Effectiveness of a clinical decision-support tool on adherence to prescribing and practice guidelines of high-risk antidepressant medications in geriatric patients

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Abstract

Introduction: TCAs and paroxetine, a SSRI, are associated with safety risks in geriatric patients because of anticholinergic properties. The purpose of this project was to evaluate the impact of a clinical decision-support tool (CDST) on adherence with medication prescribing and practice guidance to enhance patient safety.

Methods: Mental health clinical pharmacy specialists and clinical pharmacy leadership led a multidisciplinary creation and integration of a CDST within a Veterans Health Administration EHR. The CDST focused on the following elements when prescribing TCAs and paroxetine in geriatric patients: clinical justification for initiation of the medication, provision of patient/caregiver education specific to the medication prescribed, evaluation of comprehension of education provided, medication reconciliation, and follow-up completed within 30 days of medication initiation. Following activation of the CDST in the EHR, measures were evaluated before intervention and after intervention.

Results: After intervention, an increase was observed in the primary outcome of the proportion of patients having documentation of all of the following: clinical justification for medication initiation, provision of patient/caregiver education, evaluation of comprehension of education provided, medication reconciliation, and follow-up completed within 30 days of medication initiation ($P = .01$). Individual proportions of patients with documented medication reconciliation and follow-up completed within 30 days significantly increased. All other secondary outcomes numerically increased but did not reach statistical significance.

Discussion: Improvement was seen in adherence with prescribing and practice guidance following the implementation of the CDST. This suggests the beneficial role of CDSTs within the EHR to optimize patient safety.

Keywords: tricyclic antidepressant, paroxetine, antidepressant, clinical decision-support tool, patient safety, clinical pharmacy

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Introduction

Medications with anticholinergic properties pose safety risks in geriatric patients because of adverse effects, such as confusion, agitation, delirium, falls, and cognitive decline.[1,2] These effects may be due to an increase in cholinergic receptors in older adults, reduced ability to eliminate medications, and increased blood-brain barrier permeability.[3]

Anticholinergic antidepressants, including TCAs and paroxetine (a SSRI), are included in the American Geriatrics Society (AGS) Beers Criteria for Potentially Inappropriate Medication (PIM) Use in Older Adults.[4] These criteria provide education on commonly documented adverse effects of medications in patients ages 65 years and older with the intent to guide practitioners to reduce patient exposure to PIMs. Because of patient safety implications with anticholinergic medications, various guidance for appropriate use and documentation has been created.[4-7] The Joint Commission encourages medication reconciliation when prescribing new medications in order to avoid errors and medication discrepancies.[5] Additionally, The Joint Commission and the Veterans Health Administration (VHA) developed standards for essential information to be communicated to patients, caregivers, and health care teams at the time of prescribing, including justification for initiation of the medication and potential side effects.[5,6] Clinical practice guidelines recommend monthly follow-up after initiation of or changes in TCAs and paroxetine, including evaluation of effectiveness, adherence, and adverse effects.[7]

Incorporating a clinical decision-support tool (CDST) within the EHR may optimize adherence with prescribing and practice guidance and enhance patient safety. One study observed a decrease in PIM prescribing in outpatient geriatric patients after implementation of a CDST containing drug-specific alerts.[8] Mental health clinical pharmacy specialists and clinical pharmacy leadership within a Veterans Health System led a multidisciplinary creation and integration of a CDST in the VHA EHR. Specifically, this CDST aimed to increase adherence with prescribing and practice guidance and enhance patient safety. The impetus for the CDST was a national VHA survey that evaluated antidepressant use for elderly veterans and identified areas for enhancing documentation of TCA and paroxetine prescribing.[9] The purpose of this study was to evaluate the effectiveness of the CDST defined by adherence to specific prescribing and practice guidance.

Methods

The CDST was implemented within a large multicenter Veterans Health System containing 2 hospitals, 3 outpatient clinics, and 8 community-based outpatient clinics. A stepwise electronic algorithm was created as an electronic clinical pathway within the EHR by the clinical applications coordinator. It included assessment of clinical justification, provision of patient/caregiver education, evaluation of comprehension of education provided, medication reconciliation, and scheduled follow-up within 30 days of medication initiation. To prescribe a TCA or paroxetine, the prescriber was required to start a templated note in the EHR, which had the stepwise algorithm embedded within it (Figure). Each question displayed with expansion to subsequent questions once the predecessor was answered. When answering questions, the prescriber clicked *yes* versus *no* to prompt the pathway onto its next step. If a question was answered with a *no* at any point, the electronic clinical pathway ended as an electronic notification on the screen of *you will not be able to order this medication without completing a full assessment*. If all answers were selected as *yes*, indicating that prescribing of this medication was appropriate, the CDST guided prescribers to the medication ordering menu and created a templated note with algorithm information populated for prescriber electronic signature and documentation. The medications included amitriptyline, amoxapine, clomipramine, desipramine, doxepin, imipramine, nortriptyline, paroxetine, and protriptyline in various strengths and formulations. The prescriber also received an electronic notification at the end of the CDST with the option to schedule a 30-day follow-up appointment via electronic text order routed to scheduling clerks. If the patient's age was less than 65 years, the algorithm questions were automatically bypassed and the prescriber was taken directly to the electronic medication ordering menu. Multiple reminders were added to the EHR guiding prescribers to the location of the note template if they attempted to use previous routes for TCA or paroxetine prescription. Prior to CDST activation in the EHR, notifications were sent to all interdisciplinary staff.

