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Education to Improve Long-Acting Injectable Antipsychotic Use

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Abstract

Purpose: Long-acting injectable (LAI) antipsychotics are underutilized as an evidence-based treatment for schizophrenia and schizoaffective disorder. The purpose of this quality improvement project was to determine if a web-based LAI education module changed advance practice prescribers' knowledge, attitudes, and practice behaviors regarding LAI antipsychotics one month after receiving LAI education at a community-based mental health organization.

Methods: This QI project was an observational pre- post-educational design. The 20-item Knowledge, Attitudes, and Practices (KAP) questionnaire was used to assess advanced practice providers' knowledge retention, attitude changes, and practice modifications regarding LAI antipsychotics and prospective patient chart reviews were performed.

Results: Participants (N = 17) included 14 nurse practitioners, two physician assistants, and one psychiatrist. Friedman tests and pairwise comparisons determined practices subsection KAP scores were statistically significantly different between pre- and posttest scores (p = .021). Total KAP, knowledge and attitudes subsection scores were determined by Friedman tests to be statistically insignificant (p > .05). An exact sign test and descriptive statistics determined there was an increase in LAIs prescribed in eight participants post-education, whereas six participants decreased LAIs prescribed post-education and three participants saw no improvement. There was no statistically significant median increase in LAIs prescribed (*Mdn* = 0.00) from pre-education (*Mdn* = 18.00) to post-education (*Mdn* = 19.00, p = .791).

Implications for Practice: LAI education can increase LAI use and additional

organizations may benefit by utilizing the LAI educational module as a viable resource if

their LAI use is closer to the national average where improvements can best be measured.

Education to Improve Long-Acting Injectable Antipsychotic Use

Schizophrenia is a chronic mental disorder characterized by deterioration in cognitive and psychosocial functioning with recurrent psychotic episodes in which the afflicted individual's ability to interpret reality is impaired (Huang et al., 2018; Pilon et al., 2017). Closely related to schizophrenia is schizoaffective disorder (SAD), characterized by concurrent symptoms of a major mood disorder and symptoms of schizophrenia (Hartman et al., 2019). Together, schizophrenia and SAD affect roughly 1.4% of the United States (U.S.) population (Gatov et al., 2017; Hartman et al., 2019; Huang et al., 2018; Pilon et al., 2017). In 2013, schizophrenia was estimated to cost the U.S. healthcare system approximately $156 billion due to recurrent hospital admissions, complex pharmacotherapy needs, and numerous indirect costs (Huang et al., 2018).

Antipsychotic medications are recommended as first-line treatment for managing symptoms of schizophrenia and SAD (Pilon et al., 2017). Most patients with schizophrenia or SAD, however, routinely relapse, the main driver of disease progression and excessive healthcare costs. Addressing modifiable risk factors such as non-adherence to medications can help prevent relapse (The National Council for Behavioral Health [NCBH], 2019). Reported non-adherence estimations range from 25%-50% and over half of all hospitalizations due to schizophrenia can be credited to medication non-adherence (Mohr et al., 2017; Pilon et al., 2017).

Long-term and continuous treatment is the most effective method for managing schizophrenia and SAD (Lin et al., 2013; Lindenmayer et al., 2020; Weiden et al., 2017). Most patients are prescribed oral antipsychotics that often require multiple daily administrations, which can lead to missed doses and poor adherence (Barbui et al., 2020;

Huang et al., 2018). A major advantage of long-acting injectable (LAI) antipsychotics is a significant decrease in dosing compared to oral formulations (Lindenmayer et al., 2020). Despite the superiority of LAI antipsychotics over oral formulations, only 13-30% of patients with schizophrenia are administered LAI antipsychotics (Kane et al., 2019; Lindenmayer et al., 2020).

Gaps in the literature persist regarding LAIs in the treatment of schizophrenia and SAD. More research is needed to develop methods that support providers in overcoming barriers concerning first-episode and early-phase schizophrenia or SAD treatment with LAIs (Cahling et al., 2017). To validate the superiority of LAI antipsychotics over oral antipsychotics, larger randomized control trials (RCTs) are needed since previous studies have predominantly been smaller RCTs (Kane et al., 2020). Currently, there are few thoroughly evaluated LAI educational interventions designed to specifically improve clinician behaviors, attitudes, and knowledge; therefore, more LAI educational interventions should be developed and evaluated (Correll et al., 2016).

LAI antipsychotics are underutilized as an evidence-based treatment for schizophrenia and SAD. In one study, the percentage of patients with schizophrenia or SAD treated with LAI antipsychotics was 40% at a community-based mental health organization (B. Thatcher, personal communication, August 17, 2021). The purpose of this quality improvement (QI) project is to improve advanced practice providers' knowledge, attitudes, and prescribing behaviors regarding LAI antipsychotics at a community-based mental health organization.

