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EDUCATIONAL OBJECTIVES

GOAL: To educate clinicians regarding the utilization of long-acting injectable medications for the treatment of schizophrenia

After participating in this activity, pharmacists will be able to:

- > Discuss schizophrenia's unique presentation and propensity to cause internal conflict and subjective distress, which often leads to nonadherence
- > Identify situations in which oral, long-acting injectable (LAI) antipsychotics, or a combination of both are ideally employed
- > Compare available LAI antipsychotic agents' indications, risks, and benefits, pharmacokinetic profiles, dosing, and administration techniques in the pharmacy
- > Discuss emerging opportunities for pharmacists to get involved in monitoring and administering LAI antipsychotic medication

After participating in this activity, pharmacy technicians will be able to:

- > Discuss the association between schizophrenia diagnosis and adherence to therapy
- > List LAI drugs used in schizophrenia, and address inventory management issues
- > Recognize when to refer patients to the pharmacist for help with their schizophrenia



The University of Connecticut School of Pharmacy is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing pharmacy education.

Pharmacists and pharmacy technicians are eligible to participate in the knowledge-based activity, and will receive up to 0.2 CEUs (2 contact hours) for completing the activity, passing the quiz with a grade of 70% or better, and completing an online evaluation. Statements of credit are available via the CPE Monitor online system and your participation will be recorded with CPE Monitor within 72 hours of submission.

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Addressing unique medication adherence issues for patients with schizophrenia

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Abstract

Schizophrenia is a chronic, serious mental illness in which medication nonadherence is extremely problematic. Given the numerous risk factors and poor outcomes associated with nonadherence, pharmacists can play a unique role in the education of patients and increase in utilization of long-acting injectable antipsychotics. Pharmacists can help the patient and provider determine the best medication choice for a patient based on many factors, including cost, adverse effects, drug-drug interaction, efficacy, convenience, and dosing strategies. In many states, pharmacists can also administer the injection to patients in their pharmacies.

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Introduction

Schizophrenia, a chronic serious mental illness, has a lifetime prevalence of 0.3% to 0.7%.¹ Given the prodromal phase of the illness characterized by negative and cognitive symptoms, the time to diagnosis can be long and early nonadherence to treatment can result in increased hospitalizations (all cause and schizophrenia related). The many unique challenges of living with schizophrenia can be magnified by the significant stigma associated with the illness, including stigma of taking medications, hospitalizations, and frequent medical appointments. Impairment in functioning and cognitive capacity cannot only impact patients but also their families and society.² Those diagnosed with schizophrenia face a number of challenges managing their lives and illness, including potential lack of insight into their illness and cognitive deficits that can interfere with treatment adherence. These types of challenges increase the risk of relapse, which can in turn result in significant personal and financial costs.

Antipsychotic medications have been able to demonstrate improvement in clinical outcomes in those with schizophrenia and reduce economic burden secondary to reduced relapse and hospitalization rates and fewer emergency room visits.³⁻⁵ Even though response to treatment is often favorable for a first episode of schizophrenia, a major challenge still exists in transforming poor adherence to consistent treatment. Medication nonadherence in these patients has been reported to range from 20% to 89%.⁶

Medication nonadherence can be extremely problematic in mental illness, particularly schizophrenia. Results from nonadherence can include: symptom exacerbation or relapse, greater risk or rates of psychiatric hospitalization and use of emergency psychiatric services, and worsening prognosis.⁶⁻⁸ Patients

experiencing their first episode of schizophrenia who are nonadherent to medications have readmission rates 5 times higher than adherent patients in the first year.^{6,9,10} Additionally, nonadherence in the first year of diagnosis leads to worse outcomes in the subsequent

Understanding a patient's perception of the medication can help determine the potential adherence a patient is likely to have.

Other risk factors for nonadherence include comorbid substance abuse, problems with continuity of care among

“LAIs are being advocated for early episodes of schizophrenia including even after the first hospitalization.”

