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RESEARCH NOTES

Use of communication tool within electronic medical record to improve primary nonadherence

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ABSTRACT

Objectives: The primary objective of this study was to determine if an online reminder decreased the rate of primary nonadherence for antihypertensive medications in patients seen in 2 primary care clinics in Omaha, NE. The secondary objectives were to determine if patients receiving the intervention achieved lower blood pressure values at follow-up visits and to determine if the intervention decreased the number of days between prescribing and prescription pick-up.

Methods: A report was generated in an electronic health record to identify patients prescribed a new antihypertensive medication from a physician at one of the primary care clinics. Patients that failed to pick up this new prescription from the pharmacy within 7 days were sent an electronic reminder via an online patient portal. A baseline comparator group was created with the use of retrospective data collection reviews for the 6 months before prospective data collection. Primary nonadherence rate and blood pressure values at follow-up visits were compared between the prospective and baseline comparator groups.

Results: The primary nonadherence rate decreased from 65.5% to 22.2% when comparing the baseline and prospective groups, respectively. The mean days to prescription pick-up decreased from 24.5 to 12.56 in the baseline and prospective groups. The prospective group showed a larger decrease in systolic blood pressure (17.33 mm Hg vs. 0.75 mm Hg) and diastolic blood pressure (6.56 mm Hg vs. 2.25 mm Hg) compared with the baseline group.

Conclusion: An online reminder through the electronic medical record appears to improve patient primary nonadherence, number of days between prescribing and prescription pick-up, and blood pressure measurements at follow-up visits. This research shows that an online reminder may be a valuable tool to improve patient primary adherence and health outcomes. Further research is needed with the use of a larger sample population to support any hypotheses about the effectiveness of the intervention.

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Hypertension is one of the most common medical disorders seen in the United States, with 29.0% of adults from 2011 to 2014 having hypertension. Of these adults with hypertension, almost one-half (47.0%) have uncontrolled elevated blood pressure.¹ Persistently uncontrolled hypertension can lead to several health problems, including but not limited to heart disease, heart attack, stroke, and kidney disease.²

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In addition to lifestyle modifications, there are an abundance of medications available to treat hypertension. As with other medications, nonadherence to their prescribed antihypertensive medications can negatively affect patients. Nonadherence is defined as a number of doses of a medication not taken or taken incorrectly that jeopardizes the patient's therapeutic outcome.³ There are several reasons for patient nonadherence, including medication cost, complex directions for use, side effects, lack of health care access, and many more.^{4,5}

Another form of nonadherence, known as primary nonadherence, can also cause detrimental effects to patient health. Primary nonadherence is defined as failure to fill a prescription for a newly prescribed medication.³ Whereas nonadherence deals with prescriptions that are filled and taken improperly or not at all, primary nonadherence addresses the issue of patients never starting a new prescription as intended by their

prescriber. Twenty-eight percent of new prescriptions are never filled, and prescriptions for new medications are filled at a lower rate than prescriptions written for medications that a patient is already taking. Of those 28% of prescriptions that go unfilled, 28.4% are for medications that treat hypertension. Studies of nonadherence often rely on the initial filling of a prescription and fail to capture prescriptions that go unfilled, thus potentially understating the true extent of the problem of nonadherence.⁶ Previous studies have looked at methods to improve patient primary nonadherence, most notably through the use of pharmacist counseling or telephone communications,⁷⁻¹⁰ but studies involving the use of technology found within the electronic health record (EHR) to improve primary nonadherence are currently lacking.

Objectives

The primary objective of this study was to determine if an online reminder decreased the rate of primary nonadherence for antihypertensive medications inpatients seen in 2 primary care clinics in Omaha, NE. The secondary objectives were to determine if patients receiving the intervention achieved lower blood pressure values at follow-up visits and to determine if the intervention decreased the number of days between prescribing and prescription pick-up.

Methods

The study took place at 2 primary care clinics located in Omaha, NE. The Catholic Health Initiatives (CHI Health) Alegant Creighton Clinic–Dundee was the practice site for 2 internists and 1 endocrinologist that took part in the study. The CHI Health Alegant Creighton Clinic–Lakeside was the practice site for 5 family medicine physicians that took part in the study.

