mhc
MENTAL HEALTH CLINICIAN

ORIGINAL RESEARCH Open Access

Impact of a pharmacist-driven tardive dyskinesia screening service

Niyati Butala, PharmD, BCPP[1]; Andrew Williams, PharmD, BCPP, BCGP[2]; Jamie Kneebusch, PharmD, BCPS, BCPP[3]; Melissa Mitchell, PharmD, BCPS, BCPP, BCGP[4]

How to cite: Butala N, Williams A, Kneebusch J, Mitchell M. Impact of a pharmacist-driven tardive dyskinesia screening service. Ment Health Clin [Internet]. 2021;11(4):248-53. DOI: 10.9740/mhc.2021.07.248.

Submitted for Publication: August 10, 2020; **Accepted for Publication:** April 21, 2021

Abstract

Introduction: Tardive dyskinesia (TD) is defined as involuntary movements that can develop with prolonged antipsychotic use. Regular monitoring using the Abnormal Involuntary Movement Scale (AIMS) is recommended to be conducted every 3 to 6 months for early recognition, although the AIMS is underused. Several studies have investigated risk factors that may be associated with TD, including age, sex, and long-term antipsychotic use. This study aimed to increase the monitoring and treatment of TD for those assessed to be at higher risk.

Methods: This was a prospective quality improvement study on the effectiveness of a psychiatric pharmacist–driven TD screening service (PPDTSS) in an inpatient psychiatric facility. Participants were composed of adult patients admitted between May and November 2018. Patients were screened daily by a clinical pharmacist and, if determined to be high risk based on studied risk factors, prioritized to receive a formal TD screening via the AIMS. The primary objective was to optimize standard of care by increasing the number of AIMS screenings conducted. The secondary objective was to increase the treatment of TD.

Results: A total of 402 patients were assessed prior to implementation of the PPDTSS, and 390 patients were screened following implementation. The PPDTSS increased the number of AIMS screenings attempted by 85.1% for high-risk individuals. Of the 75 patients who had an AIMS screening attempted in the postintervention group, 46 (61.3%) had an AIMS screening completed, of which 3 (6.5%) were positive.

Discussion: The results of this study demonstrate that psychiatric pharmacists can be used to improve the regular monitoring of patients at high risk for TD.

Keywords: tardive dyskinesia, TD, AIMS, screening tool, pharmacist, EPS

[1] (Corresponding author) Clinical Pharmacist, Riverside University Health System, Riverside, California, n.butala@ruhealth.org, ORCID: https://orcid.org/0000-0003-0383-6068; [2] Senior Clinical Pharmacist, Riverside University Health System, Riverside, California, ORCID: https://orcid.org/0000-0003-3140-414X; [3] Clinical Pharmacist, Riverside University Health System, Riverside, California, ORCID: https://orcid.org/0000-0001-6721-6381; [4] Senior Clinical Pharmacist–Special Projects, Riverside University Health System, Riverside, California, ORCID: https://orcid.org/0000-0002-1875-7541

Disclosures: All authors recognize that there are no conflicts of interest to disclose. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Introduction

According to the DSM-5,[1] tardive dyskinesia (TD) is defined as involuntary movements generally of the tongue, lower face, jaw, torso, and extremities that are developed from the use of antipsychotics. These movements can either be choreiform (rapid and jerky) or athetoid (slow, snakelike, and writhing). The involuntary movements can occur at least 3 months after exposure to a new antipsychotic for most patients, but within 1 month for patients 60 years or older.[1] Although the incidence of TD is rare, the American Psychiatric Association (APA) states that patients should be evaluated for extrapyrami-

dal side effects (EPS) and TD before initiation of any antipsychotic with regular follow-up monitoring.[2,3]

There are several risk factors that can place an individual more at risk for developing TD. The updated 2019 APA guidelines on schizophrenia state that patients older than 55 years are at a higher risk of TD.[3] Race also factors into the incidence of medication-induced TD.[4] A 2004 evaluation of 1149 patients with TD receiving long-term antipsychotic treatment reported that African Americans were less likely to show improvement in TD compared with Americans of European descent.[5] Modifiable risk factors include smoking, alcohol, and substance abuse.[6]