2 years.^{10,11} These repeated episodes of psychosis and relapse can lead to the development of chronic psychosis, longer time to symptomatic improvement, increased functional impairment and disability, and possible resistance to antipsychotic medications.^{7,8,11} Other consequences to consider in a nonadherent patient include: comorbid substance abuse, poorer cognitive functioning, reduced quality of life, increased rates of arrest, violence/aggression, or victimization, and increased risks of suicide.^{7,8,12}

Numerous risk factors for nonadher-

mental health services (ie, being able to obtain medications that are prescribed), prior hospitalizations, living independently, and exhibiting a baseline level of hostility.¹³ Cultural influences and stigma can contribute to nonadherence. Tolerability and adverse effects of medications greatly contribute to a culture of nonadherence not only in schizophrenia but also in many behavioral health disorders. Pharmacists should ask at each interaction with patients how they are taking the medication and what effects they are having with it. Educating a patient on the major adverse

effects and engaging a patient in discussion about those can help patients understand what to expect from their medications.

A large amount of literature describes various tech-

niques to improve adherence to medications. Perceived effectiveness influences the continued use of medications, and appropriate medication use has been associated with a good or effective response. A patient's perception of the ability of an antipsychotic to “cure” their illness also increases adherence. More studies on behavioral interventions are needed, including motivational interviewing, to determine their full effect on improving adherence.

Long-acting injectable (LAI) antipsychotics have been studied many times over in patients who are nonadherent

PAUSE AND PONDER

What patient characteristics would describe those most likely to benefit from an LAI?

ence have been identified in the literature for those diagnosed with schizophrenia. Lack of insight or awareness of the disorder is a major risk factor of nonadherence.^{6-8,12} Delusions and hallucinations associated with the illness can contribute to medication and treatment nonadherence. Patients' perceptions and attitudes toward accepting the diagnosis and taking medication also heavily influence their ability to adhere to medications prescribed.^{7,8} Pharmacists can engage patients to determine their level of insight into the illness by asking why they are taking the medication or what the doctor told them it was for.

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TABLE 1

Long-Acting Antipsychotic Injectables: Indications, Dosage Forms, Pharmacokinetics

MEDICATION	FDA INDICATION(S)	DOSAGE FORM	INJECTION SITE	TMAX (DAYS)	T ½ (DAYS)
Fluphenazine	Schizophrenia	25 mg/mL (in sesame oil)	Deltoid or gluteal	2-4	14
Haloperidol	Schizophrenia	50 mg/mL (in sesame oil)	Deltoid or gluteal	6	21
Aripiprazole	Schizophrenia	300 mg, 400 mg kits	Deltoid or gluteal	5-7	30-47
Aripiprazole lauroxil	Schizophrenia	441 mg, 662 mg, 882 mg pre-filled syringe	Deltoid (441 dose only) or gluteal (all doses)	4 (with oral form)	29-35
Olanzapine	Schizophrenia	210 mg, 300 mg, 405 mg kits	Gluteal	7	30
Paliperidone (monthly)	Schizophrenia, schizoaffective disorder	39 mg, 78 mg, 117 mg, 156 mg, 234 mg kits	Deltoid (initial) Deltoid or gluteal (maintenance)	13	25-49
Paliperidone (every 3 months)	Schizophrenia (in patients adequately treated with monthly LAI paliperidone for ≥4 months)	273 mg, 410 mg, 546 mg, 819 mg kits	Deltoid or gluteal	30-33	84-95 (deltoid injections) 118-139 (gluteal injections)
Risperidone	Schizophrenia, bipolar I disorder (maintenance)	12.5 mg, 25 mg, 37.5 mg, 50 mg kits	Deltoid or gluteal	21 (main release begins)	3-6

Source: Refs 20-27

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to oral medications. It is known LAI antipsychotics are at least as effective as oral antipsychotics for treating schizophrenia.¹⁴ Additionally, a recent systematic review and meta-analysis demonstrated that second-generation LAIs were superior to first-generation LAIs for relapse prevention.¹⁵ More recently, LAIs have been studied in first-episode psychosis and for early initiation of treatment for schizophrenia.^{16,17} Anyone who is likely to be on long-term antipsychotic medication should be considered a candidate for an LAI. With the added benefit of addressing problems of daily adherence, LAIs are being advocated for early episodes of schizophrenia including even after the first hospitalization. Many benefits have been seen with this recommendation, including reduced rates of recurrence, rehos-

pitalization, and comorbidities and complications of untreated/undertreated illness.^{18,19}