The Iowa Model-Revised was selected as the framework to guide the current QI project as this model is a widely used, application-focused guide devised to support

clinicians in applying evidence-based practice in the clinical setting with the goal of improving healthcare outcomes (Buckwalter et al., 2017). The model was designed for the development of a pilot project for testing before applying an intervention more broadly (Buckwalter et al., 2017; Green, 2020). In addition, the Iowa Model-Revised has several feedback loops that permit repeated adjustments to gain further improvements to the project (Buckwalter et al., 2017).

The aim of this project is to determine if a web-based education module improves advance practice providers' knowledge, attitudes, and practice behaviors regarding LAI antipsychotics one month after receiving the LAI education module at a community-based mental health organization. The primary outcome measures for this project are pre-, posttest, and one-month posttest questionnaire total and subsection scores and the number of times a provider prescribes a LAI to a patient with a diagnosis of schizophrenia or SAD. The study questions for this QI project include: In advanced practice providers working at a community-based mental health organization,

1. What was the change (if any) in the knowledge and attitudes of providers regarding LAI prescribing immediately after the education module and at one-month following the education module?

2. **What** was the change (if any) in the LAI prescribing behaviors of providers over the course of one month after the education module is completed?

Review of Literature

A literature search was conducted using the search engines PubMed, CINAHL, and APA PsychInfo. Key search terms and phrases included *long-acting injectable*

antipsychotic, *prescribed* OR *prescription*, *intervention* OR *best practice*, *schizophrenia*

OR *schizophrenic disorder* OR *schizoaffective disorder*. The initial number of

publications generated based on key terms and phrases was 109. Inclusion criteria

included schizophrenia or SAD diagnosis, adults (18 years and older), written in English,

published in an academic journal, and published between the years 2016 and 2021.

Exclusion criteria included participants aged 17 years old and younger, published prior to

2016, and not written in English. After refining the search, 58 articles resulted. The

ancestry method was utilized to gather an additional six articles due to the limited number

of relevant publications. Nineteen publications were retained for use in this literature

review.

LAI antipsychotics are an effective alternative approach to oral antipsychotic use

for the treatment of schizophrenia and SAD to improve patient adherence and reduce

relapse. The American Psychiatric Association (APA) practice guideline for the treatment

of schizophrenia recommends patients that prefer to be treated with an LAI and those

with prior adherence concerns should be given LAI antipsychotics (Keepers et al., 2020).

The National Council for Behavioral Health (NCBH, 2019) guideline and The French

Association for Biological Psychiatry and Neuropsychopharmacology (FABPN)

recommends any patient in need of maintenance antipsychotic treatment be offered LAI

antipsychotics (Llorca et al., 2013).

Overall, LAI antipsychotics have demonstrated to be as effective, if not better,

than oral antipsychotics. A meta-analysis by Kishimoto et al. (2017) determined LAIs

were better at decreasing the frequency of hospitalization compared to oral

antipsychotics. In mirror image and cohort studies, which have more realistic

applications, LAI antipsychotics were better than oral forms in reducing treatment discontinuation (Kishimoto et al., 2013; Kishimoto et al., 2017).

Generally, patients perceived LAI antipsychotic use positively and as a viable treatment option. In a survey of patients using LAI antipsychotics, 70% of patients felt clinical support had improved due to routine contact with their clinician compared to oral antipsychotic treatment (Caroli et al., 2011). Injections were preferred 47% of the time compared to oral versions which were preferred 43% of the time. Over 67% of patients felt better overall after receiving a LAI and over half viewed LAI use as being more effective than oral options.

Due to the long half-life of LAIs, the window of opportunity to prevent relapse and prevent rehospitalization is prolonged compared to oral medications. In a RCT by Kane et al. (2020), LAI usage in patients with early-phase schizophrenia significantly prolonged time to re-hospitalization due to relapse by 44% compared to standard treatment with oral antipsychotics. LAI antipsychotics have the potential to be an important risk mitigation strategy to delay time to relapse and rehospitalization after discontinuation. In addition, LAI antipsychotics administered by a healthcare provider offers clinicians the ability to track when a patient misses a dose, another relapse prevention strategy (Barbui et al., 2020).