Several studies have also been conducted comparing the rates of EPS between first- and second-generation antipsychotics (FGAs and SGAs).[7] In all studies, development of TD was observed in both classes of antipsychotics. A 2017 meta-analysis conducted by Carbon et al[7] concluded that the lifetime prevalence of TD associated with FGAs was 30% compared with 20.7% with SGAs. Tenback et al[8] concluded that use of both FGAs and SGAs, older age, female sex, brain injury or dementia, early EPS, and African American race all increase the risk of developing TD. Although these risk factors help identify those who may be at higher risk, all patients receiving antipsychotic therapy should be evaluated using the Abnormal Involuntary Movement Scale (AIMS).[1] The AIMS was designed by the National Institute of Mental Health in the 1970s to assess TD. It is used to both detect TD and follow the severity of a patient's TD over time. Ideally it should be administered every 3 to 6 months to monitor the patient. The assessment is composed of 12 items that are divided into facial and oral movements, extremity movements, trunk movements, global judgments, and dental status categories. A positive AIMS is indicated by a score of 2 in 2 or more movement categories or a score of 3 or 4 in a single movement category.[9]

Although several studies have looked into varying risk factors that may be associated with TD, there is not a developed screening tool to preemptively screen patients who may be at an increased risk. Joseph et al[10] conducted a survey of psychiatrists (n = 124) in the United Kingdom that found a disparity among psychiatrists in monitoring frequency for TD, with 89% (n = 110) of respondents fully agreeing that psychiatrists should monitor for abnormal movements in patients on antipsychotics, but only 66% (n = 32) reporting that they routinely complete the monitoring. A survey of community mental health centers in Massachusetts found that 43% of the centers had nonphysicians conducting TD screenings.[11] Given the underuse of the AIMS and TD monitoring disparities among providers, this study aimed to assess the impact of a psychiatric pharmacist–driven TD screening service (PPDTSS) on TD monitoring rates and risk stratification in an inpatient psychiatric setting.

Methods

This study received appropriate IRB approval. This prospective quality improvement study was conducted in a 77-bed locked psychiatric inpatient teaching hospital.

The preintervention, or control, group included patients 18 years and older who were admitted to the inpatient treatment facility from the emergency department for at least 1 day, taking at least 1 antipsychotic during admission, and discharged from the treatment facility between May 20, 2018, and August 20, 2018. All patient charts were reviewed using the TD Screening Tool, which was composed of 6 potential risk factors, including female sex, age greater than 50 years, recorded antipsychotic use for more than 1 year, African American ethnicity, history of EPS (dystonia, akathisia, parkinsonian-like reactions), or a documented SUD. Patients were considered to have a history of EPS if the patient had a reaction documented in their chart or had been prescribed a medication, such as benztropine, propranolol, diphenhydramine, or trihexyphenidyl, indicated for EPS. If patients had 3 or more risk factors they were considered at higher risk for TD. The chart was then reviewed to determine if the patient was assessed for TD during that admission by searching the chart for the following terms: *TD*, *tardive dyskinesia*, *tardive*, and *AIMS*.

The postintervention, or intervention, group consisted of patients 18 years and older on admission who were admitted for at least 1 day to the inpatient treatment facility between August 20, 2018, and November 20, 2018. Patients had to satisfy the criteria as outlined in the screening tool (Figure), be able to follow directions, and not be aggressive or too disorganized as identified by the charge nurse and behavioral health specialist on the unit at the time of the AIMS screening. All patients admitted to the unit for more than 24 hours were screened daily using the TD screening tool by the clinical pharmacist. Patients with 3 or more risk factors were then assessed for TD with the validated AIMS by the pharmacist.

