Improving Nursing Recognition of Drug-Induced Movement Disorders

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Abstract

Background: Drug-induced movement disorders are common and under-assessed. They are most commonly caused by antipsychotic medications which are used to treat a number of different psychiatric conditions. Drug-induced movement disorders range from barely noticeable or uncomfortable to life-threatening. Collaboration between nurses and providers is crucial in order to accurately assess and provide timely evidence-based treatment to patients. As nursing education is generalist in nature, more specialized training on drug-induced movement disorders is needed for nurses working in psychiatric hospitals.

Methods and Intervention: The Plan-Do-Study-Act method of quality improvement was used for this project. A review of the current literature on drug-induced movement disorders was used to develop an online education module that was made available to nurses working in a psychiatric hospital. Baseline scores on a drug-induced movement disorder knowledge test were compared with scores after completing the module.

Results: Of 16 individuals completing the module, the mean pre-test score was 84.4% and the mean post-test score was 96.3% for a mean improvement of 11.9%. The results of the Wilcoxon signed rank test showed that the scores on the post-test are significantly higher ($p < 0.05$) than those on the pre-test.

Conclusions: Completing the education module on drug-induced movement disorders led to increased knowledge of the subject. This project will have ongoing impact on nurses and the care they provide to patients as the education module will remain available to nurses into the future and will be included in the hospital's nurse residency program.

Problem Statement

Drug-induced movement disorders are an under-assessed group of disorders caused by common psychotropic medications including antipsychotics, antidepressants, and mood stabilizers. These disorders include both acute and tardive syndromes, and include the symptoms known as extrapyramidal symptoms including dystonia, akathisia, parkinsonism, dyskinesia and more broadly include tremors, neuroleptic malignant syndrome (NMS), and serotonin syndrome. While serotonin syndrome and lithium toxicity have different etiologies than the extrapyramidal movement disorders, they are included in this project as they should also be in the awareness of psychiatric nurses. For simplicity, the term drug-induced movement disorders will be used in this paper to include all the above-mentioned disorders. Drug-induced movement disorders include potentially lethal syndromes (Factor et al., 2019) and are under-assessed by nurses and providers alike (Gray & Gournay, 2000, Cortese et al., 2004). Better education and awareness of these disorders are needed to improve the safety and quality of psychiatric care.

Available Knowledge

Dopamine receptor blocking agents are the most common cause of drug-induced movement disorders. While antipsychotic medications are the most common cause in the psychiatric setting, the antiemetics including metoclopramide and promethazine also block dopamine receptors and should be considered when assessing for drug-induced movement disorders (Factor et al., 2019). Second-generation antipsychotic (SGA) medications generally have a lower risk of causing movement disorders than first-generation antipsychotics (FGA). However, the perceived safety of SGAs has led to an increase in their prescription, offsetting any improvements in safety (Factor et al., 2019).

Acute drug-induced dystonic reactions are characterized by uncontrollable muscle contractions and are more common with FGAs (2-6%) than SGAs (1-2%) (Rajan et al., 2019). Dystonia can affect different muscle groups, but most commonly affects muscles in the face and neck. Acute dystonic laryngospasm is serious and may prove fatal if unrecognized and untreated (Rajan et al., 2019). Akathisia is a syndrome of restlessness leading to stereotypic movements including pacing and rocking back and forth. Akathisia can also be perceived as anxiety and can lead to aggression and/or self-harm. Akathisia can occur in up to 50% of individuals treated with dopamine receptor blocking agents but rates vary greatly from agent to agent (4-50%) (Factor et al., 2019). Drug-induced parkinsonism develops sub-acutely but can be severely disabling. It occurs with dopamine receptor blocking agents as well as less frequently with other medications including lithium and valproate. As with other drug-induced movement disorders, the risk of drug-induced parkinsonism is lower with SGAs than FGAs (Factor et al., 2019). Tardive dyskinesia (TD) is a syndrome of involuntary stereotypic movements predominantly of the orofacial muscles that can impair eating, swallowing, and speaking, and can be socially disabling. Prevalence of TD ranges from 21-30% of individuals treated with antipsychotic medications. However, in patients that have only received SGAs and never received FGAs, the prevalence of TD is 7% (Factor et al., 2019).