To assess the CDST's impact, a retrospective cohort study was conducted. The preintervention cohort included patients from December 1, 2018, through January 31, 2019. The postintervention cohort included patients from May 1, 2019, through June 30, 2019. Two-month time frames were chosen to allow sufficient time to review prescribing practices prior and subsequent to intervention. The CDST was implemented in February 2019; thus, a 2-month period was given to allow for adoption of the CDST before collecting postintervention data.

Patients were included if they were 65 years of age or older and received a new prescription for a TCA or paroxetine. Patients were excluded if they were prescribed doxepin with a total daily dose of less than or equal to 6 mg (these doses were excluded from AGS Beers Criteria as PIMs for older adults) and/or if their prescription was for TCA or paroxetine continuation or dose titration of the original prescription.
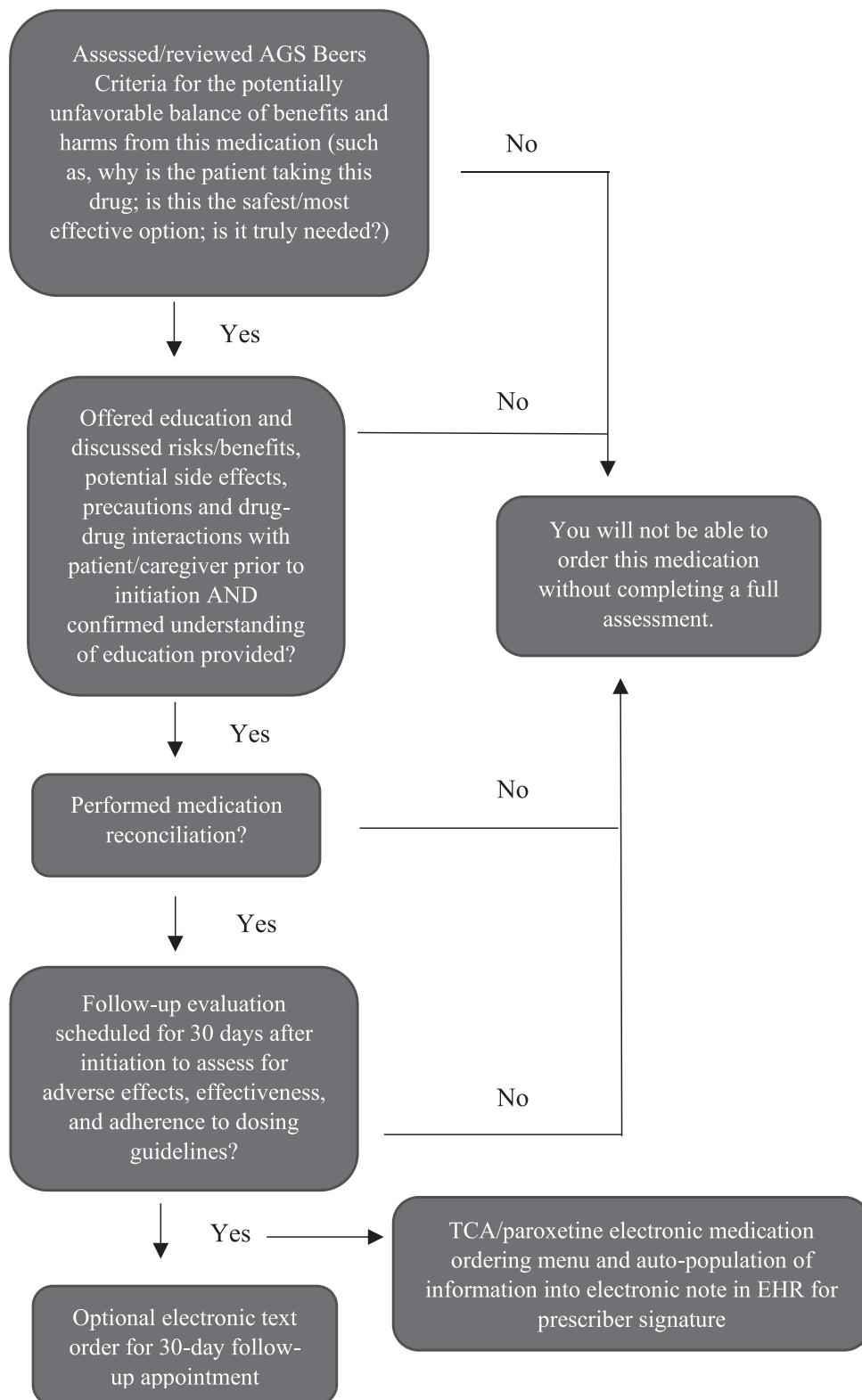
FIGURE: Clinical decision-support tool (AGS = American Geriatrics Society)