Patients with a positive AIMS were referred to the treatment team to consider pharmacologic adjustments. Pharmacologic recommendations included the minimization of anticholinergics, a change in the antipsychotic, or a reduction in the antipsychotic dose, and after the above options were tried, consideration of the potential use of a vesicular monoamine transporter 2 (VMAT2) inhibitor. If the patient had a negative AIMS, the treatment team was advised to continue monitoring the patient every 3 months because the patient was identified as being at higher risk

Psychiatric Pharmacist Tardive Dyskinesia Screening Service Progress Note
Based on the following criteria, the patient is a candidate for the AIMS screening tool (baseline and every 3 months)
Patient **MUST** meet following criteria:
Patient currently on a standing antipsychotic (typical or atypical) ☐ Typical Antipsychotic ☐ Atypical Antipsychotic
Patient must meet **THREE** of the following criteria
☐ Female
☐ Patient over the age of 50
☐ Record of being on an antipsychotic for over one year
☐ Race: African American
☐ Patient has a history of EPS (dystonia, akathisia, parkinsonian like reactions) documented or is on benztropine (Cogentin), propranolol (Inderal), diphenhydramine (Benadryl) or trihexyphenidyl (Artane) as indicated for EPS
☐ Patient has a documented substance abuse problem
The patient was identified at being at a high risk for developing tardive dyskinesia based on the above risk factors. A formal AIMS was conducted on _00-00-2018_. (Exclusion: If patient is aggressive, too disorganized to follow directions or uncooperative)
Positive AIMS Screen: The patient had a positive score on the AIMS. 1. *Consider the minimization of anticholinergics* 2. *Consider changing the antipsychotic or a reduction in the antipsychotic dose* 3. *Once the above options are tried, the patient is stable and the tardive dyskinesia is still affecting the patient's day to day activities consider the potential use of Ingrezza (valbenazine).* *Negative AIMS Screen: The patient had a negative score on the AIMS, but the patient still remains at a higher risk of developing tardive dyskinesia based on the criteria above. Please consider reevaluating the patient in 3 months on _00-00-2018_.*
Pharmacist will continue to monitor

FIGURE: Psychiatric pharmacist–driven tardive dyskinesia screening service tool (AIMS = Abnormal Involuntary Movement Scale; EPS = extrapyramidal side effects)

for developing TD. These recommendations were documented in the chart as a pharmacy progress note. The progress note included the patient's current medications, the patient-specific positive risk factors, the date the AIMS screening was completed, the results of the AIMS, and recommendations from the pharmacist. Pharmacists also documented inability to conduct an AIMS due to poor cooperation, aggression, or disorganization.

Prior to the addition of the TD screening service, clinical pharmacists attended rounds with the interprofessional team, which consisted of a social worker, an attending psychiatrist, 2 psychiatric residents, a pharmacy student, and a nurse. After rounds concluded at 11 AM, clinical pharmacists continued the rest of their clinical duties in the clinical office and were unable to observe patients throughout the day.

At the conclusion of the study time period, retrospective observational data were collected to verify if the recommendations were accepted or denied by the treatment team. Patient demographic variables, such as age, race, sex, length of hospital stay, diagnosis, previous antipsychotics, dates of antipsychotic initiation, documented EPS, and documented SUD, were also collected from the patient chart. Physicians were also provided a survey to assess their comfort in diagnosing and treating tardive dyskinesia, to assess how often they counseled patients on the risk of TD, and to evaluate the impact of the PPDTSS. Descriptive statistics were used to assess risk factors, number of AIMS screenings administered, and survey results.

The primary outcome of this study was the number of high-risk patients identified and assessed for TD before and after the implementation of the PPDTSS. The secondary outcome was the number of patients treated for TD.

Results

Initial screening for study patients included 455 in the control group and 436 in the postintervention group. A total of 53 and 46 patients were excluded from the preintervention and postintervention groups, respectively. Patients from both groups were excluded because of a lack of an antipsychotic prescribed during admission. A total of 29 patients (38.7%) of the 75 that had an AIMS screening attempted in the postintervention group were too aggressive, too disorganized, or refused to participate in the AIMS screening after 2 individual attempts.

The control group consisted of 402 patients, with 103 patients (25.6%) having 3 or more risk factors for developing TD. Of these patients who were deemed higher risk, only 15 (14.6%) were assessed for TD via AIMS, and 2 were screened as positive. The postintervention group consisted of 390 patients who were screened using the TD screening tool. Of those screened, 75 (19.2%) had 3 or more risk factors for developing TD, and all (100%) were assessed for TD. The AIMS was completed for 46 patients (61.3%), and 3 (6.5%) were positive for TD.