Neuroleptic malignant syndrome (NMS) is a rare (0.01-0.04% of patients treated with antipsychotics) but serious syndrome caused by dopamine receptor blocking agents, including antipsychotics and antiemetics. This syndrome consists of delirium, rigidity, high fever, and dysautonomia in the context of exposure to a dopamine antagonist. While mortality rates for NMS have significantly improved over the years, the mortality rate for NMS remains around 10% although it is lower when associated with SGAs than with FGAs (Rajan et al., 2019).

Prompt recognition of this condition is tantamount in its treatment. Serotonin Syndrome (SS) is also potentially life-threatening and can present similarly to NMS but is caused by serotonergic vs. antidopaminergic agents. SS exists in a spectrum of serotonin toxicity from mild toxicity to severe SS. Incidence of this condition is poorly documented but is most likely to result from overdose or combinations of multiple serotonergic agents (Rajan et al., 2019).

In schizophrenia, there is a positive correlation between worse mood and psychotic symptoms and movement disorder symptoms. (Weng et al., 2019). Drug-induced movement disorders decrease quality of life (Fujimaki et al., 2012), decrease medication adherence (Musco et al., 2019), and increase healthcare resource utilization and medical costs (Abouzaid et al., 2012). While nurses play an important role in the assessment of drug-induced movement disorders (Dilks et al., 2019), they do not thoroughly and consistently assess for these disorders leading to a lack of detection (Gray & Gournay, 2000). This problem is not solely a problem in nursing, as physicians frequently fail to document assessment for drug-induced movement disorders as well (Cortese et al., 2004).

Drug-induced movement disorders have observable features that clinicians can assess through both observation and more formal assessment using validated rating scales. These scales include the Barnes Akathisia Rating Scale, the Simpson-Angus Scale for parkinsonism, and the Abnormal Involuntary Movement Scale (AIMS) for tardive dyskinesia. The Extrapyramidal Symptom Rating Scale can be used to differentiate between movement disorders. Additionally, the Extrapyramidal Side Effects Assessment Scale was developed by and for nurses (Fagan-Pryor & May, 2000). The goal of developing this scale was to "help nurses easily assess and document the presence of EPS symptoms" (Fagan-Pryor & May, 2000, p. 54).

Nurses are responsible for administering PRN medications which are frequently ordered to address acute dystonia and akathisia. Knowledge of these disorders is important for the appropriate administration of PRN medications. Likewise, when no medications are ordered to address a movement disorder, bringing the issue to the attention of the attending provider can lead to further assessment and treatment with the appropriate medications. Alerting a provider is particularly important in NMS and serotonin syndrome which are potentially deadly if untreated.

Rationale

The framework used for this project is the "Model for Improvement," which was developed by Associates in Process Improvement and is used by the Institute for Healthcare Improvement (Institute for Healthcare Improvement, n.d.). This framework uses a process of plan-do-study-act cycles to implement changes within an organization gradually and purposefully.

The problem of inadequate assessment of drug-induced movement disorders is conceptualized as being a lack of nursing knowledge of the topic. While nursing education provides a general overview of common medications and their side effects, drug-induced movement disorders are most common in psychiatry and a generalist education is not likely to provide in-depth education on this topic. Providing education on the different drug-induced movement disorders will increase nursing competence and lead to improved safety and quality of care.

Specific Aims

The aim of this project was to improve the safety and effectiveness of care provided at the psychiatric hospital where this project was conducted. Measuring clinical outcomes is beyond the scope of this project, so knowledge of the topic will be used as a proxy measure.

Nurses' scores on a drug-induced movement disorder knowledge test will increase by 30% after completing the education module and will maintain the increased scores after a period of four weeks. This project was implemented in March 2021 and completed by the end of April 2021.