The primary outcome was the proportion of patients having all of the following: clinical justification for medication initiation, provision of patient/caregiver education specific to the medication prescribed, evaluation of comprehension of education provided, medication reconciliation, and follow-up completed within 30 days of medication initiation. Secondary outcomes included individual components of the primary outcome, adverse

TABLE 1: Baseline characteristics of the study[a]

Characteristic	Preintervention Group n = 15	Postintervention Group n = 15
Age, y	71 (68-75)	68 (67-72)
Race		
Black or African American	1 (6.7)	2 (13.3)
White	13 (86.7)	10 (66.7)
American Indian	0	1 (6.7)
Declined to answer	1 (6.7)	2 (13.3)
Sex		
Female	2 (13.3)	1 (6.7)
Male	13 (86.7)	14 (93.3)
Medication prescribed		
Amitriptyline	3 (20.0)	7 (46.7)
Doxepin	9 (60.0)	6 (40.0)
Imipramine	0	1 (6.7)
Nortriptyline	2 (13.3)	0
Paroxetine	1 (6.7)	1 (6.7)
Primary indication for medication		
Psychiatric[b]	2 (13.3)	3 (20.0)
Pain	2 (13.3)	4 (26.7)
Insomnia	5 (33.3)	7 (46.7)
Other/unknown	6 (40.0)	1 (6.7)

[a]All data is No. (%) except for age (which is median [IQR]).
[a]Psychiatric indication includes depression, anxiety, or mood disorder not otherwise specified.

effects reported by 30-day follow-up, medication modification/discontinuation by 30-day follow-up, and prescriber assessment of each of the following by 30-day follow-up: medication adherence, adverse effects, and medication effectiveness. Primary and secondary outcomes were evaluated through prescriber progress note documentation in the EHR. Nominal data were analyzed with Fisher exact test using GraphPad QuickCalcs accepting an α error of less than or equal to 0.05. This project was conducted in accordance with institutional procedures for quality improvement projects, and IRB approval was not required.

Results

Of 222 patients, 15 met the inclusion/exclusion criteria for the preintervention group, and of 280 patients, 15 met the inclusion/exclusion criteria for the postintervention group. Most of the patients were excluded because the prescription was a TCA or paroxetine continuation or a dose titration of the original prescription. Overall, the facility does not prescribe large quantities of these medications, so the number of patients with new prescriptions that met inclusion criteria was expected to

be low. Baseline demographics for each group are listed in Table 1.

The primary outcome increased from 6.7% (1 of 15 patients) before intervention to 53.3% (8 of 15 patients) after intervention ($P = .01$). Each individual component of the primary outcome increased, with significant increases observed in medication reconciliation (46.7% increase; $P = .02$) and follow-up completed within 30 days (40.0% increase; $P = .05$). Although the remaining outcomes were numerically increased, the differences did not meet the aforementioned threshold for statistical significance. The proportion of patients who reported adverse effects by the 30-day follow-up exceeded the proportion of patients who modified or discontinued their medication by 30-day follow-up; prescribers documented in the EHR that patients who continued the medication felt that the benefit of continuation was greater than the tolerable adverse effects reported. Results are displayed in Table 2.

Discussion

The result of this study showing a statistically significant improvement in the primary outcome suggests that integration of a CDST in the EHR was associated with increased adherence with TCA and paroxetine prescribing and practice guidance. This may have positive safety implications in geriatric patients by ensuring all essential components of TCA and paroxetine prescribing are completed and documented.

Although improvements were seen, continued diligence to ensure adherence to prescribing and practice guidance is necessary. Although there was a significant increase in the proportion of patients with follow-up completed within 30 days of medication initiation, almost half of patients still did not have documented follow-up completed within the specified time period. This may be because the prescriber performed a brief virtual encounter (eg, via telephone discussion) without formal EHR documentation because of brevity or a return visit was completed outside of 30 days of medication initiation. Additionally, although infrequent in occurrence, inpatient admissions, failed scheduling attempts, and patient no-shows were considered lack of documented follow-up within the 30-day window. Integrating and adjusting CDSTs entails evaluation of these outcomes to create an optimal tool.