LAIs are available for both typical and atypical (or second-generation) antipsychotics. All available LAIs are indicated for schizophrenia, with several of them having other unique indications (**Table 1**).²⁰⁻²⁷ Many differences exist between the products. They each differ in pharmacologic profile, which contributes to adverse effects; pharmacokinetic profile, which contributes to the need for oral overlap; frequency of dosing; and the ability to use a loading dose.

Many advantages exist for LAIs compared to oral antipsychotics including consistent drug delivery, adherence transparency, reduced risk of unintentional or deliberate overdose, predictable bioavailability, regular con-

tact between the patient and health-care team, less probability for rebound symptoms and rapidly occurring/abrupt relapses, convenience, and overcoming partial or overt nonadherence.²⁸ Health-care providers must weigh these risks with the potential disadvantages of using an LAI, including cost of the newer formulations, slow dose titration, longer time to reach steady state levels, less flexibility of dose adjustments, delayed disappearance of adverse effects, injection site reactions and pain, burden of potential travel to receive the injection, need for refrigeration, a patient's perception of stigma or coercion, and decreased medication options.²⁹

First-generation antipsychotics

The older, typical LAIs are less expensive but are often associated with more

FOR PATIENTS WITH SCHIZOPHRENIA

frequent adverse effects, including extrapyramidal symptoms, cognitive dulling, and neurologic complaints.^{30,31} Fluphenazine is characterized by large interpatient variability in its pharmacokinetic profile, which makes it challenging to determine the correct dose when

converting from an oral antipsychotic (Table 2).^{30,32} As well, both fluphenazine and haloperidol must be administered using a Z-track method to reduce drug leakage and tissue irritation. In addition to this potentially painful administration technique, the volume of the injection

is usually greater with the typical medications. Also, older formulations have risks of “lumps,” indurations, and abscesses with injections. The older formulations (eg, haloperidol, fluphenazine) are based in sesame oil, which is

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TABLE 2

Long-Acting Antipsychotic Injectables: Dosing Regimens

MEDICATION	INITIAL (MG)	AVERAGE (MG)	MAXIMUM (MG)	ORAL OVERLAP
Fluphenazine	12.5–25 (usually 1.25 X oral daily dose)	6.25–25/2 weeks	100	Unknown; significant effects on symptoms typically occur in 2–4 days
Haloperidol	10–20 X oral daily dose. If injection dose conversions >100 mg, second injection should be administered in 3–7 days.	10–15 X oral daily dose/month. If dose large (>200 mg IM) or above volume limit (3 mL) for single injection, may need series of injections during week.	450	Yes, steady state concentrations are not obtained until after 3rd or 4th dose
Aripiprazole	400 Dose adjustment needed for CYP2D6 poor metabolizers and patients on concomitant CYP2D6 inhibitors and/or CYP3A4 inhibitors	400/month Dose adjustment needed for CYP2D6 poor metabolizers and patients on concomitant CYP2D6 inhibitors and/or CYP3A4 inhibitors	400	In conjunction with 1st dose, take 14 consecutive days of concurrent oral aripiprazole (10–20 mg/day or current oral antipsychotic)
Aripiprazole lauroxil	ORAL DOSE: 10 mg/day = 441 mg/month ORAL DOSE: 15 mg/day = 662 mg/month ORAL DOSE: ≥20 mg/day = 882 mg/month Dose adjustment needed for CYP2D6 poor metabolizers and patients on concomitant CYP2D6 inhibitors and/or CYP3A4 inhibitors	441–882/month or 882/6 weeks Dose adjustment needed for CYP2D6 poor metabolizers and patients on concomitant CYP2D6 inhibitors and/or CYP3A4 inhibitors	882/month	In conjunction with 1st dose, take 21 consecutive days of concurrent oral aripiprazole
Olanzapine	ORAL DOSE: 10 mg/day = 210/2 weeks X 4 doses or 405/4 weeks X 2 doses ORAL DOSE: 15 mg/day = 300/2 weeks X 4 doses ORAL DOSE: 20 mg/day = 300/2 weeks X 4 weeks	ORAL DOSE: 10 mg/day = 150/2 weeks or 300/4 weeks ORAL DOSE: 15 mg/day = 210/2 weeks or 405/4 weeks ORAL DOSE: 20 mg/day: 300/2 weeks	300 (if every 2 weeks) or 405 if every 4 weeks	Not required
Paliperidone (monthly)	234 followed by 156 1 week later (+/- 4 days)	39–234/month (schizophrenia) 79–234/month (schizoaffective disorder) ORAL DOSE: 12 mg/day = 234/month ORAL DOSE: 6 mg/day = 117/month ORAL DOSE: 3 mg/day = 39–78/month	234	Not required Initial dosing regimen must be followed.
Paliperidone (every 3 months)	Depends on last dose of monthly paliperidone 78 mg/month = 273 mg/3 months 117 mg/month = 410 mg/3 months 156 mg/month = 546 mg/3 months 234 mg/month = 819 mg/3 months	273–819 mg/3 months	819	Not required
Risperidone	25 mg every 2 weeks	25–50 mg every 2 weeks	50 mg every 2 weeks	3 weeks of oral overlap required