<center>**Methods**</center>

Context

This quality improvement project was carried out at an urban psychiatric hospital in the pacific northwest. This hospital has both adult and adolescent inpatient units as well as an adult psychiatric emergency services department. The hospital serves patients who receive care on both voluntary and involuntary bases. The education was made available to clinical staff in all units of the hospital. Nurses at this hospital administer scheduled and PRN psychotropic medications that carry risk of drug-induced movement disorders. They are responsible for monitoring patients' reactions to medications and alerting providers to adverse reactions as well as administering PRN medications to treat drug-induced movement disorders as ordered by an attending provider.

Interventions

The intervention for this quality improvement project was an audiovisual education module provided to nurses via an online education system. The module covers drug-induced movement disorders, their observable characteristics, how to prioritize interventions for acute conditions, and the medications used to treat these disorders. Once the module was uploaded to the organization's online education system, it was advertised using flyers throughout the hospital, emails to nursing staff from the nursing managers, as well as word of mouth. Several weeks into the six-week intervention period, a notification was received that there were some unintended problems with the module. The pre-test had been inadvertently set to require an 80%

score prior to users being able to view the module, something that discouraged some users from completing the module. Once this issue became known, it was quickly fixed, and the required score was removed. A presentation like the one provided to the nurses was given to providers from the hospital's emergency services. Feedback from this presentation on recommendations for nurses responding to acute dystonic reactions was incorporated into the education module about four weeks into the intervention. The presentation materials will be used going forward to train nurses in the nurse residency program at the hospital. Finally, this education module will continue to be available to nurses on the online education platform for an indefinite period. Each of these steps represent iterations of the PDSA cycle as the intervention adapted to obstacles that presented themselves.

Study of the Interventions

The impact of the education on drug-induced movement disorders was assessed using a pre-test and post-test of nurses' knowledge of the subject. The same test was administered immediately before and after viewing the education module. This provided a baseline assessment of nurses' knowledge of the subject and any changes in the score of the post-test were directly attributed to the intervention. Due to the above-mentioned problem with an 80% score required on the pre-test, some users took the pre-test multiple times prior to viewing the module. Only their first score on the pre-test was used in the results.

Measures

The outcome measure for this project was the score on the post intervention test. A score increase of 30% from baseline to follow-up was arbitrarily decided on to be a positive outcome. Process measures included the number and percentage of nurses who complete the education module. Balancing measures for this project included the labor required to implement the project

and the time nurses spent viewing the education module and were not engaged in patient care. The labor to implement the education module was minimal as it was disseminated via an existing online education platform within the organization requiring only a small effort from employees already familiar with the system. Data was collected by the online education platform and a data report on a spreadsheet of all staff who viewed at least some part of the module was generated and de-identified by a hospital employee familiar with the education platform.

Analysis

The paired T-test would be the preferred statistical test to compare results of the pre-test and post-test. However, given the small sample size and non-normal distribution of the data points, the non-parametric Wilcoxon signed rank test was used to analyze the data instead. No formal analysis of qualitative data was planned.

Ethical Considerations

This is a quality improvement project with the aim to provide education on established best practices. The proposal was submitted to the IRB boards of both the academic institution where the author is studying and the healthcare organization where the project was implemented. Both boards found the project to be quality improvement in nature and not human subject research. The author does not have any conflicts of interest to disclose. The author is employed as a psychiatric mental health nurse practitioner at the hospital at which the project was conducted.

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Results

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During the six-week intervention period 28 hospital employees viewed at least part of the module. 16 completed the pre-test and post-test. While the target audience for the intervention was nurses, the module was also available to other hospital employees. Twelve of the 16 who

completed both tests were nurses with the remainder being pharmacists, behavioral health technicians, and providers. The mean pre-test score was 84.4% and the mean post-test score was 96.3% for a mean improvement of 11.9% (See Appendix A). As the data was not normally distributed and the sample size was less than 100, the Wilcoxon signed rank test was used instead of the paired t-test. The results of the Wilcoxon signed rank test showed that the scores on the post-test are significantly higher ($p < 0.05$) than those on the pre-test.