There are limitations to this evaluation that warrant discussion. Observational study designs are subject to limitations in internal validity, including potential for selection bias, information bias, and confounding factors. No modifications or adjustments were employed to account for this. Given a veteran sample within 1

TABLE 2: Summary of the study results

Result, No. (%)	Preintervention Group n = 15	Postintervention Group n = 15	P Value
Primary outcome[a]	1 (6.7)	8 (53.3)	.01
Secondary outcomes			
Clinical justification for medication initiation	12 (80.0)	15 (100.0)	.22
Provision of patient/caregiver education specific to medication prescribed	10 (66.7)	14 (93.3)	.17
Evaluation of comprehension of education provided	8 (53.3)	13 (86.7)	.11
Medication reconciliation	6 (40.0)	13 (86.7)	.02
Follow-up completed within 30-d of medication initiation	2 (13.3)	8 (53.3)	.05
Adverse effects reported by 30-d follow-up	0	4 (26.7)	.10
Medication modification/discontinuation by 30-d follow-up	0	2 (13.3)	.48
Prescriber assessment of each by 30-d follow-up			
Medication adherence	1 (6.7)	4 (26.7)	.33
Adverse effects	1 (6.7)	6 (40.0)	.08
Medication effectiveness	2 (13.3)	6 (40.0)	.21

[a]Primary outcome is the composite of outcomes designated in italic type.

multicenter health system, this may limit the external validity of the study.

Another limitation was in the design of the CDST. Although prescribers were required to access the CDST to prescribe TCAs and paroxetine, mandating retention and documentation of the note via prescriber signature was not possible, and the autopopulated information may have been deleted from the EHR. The EHR was searched for any other notes for documentation if this autopopulated note was not located. After completion of this study, additional education was provided, and text reminders were added within the CDST at different steps (including the final screen of the CDST) to notify the prescriber to sign the auto-populated note to ensure documentation. Additionally, scheduling 30-day follow-up appointments via electronic text order routed to scheduling clerks was optional in the CDST, so a prescriber could bypass this step and place their own electronic text order outside of the CDST or not schedule follow-up. Following this study, this step was mandated in the CDST, so the prescriber could not circumvent this. Of note, the CDST did not provide functionality to assess the origin of the text order (ie, used by the prescriber as part of the CDST vs outside of it). Also, the CDST did not provide functionality to record how many patients were not prescribed a TCA or paroxetine after full assessment; therefore, it was not possible to calculate avoidance rate of initiation of an inappropriate medication.

Although it was mandatory to use the CDST to prescribe any outpatient TCA or paroxetine in the EHR, these medications were able to be freely ordered in the inpatient setting. This was intentional to avoid delays in acute care on admission and during hospitalization. Upon discharge from the hospital and if the medication was continued in the outpatient setting, the prescriber could bypass the CDST by automatically converting this inpatient medication to an outpatient medication within the EHR's functionality. Although it was expected that it would be rare for this situation to occur (ie, new TCA or paroxetine prescribed while in the hospital and continued upon discharge), this was a way that the tool could be bypassed. Inpatient clinicians (including inpatient clinical pharmacy specialists) were educated on the importance of using the CDST for any new outpatient prescriptions and evaluating on discharge. No other modalities were available to bypass the CDST, and although prescribers' perceptions were not specifically studied, they were involved in the creation of the tool and were amenable to using it.

The outcomes of this study provide useful results and insight into solutions, but these are surrogate outcomes for clinical endpoints. Although CDSTs have been shown to decrease PIM prescribing in geriatric patients, there are mixed data showing reduction in adverse drug event rates after implementation of CDSTs and safety alerts.[8,10,11] To our knowledge, no other studies have specifically evaluated the effects of a CDST on adherence to prescribing and practice guidance of PIMs in geriatric patients. Performing an evaluation of clinical, humanistic, and economic outcomes would be useful to further elucidate the impact that adherence to TCA and paroxetine prescribing and practice guidance would have on quality measures.

This quality improvement initiative provides support of a CDST integrated in the EHR to optimize adherence to

prescribing and practice guidance for TCAs and paroxetine in geriatric patients. The significant improvements in several measures suggest the useful role of instituting a CDST and potential translation to improved patient safety. Methods to improve TCA and paroxetine prescribing should continue to be explored. When updates occur and evidence evolves, CDSTs must be revised to adhere to current practice.

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