing systems is estimated to be \$27 billion a year in the U.S. (Leavitt, 2007). These cost savings are created through reduction in ADEs, improved efficiency, and provider access to formularies. The amount of time spent clarifying prescriptions is greatly reduced, allowing prescribers to focus on patient care. Cost savings coupled with incentives and improved efficiency will increase the use e-prescribing in the future.

One of the largest barriers to implementing an e-prescribing system is cost. Many smaller practices have difficulty with both the cost of the system and the training of staff (Lander, Klepser, Cochran, Lomelin, & Morien, 2013). Another hindrance is the inability to send controlled substances as eRXs. For some prescribers, these medications represent a large portion of their prescribed medications. New legislation now makes it possible to send controlled prescriptions, but there are many stipulations that are making it difficult. Additionally, an issue arises with the inability of multiple systems to share information effectively and a lack of a standard formatting, which reduces the effectiveness of e-prescribing systems. Physicians are wary of the initial increase in time spent entering orders on the computer. This issue should resolve itself with increased use and familiarity with the system. This literature review was limited by the search strategy utilized. The number of databases searched along with publication bias may have restricted the articles used in the review. Researcher bias may have been an issue. The research on e-prescribing in ambulatory care settings is limited compared to that of hospital settings. This factor could be due to the fact that less small group physicians' offices have implemented e-prescribing due to the costs involved.

CONCLUSION

This literature review has shown e-prescribing has the potential to increase patient safety and efficiency of care. This supports the stated hypothesis that e-prescribing has led to improved patient care through meaningful use. More than just a convenient way to send prescriptions, e-prescribing allows prescribers to prescribe safely and cost effectively, and is likely to continue to grow in the future.

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