Feedback regarding the intervention came as informal comments from individuals who took the module. The first comments received were individuals attempting to view the module who were frustrated with having a passing score of 80% on the pre-test required before viewing the module. Of those who viewed the module, the feedback was overwhelmingly positive. Nurses felt that the topic was important and relevant to their work. Some commented that it should be required education for nurses working at the hospital. Providers commented that educating nurses on this topic was important as nurses spend more time observing patients than the providers do. Providers value nurses for their role in detecting drug-induced movement disorders.

Data was included only from the 12 participants who completed both the pre-test and post-test. Data was not included for the 16 participants who did not complete both tests.

Discussion

Summary

During the six-week intervention period, participants' scores on a drug-induced movement disorders knowledge test improved by 11.9% on average after viewing an education module on the topic. Nurses and providers provided feedback that this is an important area for quality improvement and were pleased with the quality of the education module. While much has

been written about drug-induced movement disorders, little has been published about quality improvement work on this topic. To this author's knowledge, this is the first paper to examine the implementation of a quality improvement project aimed at improving nurses' ability recognize and respond to drug-induced movement disorders. This project demonstrates that providing an online education module is an effective way to improve nurses' knowledge of drug-induced movement disorders.

Interpretation

A statistically significant improvement was noted on scores on the post-test compared to the pre-test administered prior to viewing the education module. The mean improvement was 11.9% which is below the arbitrarily decided upon goal of a 30% improvement. However, since the average pre-test score was 84.4%, an improvement of 30% overall would not be possible. Only four pre-test scores were 70% or lower, and of those scores the mean improvement was 27.5%. Using an online education module appears to be an effective method for improving nurses' knowledge of drug-induced movement disorders.

The six-week intervention period captured in this study represents only a small part of the ongoing impact of this quality improvement project. The module continues to be available to nurses on the organization's online education system and will be incorporated into the training for the hospital's nurse residency program. The anticipated impact of improved nursing knowledge of drug-induced movement disorders is that patients will receive timelier evidence-based care leading to reduced suffering.

This project is easily reproducible and is a cost-effective and efficient method that works with existing technology available to most healthcare organizations. Many healthcare

organizations already use some form of online education platform to track employees' compliance with mandatory education.

Limitations

This project is limited primarily by the low participation rate of nursing staff at the hospital where the project was conducted. Despite using flyers, emails, and word of mouth to advertise the education module, of 216 nurses working at the hospital, only 12 completed the entire module with pre-test and post-test during the six-week intervention period. One possible cause of the low participation rate is that the intervention period was around the same time that several mandatory education modules were due for hospital employees. It was decided by hospital administration that this education module would not be made mandatory for nursing staff. However, requiring nurses to take module would increase the impact of the project.

One possible source of bias in the results of this project is that some participants took the pre-test multiple times in order to obtain a score of 80% before viewing the module. This may have artificially inflated the post-test scores of these few participants. As soon as this issue was noticed, it was corrected.

Conclusions

Completing the education module on drug-induced movement disorders led to increased knowledge of the subject as demonstrated by improved scores on the drug-induced movement disorders knowledge test. The impact of this project will continue to be seen as more nurses take the education module and receive this training as part of the nurse residency program.

Nurses work in increasingly specialized areas of healthcare but receive generalist training. While on the job training is adequate for teaching nurses to manage routine situations, less common, but serious conditions, require specialized training and knowledge. Online training

modules offer a low cost and effective option for providing specialized training on important nursing topics. Nurse practitioners are uniquely poised to create these educational modules as they are experts in their field of practice who also have intimate knowledge of the nursing role and scope of practice. This type of education can be utilized in a wide variety of settings and can be customized to fit the needs of a particular context. Upon request to the author, this education module can be shared with organizations wishing to provide education to nurses on the topic of drug-induced movement disorders.

Future quality improvement projects that utilize online education modules should work on improving advertising to increase participation. Hospital administrators could opt to make education modules mandatory or could consider compensating nurses for completing training modules. Other topics that would lend themselves to online education modules would include appropriate usage of PRN medications, motivational interviewing techniques, and drug and alcohol withdrawal protocols.

To continue work on improving assessment and management of drug-induced movement disorders, work should be done to measure incidence of these disorders and the outcomes for these patients. Currently, drug-induced movement disorders are not tracked in a standardized way in the electronic health record utilized by this organization. Developing a standardized approach to tracking drug-induced movement disorders could be a future quality improvement project at this organization.

References

Abouzaid, S., Tian, H., Zhou, H., Kahler, K. H., Harris, M., & Kim, E. (2014). Economic burden associated with extrapyramidal symptoms in a Medicaid population with schizophrenia. *Community Mental Health Journal*, *50*(1), 51–58. https://doi.org/10.1007/s10597-012-9561-7

Cortese, L., Jog, M., McAuley, T. J., Kotteda, V., & Costa, G. (2004). Assessing and monitoring antipsychotic-induced movement disorders in hospitalized patients: A cautionary study. *The Canadian Journal of Psychiatry*, *49*(1), 31–36. https://doi.org/10.1177/070674370404900105

Dilks, S., Xavier, R. M., Kelly, C., & Johnson, J. (2019). Implications of antipsychotic use. *Nursing Clinics of North America*, *54*(4), 595–608. https://doi.org/10.1016/j.cnur.2019.08.004

Factor, S. A., Burkhard, P. R., Caroff, S., Friedman, J. H., Marras, C., Tinazzi, M., & Comella, C. L. (2019). Recent developments in drug-induced movement disorders: A mixed picture. *The Lancet Neurology*, *18*(9), 880–890. https://doi.org/10.1016/S1474-4422(19)30152-8

Fagan-Pryor, E. C., & May, D. L. (2000). Establishment of interrater reliability for a nursing extrapyramidal side effects (EPS) assessment scale. *Journal of Nursing Care Quality*, *14*(3), 54–63. https://doi.org/10.1097/00001786-200004000-00007

Fujimaki, K., Morinobu, S., Yamashita, H., Takahashi, T., & Yamawaki, S. (2012). Predictors of quality of life in inpatients with schizophrenia. *Psychiatry Research*, *197*(3), 199–205. https://doi.org/10.1016/j.psychres.2011.10.023

Gray, R., & Gournay, K. (2000). What can we do about acute extrapyramidal symptoms?

Journal of Psychiatric and Mental Health Nursing, *7*(3), 205–211.

https://doi.org/10.1046/j.1365-2850.2000.00296.x

Institute for Healthcare Improvement. (n.d.). *How to Improve.*

http://www.ihi.org/resources/Pages/HowtoImprove/default.aspx

Musco, S., Ruekert, L., Myers, J., Anderson, D., Welling, M., & Cunningham, E. A. (2019).

Characteristics of patients experiencing extrapyramidal symptoms or other movement

disorders related to dopamine receptor blocking agent therapy. *Journal of Clinical*

Psychopharmacology, *39*(4), 336–343. https://doi.org/10.1097/JCP.0000000000001061

Rajan, S., Kaas, B., & Moukheiber, E. (2019). Movement disorders emergencies. *Seminars in*

Neurology, 39(01), 125–136. https://doi.org/10.1055/s-0038-1677050

Weng, J., Zhang, Y., Li, H., Shen, Y., & Yu, W. (2019). Study on risk factors of extrapyramidal

symptoms induced by antipsychotics and its correlation with symptoms of schizophrenia.

General Psychiatry, *32*(1), e100026. https://doi.org/10.1136/gpsych-2018-100026

Appendix A

Pre-test and Post-test Score Frequency