Source: Refs 20,21,23–27

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associated with allergic reactions and can be painful when injected.²⁹ First-generation LAIs are used frequently given the low cost and availability of the medications.

The Z-track administration technique of the typical anti-psychotics requires some minor training and practice. Typically, intramuscular injections are injected directly into the muscle. During the Z-track procedure, however, the skin and tissue are pulled and held firmly while a long needle is inserted into the muscle. After the medication is injected, the skin and tissue are released. Typically when a needle is inserted into tissues, it leaves a very small hole, or track. Small amounts of the medication (typically oil-based products) can leak backward through this track and be absorbed into other tissues. Pulling the skin and tissue in the Z-track method causes the needle track to take the shape of the letter "Z." This

“Typical antipsychotic LAIs must be administered via a Z-track method.”

zigzag track line is what prevents medication from leaking from the muscle into surrounding tissues.

Second-generation LAIs

No current head-to-head studies exist comparing second-generation antipsychotics. Most studies report limited differences in efficacy among oral second-generation antipsychotics. Additionally, there is a paucity of data comparing oral second-generation antipsychotics in first-episode schizophrenia. The oral antipsychotics and LAIs have similar drug interactions and side-effect profiles. Selection should consider their specific characteristics.

Risperidone long-acting injection.

The first of the atypicals to be formulated in an LAI, risperidone long-acting injection is unlike previous typical LAIs, as it comes as a powder that must be

lution, risperidone. The tricky part is the dosing. This medication requires a loading dose strategy, which also eliminates need for an oral overlap. The first dose of the medication is given on day

1. The typical dose for day 1 is 234 mg. The second dose is given on day 8 (+/-4 days), typically 156 mg. The third dose is given on day 36 (+/- 7 days), typically 117 mg for schizophrenia, but can range from 78 mg to 234 mg for schizoaffective disorder.

PAUSE AND PONDER

How would you alter the treatment plan of a patient who missed their day 36 dose of paliperidone palmitate?

refrigerated. The medication should rest at room temperature for 30 minutes prior to injection.²² Just prior to injection, the clinician mixes the powder in the provided saline and shakes. This administration process can be more challenging and time consuming than previous LAI medications. Additionally, if the patient should decide not to receive the injection, the medication cannot be saved. Other disadvantages of the medication include its release mechanism. After the initial injection, only 1% of the medication is released. It is not until week 3 that the tiny microspheres release the medication slowly into the body. A minimum of a 3-week overlap is required with oral medications to prevent relapse. Advantages of the medication include its dissolution in saline and the injection is much less painful than typical antipsychotic LAIs. As well, dosing is rather uncomplicated with 2 mg to 4 mg daily of risperidone orally equaling the 25-mg every 2-week injection. See **Table 2** for complete dosing recommendations for LAIs. See **Table 3** for common adverse reactions for the atypical antipsychotics.

