Original Research

Analysis of pharmacists' interventions on electronic versus traditional prescriptions in 2 community pharmacies

Adrienne M. Gilligan, M.S.[a,*], Kimberly Miller, Pharm.D.[b],
Adam Mohney, Pharm.D.[c], Courtney Montenegro, Pharm.D.[d],
Jacob Schwarz, Pharm.D.[e], Terri L. Warholak, Ph.D.[a]

[a]*Department of Pharmacy Practice and Science, The University of Arizona College of Pharmacy, 1295 N Martin,
P.O. Box 210202, Tucson, AZ 85721, USA*
[b]*Walgreen's, Phoenix, AZ, USA*
[c]*Fry's Food & Drug, Fountain Hills, AZ, USA*
[d]*Safeway, Washington, DC, USA*
[e]*Lakeland Regional Medical Center, Lakeland, FL, USA*

Abstract

Background: Relatively little is known about how e-prescribing impacts outpatient prescribing errors. Comparing these data with problems identified with other prescription conveyance methods will help researchers identify system problems and offer solutions.

Objectives: The objectives of this study were to (1) measure the incidence of prescription problems that required pharmacist intervention, (2) determine the types and relative frequencies of prescription conveyance that contain problems that require pharmacist intervention, and (3) estimate the pharmacy personnel time and related practice expenses for prescriptions requiring intervention.

Methods: This study used an observational prospective design examining data from 2 community chain grocery store pharmacies. The primary outcome was number of interventions for each prescription conveyance type. Variables of interest included (1) the type of medication(s) involved in the intervention, (2) how the pharmacist was alerted to the potential problem, (3) reason for the intervention, (4) pharmacists' actions based on the intervention, (5) time spent during the resolution of the intervention, and (6) costs based on pharmacy personnel time. Chi-square analysis with a Bonferroni correction was used to compare percentage intervention rates between prescription conveyances. E-prescribing was used as the reference group to compare across interventions. A Kruskal-Wallis rank test was used to compare the time on task values for the interventions.

Results: Pharmacists reviewed 1678 new prescriptions and intervened on 153 (9.1%) during 13 days of data collection. A total of 11 hours and 58 minutes were required to perform all interventions for an overall average of 4.9 (standard deviation = 0.34) minutes per intervention. The most common reasons for pharmacists'

intervention on e-prescriptions were excessive quantity/duration (18.2%) and violating legal requirements (18.2%). The percentages of interventions were significantly different between e-prescribing (11.7%) and both faxed (3.9%) and verbal (5.1%) orders ($P < .0001$ and $P < .01$, respectively), with faxed and verbal interventions occurring less frequently. The difference in the intervention rates between e-prescribing (11.7%) and handwritten (15.4%) prescription conveyances were not statistically significant.

Conclusion: When comparing e-prescribing with handwritten prescriptions requiring interventions, no significant differences existed. Results suggest that pharmacists must intervene on e-prescriptions as at the same rate as handwritten prescriptions.

Introduction

Studies have suggested that up to 11% of all new outpatient prescriptions have been found to have at least one problem that requires intervention by a pharmacist.[1-7] Electronic order entry (e-prescribing), which has been promoted as a potential mechanism for increasing patient safety (ie, reducing prescription errors) and increasing prescribing efficiency, has been shown to decrease the amount of medication errors in the inpatient setting by more than 80%.[8-17] However, relatively little is known about how e-prescribing impacts outpatient prescribing errors. Some researchers believe that the implementation of e-prescribing to the outpatient setting will yield similar effects to those of inpatient settings. However, effects remain unknown.[18-20]

E-prescribing in the United States is defined as "the transmission, using electronic media, of prescription or prescription-related information, between a prescriber, dispenser, pharmacy benefit manager (PBM), or health plan in either direction or through an intermediary, including an e-prescribing network. It includes, but is not limited to, two-way transmission between the point of care and the dispenser."[21] In other countries, such as the United Kingdom, electronic prescriptions can occur in 2 methods: (1) a mechanism whereby prescribers can download medication data or generate an electronic prescription automatically from the core network, but the system still uses a paper prescription infrastructure or (2) generate an electronic encrypted signature and be allowed to transfer the prescription electronically as opposed to having the patient take the prescription to the pharmacy.[22] The first method has been adopted since the 1990s, whereas the second method is still currently being implemented. E-prescribing in England, Denmark, and Scotland has demonstrated that one of the biggest benefits to prescribers addressing legibility concerns is a significant time-saver and offers the potential to use decision support capabilities.[23]

The Institute of Medicine has recommended that by 2010, all prescriptions should be written electronically,[24-26] and public and private initiatives are encouraging ambulatory prescribers to implement and use e-prescribing.[27] E-prescribing has the potential to minimize interruptions in the pharmacy that are created from verbal and fax conveyances.[28-33] Although faxed and verbal prescriptions are legal in the United States, in other countries such as the United Kingdom and the Netherlands, only electronic and handwritten prescriptions are valid.[22] Pharmacists also may save time processing prescriptions that do not have to be entered into pharmacy computer systems manually.[33-35] However, e-prescribing adoption in the ambulatory care setting remains less than optimal; it is estimated that 12% to 20% of prescribers in the ambulatory setting are currently using e-prescribing.[36-38] One reason for the low implementation rate of e-prescribing may be provider attitudes concerning expected productivity loss and lack of time to learn about new systems.[39] Additionally, other concerns include increased costs, the effort needed to adapt office systems, and technical difficulties.[40]

E-prescribing impacts pharmacists as well as prescribers. Anderson and Malone[41] found that pharmacists express concerns about e-prescribing similar to those of prescribers, although the majority (54%) agreed that e-prescribing was inevitable. Murray et al[42] evaluated the impact of e-prescribing on pharmacist work patterns in the outpatient pharmacy of a hospital, and the results demonstrated important changes in work-related activities and functions after e-prescribing began: pharmacists spent 12.9% more time correcting prescription problems and 2.2% less time in