Both groups included a higher number of men younger than 50 years. Most of the patients in both the control and intervention groups received SGAs: 362 (90%) and 364 (93.3%), respectively. A total of 16 (4.0%) versus 12 (3.1%) patients were on both an FGA and SGA, and 24 (6.0%) and 12 (3.1%) patients were only on an FGA in the preintervention and postintervention groups, respectively. Further demographic information is highlighted in the Table.

TABLE: Population demographics of the study: tardive dyskinesia risk factors

	Control Group n = 402		Intervention Group n = 390	
Demographics	**No.**	**%**	**No.**	**%**
Sex, male	238	59	231	59
Age				
Age >50 y	98	24	70	18
Age <50 y	304	76	320	82
Antipsychotic use				
>1 y	134	33	181	46
<1 y	268	67	209	54
Race				
African American	82	20	77	20
Other	320	80	313	80
Documented extrapyramidal side effects				
Yes	79	20	57	15
No	323	80	333	85
Documented SUD				
Positive	192	48	115	29
Negative or not applicable	210	52	275	71

Most patients had 2 risk factors, with 31.6% and 36.7% observed in the preintervention and postintervention groups, respectively. A total of 103 patients (25.6%) of the control group compared with 77 (19.7%) of the intervention group had at least 3 risk factors.

Of the 2 patients who screened positive on the AIMS in the control group, both were on an SGA. One was a young white man who had been on antipsychotics for more than a year and had a documented past history of EPS and SUD. The other was an African American woman older than 50 years who had been on antipsychotics for more than a year and had a documented SUD. Both were noted to have TD movements of the jaw, neither had an AIMS documented, and neither was started on a VMAT2 inhibitor, but 1 was discharged home with an anticholinergic medication.

Three patients screened as positive on the AIMS in the intervention group. One was prescribed an SGA, 1 was prescribed an FGA, and 1 was prescribed an FGA and an SGA. All were men, 2 (66.7%) were older than 50 years, 2 (66.7%) were African American, all 3 (100%) were on antipsychotics for more than a year, none (0%) had documented history of EPS, and 2 (66.7%) had a documented SUD. Anticholinergic medications were discontinued for all 3 patients, but a VMAT2 inhibitor was not added to any patient regimen. A VMAT2 inhibitor was not started in the postintervention group because 2

patients refused an additional medication, and 1 provider did not initiate the medication in 1 patient because of cost, homelessness, and frequent admissions for noncompliance.

Additional pharmacist interventions, such as change in therapy, identification of a side effect, missing home medications, and patient education, were provided for 15 patients (32.6%) who had an AIMS completed. Interventions on 5 additional patients who were not screened for AIMS were able to be made because of the presence of a pharmacist on the unit.

A total of 5 physicians (45.5%) of 11 completed the provider survey about the PPDTSS, 60% of whom stated that they did not routinely evaluate for TD, were not comfortable in diagnosing TD, and did not routinely counsel their patients on the risk of TD in their practice. A total of 4 physicians (80%) indicated that the PPDTSS note was "somewhat helpful," whereas 1 (20%) found it "always helpful."

Discussion

Compliance with TD monitoring and the number of AIMS screenings conducted improved following the implementation of the PPDTSS. Analysis of the primary objective showed an improvement in the number of patients screened for TD after pharmacist intervention. The PPDTSS increased the number of AIMS screenings attempted by 85.1%. Although no patients in the preintervention or postintervention group were started on any VMAT2 inhibitors, the control group did have a patient started on an anticholinergic medication to treat TD, although anticholinergics may actually worsen TD symptoms. Conversely, the postintervention group had all anticholinergics discontinued.

The PPDTSS prioritized the number of patients requiring an AIMS, which created a more manageable workload for 1 pharmacist to complete daily. However, this prevented evaluation for potential patients who did not meet criteria for being *higher risk* based on having 3 or more risk factors. This could have led to missed TD assessments in those who may have been positive for symptoms. Retrospectively, study investigators were unable to determine if there were undocumented patient refusals to AIMS or if the patient was too aggressive during the admission, leading to the lack of an assessment. Moreover, there are varying note templates that both the doctors and nurses use. Some note templates ask about TD and require the provider to fill in a response, whereas others do not prompt a question, which may also contribute to the lack of documentation in the control cohort.