Paliperidone palmitate 1-month extended-release injectable suspension. The active metabolite of risperidone, 9-hydroxyrisperidone, composes the paliperidone palmitate injection. This medication comes in a pre-filled syringe, making administration much easier than its previous formu-

lation, doses occur monthly. The package insert also provides detailed instructions on how to make up missed injections at every time point. Other advantages of paliperidone palmitate include less drug-drug interactions and potential better safety compared to other LAIs in liver impairment.²³

Paliperidone palmitate 3-month extended-release injectable suspension. This formulation of paliperidone provides the longest interval of any approved long-acting injectable antipsychotic. It is approved for patients who have been taking the 1-month paliperidone palmitate injection for at least 4 months. Due to its low solubility in water, paliperidone palmitate dissolves slowly once injected before being hydrolyzed as paliperidone and absorbed in the bloodstream. From the time of release on day 1, it remains active for as long as 18 months. The medication carries the same risks and adverse effects as paliperidone monthly, but offers the advantage of 4-times-a-year injection.²⁴

Olanzapine extended-release injectable suspension. This medication is supplied as a pre-filled syringe, which makes administration easier, but it has potentially serious adverse effects if the medication is not administered properly. Post-injection delirium/sedation syndrome occurred in 30 reported cases during clinical trials with the med-

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ication due to intravascular injection of a portion of the medication, which clinically presents like an olanzapine overdose. The side effect, although rare (0.07% of injections) can be life threatening. It can occur immediately or up to 300 minutes after injection. When preparing the injection, specific instructions are provided for administration. After mixing the injection and preparing the site for injection, the needle should be inserted into the gluteal muscle only. After insertion, aspiration for several seconds should be completed to ensure that no blood appears. If blood appears in the syringe, the syringe and dose should be discarded and a new kit used. This can be costly if another kit must be used. The injection should be given with steady, continuous pressure. Additionally, the injection site should not be massaged. For this reason, the patient must be observed for at least 3 hours post injection by a healthcare professional. Additionally, to prescribe this medication, the clinician must be registered with Eli Lilly's Patient Care Program. Note that not only does the clinician have to register but also the healthcare facility and pharmacy provider must register to dispense the product.²¹

Aripiprazole extended-release injectable suspension. One of the new atypical LAIs, this medication is available as a lyophilized powder, which needs to be reconstituted with sterile water. Again, this can make administration more challenging, but the medica-

sia), which are common. Additionally, the medication has had drug–drug interactions with CYP2D6 and 3A4 inhibitors and 3A4 inducers. Patients who are CYP2D6 poor metabolizers may also require dosage adjustments (50% dose decrease), which can be difficult with an LAI. The medication also requires a

a 3-week oral overlap. At its highest dose of 882 mg, this medication can be administered every 6 weeks. Other advantages include pre-filled syringes and availability of the medication in 3 strengths, which can provide ease when dosing the medication. The formulation carries the same adverse effects

TABLE 3
Comparison of Adverse Effects with Second-Generation Antipsychotics

	ARIPIPRAZOLE	OLANZAPINE	PALIPERIDONE	RISPERIDONE
Weight gain	Low	High	Moderate	Moderate
Dyslipidemia	Low	High	Moderate	Moderate
QTc prolongation	Yes	Yes	Yes	Yes
CYP3A4 metabolism	Yes	No	No	Yes
Sedation	Low	High	Low	Low
Extrapyramidal symptoms	Low	Low	Moderate	Moderate
Akathisia	Moderate	Low-Moderate	Low	Low
Hyperprolactinemia	Low	Low-Moderate	High	High

Source: Refs 20–25

2-week oral overlap, as the maximum plasma concentration is obtained on days 5 to 7.²⁰