Even with multiple guidelines and numerous studies describing the advantages of employing LAIs in the treatment of schizophrenia and SAD, barriers continue to limit broad LAI antipsychotic use. One meta-analysis described multiple barriers to LAI use which were grouped into clinician, patient, and systemic factors (Lindenmayer et al., 2020). Clinician factors included the perception that LAIs were coercive, clinician

apprehension regarding dose control, as well as clinician practice patterns (Lindenmayer et al., 2020). Patient factors included the view that LAIs were coercive and restricted autonomy, limited patient knowledge about LAIs, and patient fears regarding injection pain; however, studies exploring patient views on coercion were often associated with mandated treatment (Lindenmayer et al., 2020). Patients also had mixed views regarding restricted autonomy and fear of injections (Lindenmayer et al., 2020). Systemic barriers included reluctance of private insurance companies to cover second generation antipsychotic (SGA) LAIs due to higher medication prices associated with SGA-LAIs compared to orals, poor ancillary support, and conservative practice guidelines (Lindenmayer et al., 2020).

Clinicians primarily prescribe LAI antipsychotics for patients with repeated relapses and hospitalizations and hesitate to prescribe LAIs in the earlier stages of the disorder (Barbui et al., 2020; Kane et al., 2020). Barbui et al. (2020), determined the average length of time until a patient with schizophrenia was prescribed a LAI antipsychotic was twelve years and only 10% of patients were prescribed a LAI in the first year of illness. Clinicians also assume that patients are unlikely to accept routine injections over daily oral administrations (Barbui et al., 2020; Kane et al., 2019). In one opinion survey, clinicians overemphasized patient concerns when discussing switching to LAI antipsychotics with patients taking oral antipsychotics (Cahling et al. 2017). Clinicians assumed patients would be concerned about pain from injections, increased stigmatization, and decreased autonomy; however, the only concern patients voiced was post-injection wait times for olanzapine pamoate (Cahling et al. 2017).

According to Lindenmayer et al. (2020), clinicians assumed LAI antipsychotics were more expensive compared to oral formulations. Lin et al. (2013) determined that patients with schizophrenia started on LAI antipsychotics acquired less overall healthcare costs compared to patients on oral versions. LAI drug costs were higher but offset by a significant reduction in rehospitalization costs and expenses experienced during outpatient care over more than a year of continuous treatment (Lin et al., 2013). Pilon et al. (2017) also found long-term use of LAI antipsychotics lowered overall healthcare costs. (Cahling et al. 2017; Lindenmayer et al., 2020).

One barrier highlighted by Lindenmayer et al. (2020) was clinician concerns that LAIs carry higher risk for treatment complications since the medication cannot be quickly stopped if an adverse reaction occurs. A RCT meta-analysis by Misawa et al. (2016) found no significant difference in most adverse effects between LAIs and oral antipsychotics. Akinesia, anxiety, and higher-LDL cholesterol were the only three adverse effects that occurred more often with LAIs than with oral antipsychotics (Misawa et al., 2016). A review by Rauch and Fleischhacker (2013) found SGA-LAIs are similar to or cause fewer side effects than oral formulations, except for olanzapine pamoate, which may cause delirium after injection.

Robinson et al. (2020) determined clinicians viewed LAIs as a difficult subject to discuss or lacked the skills or time to effectively communicate the benefits of LAI antipsychotics in the treatment of schizophrenia. Strikingly, one survey found that 79% of patients reported their psychiatrist had never informed them about LAI antipsychotics as a pharmacological option, most likely attributed to reduced clinician willingness to discuss the topic, lack of time, or ineffective communication skills (Kane et al., 2019).

Clinicians benefit from discussing LAI antipsychotics as a viable option at the onset of schizophrenia. According to Kane et al. (2014), encouraging LAI use at the start of treatment supported the therapeutic relationship, ensured transparency, and prevented confusion or a negative patient response if the LAI discussion was presented further along in the treatment process.

Importantly, how the clinician delivers LAI antipsychotic education has a profound impact on patient acceptance. In a study by Weiden et al. (2015), if psychiatrists communicated LAI antipsychotic education to patients using negative or neutral language, only 33% agreed to treatment. When the same patient sample was presented equivalent information later in a positive manner, 96% agreed to treatment. Challenging how clinicians communicate is essential to increasing the frequency of LAI antipsychotic use. Lindenmayer et al. (2020) also suggested presenting every patient, including those with first episode psychosis, LAI education in a positive manner at the start of the disorder to reduce patient association with clinical coercion and stigma associated with worsening illness. LAI antipsychotic education should include risks and benefits verse oral antipsychotics and should be a collaborative process between the clinician, patient, and families (Lindenmayer et al., 2020).

A QI project by Lewis (2020), found a web-based educational toolkit slightly improved the knowledge, attitudes, and practices of psychiatric prescribers regarding LAI antipsychotics. The QI project also revealed a relationship between a positive change in attitudes and psychiatric prescriber practices. Study results were limited due to the lack of a comparison group, a small sample size, and the study was not peer-reviewed.

To assess the effectiveness of the web-based educational toolkit, