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Objective and subjective benefits of a psychiatric pharmacist–led long-acting injectable medication training at a large, multisite organization

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Abstract

Introduction: Many psychiatric, long-acting injectable (LAI) medications are available, and each product comes with its own unique challenges. Improper administration can lead to pain, decreased efficacy, and loss of trust in the patient-provider relationship. This study was conducted to determine if a pharmacist-led, 1-hour training was successful in increasing psychiatric LAI medication knowledge through a pretest and posttest. The study also assessed staff satisfaction, confidence, and relevance to practice through a feedback questionnaire.

Methods: Four 1-hour live trainings took place in November 2019. Thirty-five nurses and 8 medical assistants attended 1 of the trainings. A pretest and posttest was administered to determine the training's efficacy, and then a final assessment was administered 4 to 6 weeks after the training. Additionally, a participant feedback questionnaire was given to determine the perceived benefits of the training.

Results: The primary outcome was to compare pretest and posttest scores. The pretest average score was 67%, the posttest average score was 97%, and the average score 4 to 6 weeks after the training was 97%. The secondary outcome was to review feedback questionnaires to determine the perceived benefit and effectiveness of the training. Ninety-five percent of participants selected that they were *very satisfied* with the training, 88% selected they would *definitely* use the information presented in their work, and 93% selected that they had *a lot* of confidence in the topic after the training.

Discussion: A psychiatric LAI medication training administered to nursing staff and medical assistants improved knowledge scores and was perceived as being useful.

Keywords: long-acting injectable, nursing training, fluphenazine enanthate, fluphenazine decanoate, haloperidol, Risperdal Consta, Vivitrol, naltrexone for extended release, Sublocade, buprenorphine extended release injection, Aristada, Perseris, Abilify Maintena, improper administration of depot antipsychotics, staff education

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Introduction

Poor adherence to oral antipsychotics was found to be an issue soon after the introduction of these medications in the 1950s; therefore, products with a longer duration of action were developed. In 1966, fluphenazine enanthate[1] was the first long-acting injectable (LAI) antipsychotic formulated, and fluphenazine decanoate[2] soon followed.

TABLE 1: Long-acting injectable products

Generic Name	Brand Name	Storage and Injection Site and Route	Year of FDA Approval[7]
First-generation antipsychotic long-acting injectables			
Fluphenazine decanoate	Prolixin decanoate	Storage: room temperature Injection site and route: usually gluteal, IM or SQ	1972
Fluphenazine enanthate	Prolixin enanthate	Discontinued product	1967
Haloperidol decanoate	Haldol decanoate[a]	Storage: room temperature Injection site and route: gluteal, IM	1986
Second-generation antipsychotic long-acting injectables			
Aripiprazole lauroxil	Aristada and Aristada Initio[b]	Storage: room temperature Injection site and route: deltoid (441 mg dose only) or gluteal, IM	2015
Aripiprazole monohydrate	Abilify Maintena[c]	Storage: room temperature Injection site and route: deltoid or gluteal, IM	2013
Olanzapine for extended-release injection	Zyprexa Relprevv[d]	Storage: room temperature Injection site and route: gluteal, IM	2009
Paliperidone palmitate 1-mo	Invega Sustenna[a]	Storage: room temperature Injection site and route: deltoid, maintenance dosing can be gluteal, IM	2009
Paliperidone palmitate 3-mo	Invega Trinza[a]	Storage: room temperature Injection site and route: deltoid or gluteal, IM	2015
Risperidone extended-release microspheres	Risperdal Consta[a]	Storage: refrigerated Injection site and route: deltoid or gluteal, IM	2003
Risperidone extended release suspension	Perseris[e]	Storage: refrigerated Injection site and route: abdomen, SQ	2018
Substance use disorder long-acting injectables			
Buprenorphine extended-release injection	Sublocade[e]	Storage: refrigerated Injection site and route: abdomen, SQ	2017
Naltrexone for extended-release injection	Vivitrol[b]	Storage: refrigerated Injection site and route: gluteal, IM	2006

FDA = Food and Drug Administration; IM = intramuscular; SQ = subcutaneous.

[a]Janssen, Titusville, NJ.

[b]Alkermes, Waltham, MA.

[c]Otsuka, Deerfield, IL.

[d]Eli Lilly, Indianapolis, IN.

[e]Indivior, North Chesterfield, VA.

Haloperidol decanoate became available in Europe in 1981 and the United States in 1986.[1] Risperidone extended-release microspheres were the first of the second-generation antipsychotics to be formulated into an LAI in 2003. Naltrexone extended-release injection,[4] approved in 2006, was the first LAI approved for substance use disorders and was followed by buprenorphine extended-release injection[5] in 2017. In the United States, there are 9 LAI antipsychotic products on the market and 2 LAI medications for substance use disorders (Table 1). Antipsychotic LAI medications are useful because they may improve adherence over oral antipsychotics. Marcus et al[6] found that 51.8% of patients on antipsychotic LAI medications were noncompliant as compared to 67.7% of patients on oral antipsychotics.

Each LAI medication has its own administration instructions and intricacies that can make proper administration difficult. For example, most LAI medications are administered slowly to decrease pain, but aripiprazole lauroxil[8] must be administered quickly to prevent the needle from clogging. Some LAI medications are kept at room temperature although risperidone extended-release microspheres, risperidone extended-release suspension,[9] naltrexone extended-release injection, and buprenorphine extended-release injection must be refrigerated. Additionally, LAIs differ in how they are supplied, and aripiprazole monohydrate[10] and risperidone extended-release microspheres require vial adapters. Multiple variables may lead to errors, and staff administering LAI medications often lack specific training regarding proper administration techniques.[11]

TABLE 2: Anonymous pretest/posttest used in the study

Question No.	Question	Responses[a]
1	Long-acting injectable medications are beneficial over oral medications for which reason?	*a. Long-acting injectable medications increase compliance* b. Long-acting injectable medications are less expensive c. Long-acting injectable medications have less side effects d. Long-acting injectable medications are more effective
2	Deltoid injections are least painful when administered where?	a. In front of the deltoid midline *b. Behind the deltoid midline*[1,2] c. In the deltoid tuberosity d. At the deltoid midline
3	A colleague is asking for recommendations on selecting a first-generation long-acting injectable for a patient. Which 2 medications are available?	a. Abilify Maintena and Risperdal Consta b. Fluphenazine and Loxapine *c. Fluphenazine and Haloperidol* d. Haloperidol and Olanzapine
4	Most long-acting injections should be administered slowly to decrease pain. One product must be given rapidly to prevent needle clogs. Which product must be administered rapidly?	a. Abilify Maintena *b. Aristada* c. Invega Sustenna d. Risperdal Consta
5	Which long-acting injectable antipsychotic medication requires that the patient is monitored for 3 hours after administration?	a. Haloperidol decanoate b. Aristada *c. Zyprexa Relprevv* d. Invega Trinza
6	You notice that the long-acting injectable antipsychotics are all being stored in a cabinet at your facility. You notify your supervisor that which of the following should be refrigerated.	a. Fluphenazine and Haloperidol b. Abilify Maintena and Aristada c. Invega Sustenna and Invega Trinza d. Risperdal Consta and Perseris
7	How is Sublocade administered?	*a. Subcutaneous abdominal* b. Intramuscular deltoid c. Intramuscular gluteal d. Intravenous

[a]Italic text indicates correct answer.

The objective of this study was to see if a 1-hour, pharmacist-led training improved LAI knowledge and confidence in nursing and medical assistant staff. The LAI training assessed improvements in objective knowledge through a pretest and posttest and subjective improvements through a feedback questionnaire.

Methods

An e-mail was sent from the chief medical officer to all nursing staff and the manager of the medical assistants to notify the staff of the mandatory training requirement. Staff were instructed to register for the class on the organization's training website. Four classes were available at 1 central location in November 2019. The institution serves mostly underserved, mentally ill populations at more than 50 facilities. Each practice site is unique in staffing level and primary patient disease states, which range from mental illnesses and substance use disorders to intellectual disabilities. Age groups of the patients range from pediatric to geriatric, and patient acuity varies greatly. Per the chief medical officer, this study was institutional review board exempt.

The class was an in-person training led by 1 board-certified psychiatric pharmacist. The class started with an anonymous, multiple-choice, 7-question pretest (Table 2) followed by an hour-long presentation. The presentation included sections on first- and second-generation LAI antipsychotic medications and LAI medications for substance use disorders. Demonstration kits and a device that vibrated when shaken with the proper velocity were utilized to show attendees how to properly mix and administer the various LAI products. The kits and devices were provided by the pharmaceutical companies that had available training products. At the end of the training, attendees were given an anonymous feedback questionnaire and a posttest that consisted of the same 7 questions that were in the pretest. Staff were able to keep a summary table of the psychiatric LAI medications and a copy of the presentation slides for their reference.

TABLE 3: Feedback questionnaire analysis

Question	Answer Options			
Please rate your satisfaction with this training.	Very dissatisfied	Somewhat dissatisfied	Somewhat satisfied	Very satisfied
n (%)	2 (5)	0 (0)	0 (0)	41 (95)
Will you use the information presented today in your work?	Definitely not	Not really	Somewhat	Definitely
n (%)	0 (0)	2 (5)	3 (7)	38 (88)
Please rate your confidence level of today's topic before the training.	Very little	Some	Moderate amount	A lot
n (%)	1 (2)	3 (8)	26 (65)	10 (25)
Please rate your confidence level on today's topic after the training.	Very little	Some	Moderate amount	A lot
n (%)	0 (0)	0 (0)	3 (7)	37 (93)

Finally, the assessment was sent to participants 4 to 6 weeks following the completion of the training.

The feedback questionnaire asked questions to determine the perceived benefit of the training. The first question stated, *Please rate your satisfaction with this training*. Answers included *very dissatisfied*, *somewhat dissatisfied*, *somewhat satisfied*, and *very satisfied*. The second question asked, *Will you use the information presented today in your work?* The possible responses included *definitely not*, *not really*, *somewhat*, and *definitely*. The third question asked, *Please rate your confidence level on today's topic before the training* and then *Please rate your knowledge and confidence on today's topic after the training*. Answer options included *very little*, *some*, *a moderate amount*, and *a lot*.

The primary end point of this study was to evaluate the changes in scores between the pretest, the posttest, and then the test given 4 to 6 weeks after the completion of the training. Secondary end points included evaluating subjective measures through the feedback questionnaire provided at the end of the training.

Results

A total of 43 staff members completed the training. Thirty-five of the participants were nursing staff, and 8 were medical assistants. The aggregate score of all completed pretests was 188/280 (67%) with a median score of 4/7 (57%). The aggregate score of all completed posttests was 286/294 (97%) with a median score of 7/7 (100%). The aggregate scores of the test given 4 to 6 weeks after the completion of the training was 142/147 (97%) with a median score of 7/7 (100%). The questions were the same on each test to show the learners what to focus on during the presentation, and the 30% improvement in scores provides an objective measure of the increase in knowledge provided by the training.

The feedback questionnaire (Table 3) was analyzed to determine how beneficial the participants found the training. Ninety-five percent of participants were *very satisfied* with the training. Two participants selected *very dissatisfied*, but their comments were all positive, and they may have selected the incorrect option on the questionnaire. This shows that the majority of participants were very satisfied with the training.

The second measure from the feedback questionnaire aimed to determine how useful this training was to nursing staff and medical assistants. This is particularly important because the staff work in a multitude of different practice sites. Some sites may administer many LAI medications, and other sites may not. Eighty-eight percent of participants answered that they would *definitely* use the information presented in their work. Seven percent of participants would *somewhat* use the information, and 5% of participants would *not really* use the information in their work.

The final measures of the feedback questionnaire analyzed the participants' confidence on the topic before and after the training. Sixty-five percent of participants had a *moderate* amount of confidence before the training, and 25% had *a lot* of confidence on the subject. Eight percent of participants had *some* confidence, and 2% of participants had *very little* confidence. After the training, no participants rated that they had *some* or *very little* confidence. Seven percent had a *moderate amount* of confidence, and 93% had *a lot* of confidence.

Discussion

A pharmacist-led LAI medication training program is a way to improve objective knowledge and confidence in regards to proper medication use. The complexities of LAI medications pose risks for patients, and decreasing medication errors is paramount. A review by the

Australian Commission on Safety and Quality in Health Care states that improving the technique of intramuscular antipsychotic injections is a strategy to improve medication safety in mental health.[13] Growing trends of obesity can contribute to improper administration of LAI antipsychotics into the fat rather than the muscle, and proper needle length selection was addressed in the training. There are considerable gaps in our understanding of the extent of medication errors in mental health. The lack of a standard for ordering and administering LAI antipsychotics has been identified as a risk factor for errors, but no studies were found that assessed how to improve the administration of these medications.[14]

Nurses face difficulties in administering psychiatric LAI medications in regards to safety, feeling uncomfortable, and difficulty maintaining the therapeutic relationship.[15] A few studies[16-18] examine providers' perception of psychiatric LAI medications. These trials report nurses perceived 54% of patients with schizophrenia to be nonadherent to treatment,[16] 23% of nurses felt they did not have sufficient time for training,[17] and overall, professional groups perceived LAI antipsychotics as a requirement to treat those with serious mental illness who are not adherent.[18] There is little information on addressing these concerns until the present study.

The training utilized a multitude of teaching methods to best reach individuals with different learning preferences. The oral presentation, written materials, and demonstration kits were used to target auditory, visual, and kinesthetic learning styles, respectively.

A strength of the study was that we were able to collect many measurements to determine the impact of the training course. The pretest and posttest were able to highlight objective questions that could benefit staff in providing proper administration and education to patients. The 67% pretest average score shows the importance of such a training, and the 30% increase in test scores that was retained for 6 weeks shows retention of knowledge. The feedback questionnaire was able to highlight subjective improvements. For example, the increased confidence level of staff, noted by a 68% increase in participants who had *a lot* of confidence, has the potential to lead to a decrease in administration errors.

There are a few limitations to this study that could have impacted the results. One limitation is that the test and feedback questionnaire are not validated scales, and therefore, the true implications cannot be determined. Additionally, 3 pretest and 1 posttest were not turned in, and some feedback questionnaires had unanswered questions. Twenty-one participants completed the test again 4 to 6 weeks later, and the aggregate score was 142/147 (97%) with a median score of 7/7 (100%). The score could be skewed by the possibility that only confident trainees completed the final assessment. The practice site of staff could also determine baseline knowledge as some facilities utilize LAIs more than other facilities. Nurses and medical assistants who are more familiar with administering these medications would have an advantage on the assessment.

Future plans are to train all newly hired nurses and medical assistants in the live, pharmacist-led class followed by an annual computer-based learning module. Future research could strengthen the implications of these results by monitoring knowledge retention for longer than 6 weeks and by monitoring for LAI medication errors pretraining and posttraining.

This study provides information on the benefit of a pharmacist-led LAI training within the study institution. Participants had objective and subjective improvements as a direct result of the training.

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