Aripiprazole lauroxil extended-release injectable suspension. This LAI contains the same active ingredient as the previous drug, but the aripip-

and drug interactions as does the previous product.²⁵

Recommending LAIs and the pharmacist's role

Even with the many treatment barriers that can exist when considering LAIs, healthcare professionals should not always assume patients will reject LAIs and will want an oral medication. Clinicians should discuss LAI antipsychotic treatment options with all patients and should not wait until patients are in crisis. Making patients aware of misconceptions about LAI antipsychotics can help increase adherence. Pharmacists should emphasize the benefits of treatment rather than the injection itself. Providers should use success stories of other patients and recommend LAI anti-

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“As front-line educators, pharmacists can reduce the stigma of injections, improve patients' attitudes toward medication, and increase adherence.”

tion offers the advantage of less weight gain compared to other atypical LAIs, less hyperprolactinemia, and no QTc prolongation. Disadvantages include adverse motor effects (tremor, akathi-

razole lauroxil particles dissolve slowly and undergo hydrolysis resulting in extended systemic availability of aripiprazole. Due to this extended release, this particular formulation requires

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psychotics with confidence. Patients should be offered these medications at their first break to help prevent unnecessary relapses and hospitalizations.

Those administering the vaccine should employ good injection practices utilizing the correct injection site (deltoid versus gluteal), rotating injection sites, using proper injection technique, and addressing any injection site discomfort.

Pharmacists can expect to encounter a lot of barriers related to LAIs, including access to care. Many patients are simply unaware that these medications exist or have little knowledge about the use of these types of formulations for long-term treatment of their illness. Patients have seen LAIs as more coercive than other treatments and may prefer to have an oral formulation instead.^{33,34} Additionally, the cost and inconvenience of receiving the injection can also be barriers to their increased use.³⁵

Pharmacists can increase utilization of LAIs in many ways. As front-line educators, pharmacists can reduce the stigma of injections, improve patients' attitudes toward medication, and increase adherence. Asking how a patient is taking their medication, how many doses in the last week they have missed, and how they feel on the medication can help address adherence issues. Describing the many symptoms of schizophrenia and discussing how the medication can help to address them can help create a therapeutic alliance with a patient. This alliance can help with medication adherence as well. Additionally, pharmacists can help navigate many of the insurance programs to help patients determine their coverage and copayment for injections. Pharmacists can also serve as the communication bridge between the patient and psychiatrist to discuss utilization of an LAI for appropriate patients. As well, pharmacists may be able to recognize inad-

equately adhere by late refills and follow up with patients and providers.

Pharmacists can also assist in the underutilization of LAIs because of the limited availability of experienced personnel to administer the injection at psychiatric office practices and community mental health centers.³⁶ With pharmacists' expanding role in the adminis-

tration will help increase the utilization of the medication. Many of the pharmaceutical companies that manufacture the medications are happy to provide training materials on the injections.

Pharmacists should strive to practice to the highest level of their license and training by staying well-informed about the levels of service allowed by their state within a collaborative practice agreement. Additionally, pharmacists should become fully familiar with the key regulatory and liability

PAUSE AND PONDER

How would you implement an LAI clinic into your practice setting?

tration of immunizations, several states and collaborative practice agreements now permit pharmacists to administer nonvaccine injections. Currently, pharmacists in Texas, Washington, Maryland, and Washington, DC, are able to administer LAIs. The programs in Washington and Texas are specifically in community pharmacies.³⁷ A small pharmacist-run injection clinic demonstrated financial benefit, saving the institution over \$6000 in total unreimbursed inpatient charges and close to \$3000 in acquisition costs for the purchase of LAIs over the course of a year.³⁸

Many models exist across the country on which pharmacists can base these innovative, community-based programs with expanded pharmacist injectable administration privileges. Not only do the clinics provide the injections but they also provide pharmacist-based medication management services associated with their administration, including adherence and adverse-effect monitoring. Pharmacists should inquire about the laws and regulations in their particular state to determine the feasibility of creating an injectable clinic. Determining the need in the area by partnering with behavioral health clinics and psychiatrists can be valuable as well. Educating the pharmacy staff on the uses of LAIs and how to engage patients in discussions about these for-

ity concerns associated with the injection process (eg, sharps disposal, liability insurance coverage, and state Board of Pharmacy regulations).

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FOR PATIENTS WITH SCHIZOPHRENIA

FOR PHARMACISTS

- Which of the following can result from medication nonadherence in patients with schizophrenia?
 - Better prognosis
 - Decreased hospitalizations
 - Symptom exacerbation
 - Decreased use of emergency services
- Which of the following is likely to occur after repeated episodes of psychosis and relapse?
 - Shorter time to symptomatic improvement
 - Development of chronic psychosis
 - Increased risk of adverse effects
 - Decreased functional impairment
- Which of the following is a potential consequence for patients with schizophrenia who are nonadherent to their medications?
 - Increased cognitive function
 - Increase in quality of life
 - Decreased risk of suicide
 - Increased rates of arrest
- Which of the following medications is approved for the treatment of schizoaffective disorder?
 - Paliperidone palmitate 1-month extended-release injectable suspension
 - Risperidone long-acting injection
 - Aripiprazole lauroxil
 - Aripiprazole extended-release injectable suspension
- Which of the following is a potential disadvantage to the use of long-acting injectable medications?
 - Slow dose titration
 - Increase in adverse effects
 - Increase in frequency of clinic visits
 - Lack of benefit in first episodes
- Which of the following adverse effects is more likely to occur with a first-generation decanoate versus a second generation?
 - Extrapyramidal symptoms
 - Hyperlipidemia
 - Increased weight
 - Hyperglycemia

FOR PHARMACY TECHNICIANS

- Which of the following can result from medication nonadherence in patients with schizophrenia?
 - Better prognosis
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- Which of the following is a potential disadvantage to the use of long-acting injectable medications?
 - Slow dose titration
 - Increase in adverse effects
 - Increase in frequency of clinic visits
 - Lack of benefit in first episodes
- Fluphenazine injections should be given by which of the following procedures?
 - Z-track
 - Subcutaneously
 - Intramuscular
 - Intradermal
- How many days on either side of the day 8 injection of 1-month paliperidone palmitate extended-release injectable suspension can a patient

TEST QUESTIONS

- Fluphenazine injections should be given by which of the following procedures?
 - Z-track
 - Subcutaneously
 - Intramuscular
 - Intradermal
- A pharmacist should recommend oral overlap with risperidone long-acting injection for a minimum of how many days?
 - 7
 - 14
 - 21
 - 28
- Which of the following is required for risperidone long-acting injection?
 - Verification of sesame allergy
 - Z-track administration
 - Loading dose procedures
 - Refrigeration of the product
- A patient is taking 3 mg of risperidone orally daily and is being converted to risperidone long-acting injection. What would be the best dose to provide the patient every 2 weeks?
 - 12.5 mg
 - 25 mg
 - 37.5 mg
 - 50 mg
- Which of the following is required for use of 1-month paliperidone palmitate extended-release injectable suspension?
 - Oral overlap
 - Z-track administration
 - Loading dose strategy
 - Refrigeration
- How many days on either side of day 8 injection of 1-month paliperidone palmitate extended-release injectable suspension can a patient receive their day 8 injection?
 - 1
 - 4
 - 7
 - 10
- How many months should a patient be stabilized on 1-month paliperidone palmitate extended-release injectable suspension prior to conversion to 3-month paliperidone palmitate extended-release injectable suspension?
 - 1
 - 4
 - 7
 - 10
- Which of the following is a major limitation to the use of olanzapine extended-release injectable suspension?
 - Post injection delirium/sedation
 - Oral overlap
 - Z-track administration
 - Reconstitution of the product
- Which of the following LAIs has the highest risk of sedation?
 - Olanzapine
 - Risperidone
 - Paliperidone
 - Aripiprazole
- Which of the following medications is approved for the treatment of schizoaffective disorder?
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 - Aripiprazole lauroxil
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- Reconstitution of the product

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