Overall, both groups had a similar number of female and male patients, with approximately 20% of patients in each group being African American. Most of the patients were younger than 50 years and did not have documented EPS. The 2 risk factors that varied between groups were past antipsychotic use and documented SUD. In the control group most of the patients were taking antipsychotics for less than 1 year and fewer patients presented with SUD, potentially indicating a lower risk for the development of TD.

Moreover, several patients in this study were on SGAs compared with FGAs. Carbon and colleagues[7] reviewed 8895 articles from 2000-2015 and determined that the rate of TD from FGAs was 30%, it was 20.7% from SGAs with unspecified prior history of FGA, and it was 7.2% from SGA use with no prior history of FGA use.[7] Comparatively, this study found that 0.5% who used SGAs but an unspecified prior use of FGAs developed TD, and 0.3% of patients who used SGAs but had no prior history of FGAs developed TD.

The methods involved in determining if a patient may be at a higher risk for developing TD had limitations. Patients in the postintervention group were assessed with an AIMS if at least 3 of the studied risk factors were present. This was an arbitrary number determined prior to the study to help prioritize the number of patients that the clinical pharmacist was able to evaluate daily. Furthermore, risk factors were identified via documentation in the patient chart. Incomplete documentation was another limitation. If the patient had never been to the inpatient psychiatric facility prior to this encounter or if the patient had a different medical chart, a full past psychiatric history or previous medication trial information may not have been not available. This impacted collected data, including if the patient was considered to be on an antipsychotic for a year or more. Similar limitations were found for documented EPS or a positive SUD documentation. Although incomplete documentation is a limitation, it demonstrates the reality of patients with a mental illness who may be admitted to different facilities, making it difficult to confirm medication adherence or other psychiatric and substance use history. The use of descriptive statistics is a limitation as well because only quantitative descriptions can be made. However, even with the lack of generalizations, it will ultimately contribute to the literature demonstrating the value of psychiatric pharmacists.

The PPDTSS also addressed an area that is not routinely documented per the physician survey, where 60% of physicians stated that they did not routinely evaluate for TD in their practice. The physician survey was emailed to all 5 attending psychiatrists and 6 first-year psychiatric residents. Of the 5 physicians who completed the survey,

4 were first-year psychiatric residents, and this may have contributed to most of the physicians stating that they did not routinely evaluate for TD. Sending the survey electronically could have resulted in a lower response rate.

The biggest barriers to implementing this service were the lack of risk factors determining which patients are at the highest risk, not having enough resources to leave other clinical responsibilities to conduct an AIMS screening, the lack of resources to conduct an AIMS screening on all patients, the potential lack of sustainability if there is a change in workflow or staff, and the feasibility of a pharmacist to make multiple attempts to determine if a patient is willing and able to have an AIMS screening attempted.

The TD screening service increased patient access to a pharmacist, which resulted in additional recommendations provided to the treatment team to optimize care. Recommendations included referrals to dieticians, changing the formulation of medications to increase adherence, reinitiating home medications, addressing potential side effects from medications, and providing patient education. More than half of the patients evaluated by the psychiatric pharmacist had an intervention made in addition to the initial TD screen. This demonstrates the potential value of having a pharmacist on treatment teams. A future direction would be to further demonstrate pharmacist value by monitoring all pharmacist intervention acceptance rates.

Conclusion

The population at the inpatient psychiatric facility could benefit from increased monitoring and documentation of TD with the use of the AIMS. The PPDTSS increased the number of AIMS screenings that were completed to further align with APA guidelines, optimizing the standard of care. It did not increase the number of VMAT2 inhibitors used, but it increased the effective recognition of TD risk factors and management of TD and contributed to improved medication management by incorporating psychiatric pharmacists on the units. Psychiatric pharmacists can be used as a resource to improve TD monitoring rates within an inpatient setting.

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