The intervention consisted of an electronic message sent through an online patient portal, known as MyChart, in the EHR, EPIC. This portal allowed for secure, direct, electronic communication between patients and providers. The intervention contained a reminder to the patient that a new prescription had been ordered and provided patient counseling on the importance of maintaining adherence to prescribed medications as well as the risks associated with uncontrolled hypertension.

Patients were included in the study if they had a primary care physician at 1 of the 2 clinic sites, had a diagnosis of hypertension, were enrolled in MyChart, had a new antihypertensive prescription sent to their pharmacy by a clinic provider, and failed to pick up that new prescription within 7 days of prescribing. A new prescription was defined as a prescription for a new antihypertensive agent or a prescription for an increased strength of the antihypertensive agent that the patient had not previously taken. Patients were excluded if the new prescription was filled by a mail-order pharmacy.

To identify patients, a report was created with the use of the EHR to identify antihypertensive medications prescribed by the study physicians. A list of antihypertensive classes identified in this report is provided in [Appendix 1](#). Charts were then reviewed to determine if a prescribed medication was a new prescription or a refill of a previous medication. For new prescriptions, pharmacies were contacted via telephone 1

week after prescribing to determine if the patients had picked them up. Patients who had not picked up the new prescriptions received the intervention in the form of a MyChart message. The exact wording of this message is provided in [Appendix 2](#). This process was repeated weekly until the patient picked up the prescription, had another appointment with the prescriber, or did not pick up the prescription within 30 days. Failure to pick up a prescription before the next appointment or within 30 days classified the patient as being primarily nonadherent. To identify a baseline primary nonadherence rate in the combined clinic population, the same process for running the report and reviewing charts was used for the 6 months before prospective data collection. Pharmacies were contacted to determine when, or if, new prescriptions were picked up by the patients. Criteria to classify a patient as primarily nonadherent were the same as stated above. The baseline data were used as a comparator to the prospective data to determine the effectiveness of the intervention on the primary outcome. [Table 1](#) presents the demographic characteristics of the patient groups.

Patient blood pressure values were recorded at every clinic visit. Once the intervention period was complete, blood pressure readings were collected for the visit in which the new medication was prescribed and for the follow-up visit for all enrolled patients. Again, this process was repeated for the 6 months before data collection to formulate a baseline population as a comparator to the prospective group.

The primary outcome of this study was the number of prescriptions in which the patient was classified as primarily nonadherent. The secondary outcomes were the decrease in systolic and diastolic blood pressure values between initial and follow-up visits and the number of days between medication prescribing and prescription pick-up. To prevent a large number of days between medication prescribing and prescription pick-up from skewing the data, this number was capped. In the event that a patient failed to pick up their medication within 30 days, a value of 30 was used as the amount of days between medication prescribing and pick-up.

Table 1
Patient demographics and results

Variable	Baseline	Prospective
Patients, n	7	9
Male, n (%)	4 (57.1)	4 (44.4)
Age, mean (SD)	57 (8.2)	63.89 (12.57)
Number of antihypertensive medications before initial visit, mean (SD)	2.5 (1)	2.11 (0.93)
Days to prescription pick-up, mean (SD)	24.5 (9.15)	12.56 (7.86)
Blood pressure (initial visit)		
Systolic, mean (SD)	141.25 (13.94)	151.11 (10.78)
Diastolic, mean (SD)	82.75 (10.36)	84.11 (7.88)
Blood pressure (follow-up visit)		
Systolic, mean (SD)	140.5 (11.99)	133.78 (22.26)
Diastolic, mean (SD)	80.5 (5.42)	77.56 (9.04)
Blood pressure decrease		
Systolic, mean (SD)	0.75 (15.89)	17.33 (18.00)
Diastolic, mean (SD)	2.25 (8.45)	6.56 (5.50)
Prescriptions, n	8	9
Primary nonadherence, n (%)	5 (62.5) ^a	2 (22.2) ^a

^a Denominator is number of prescriptions.

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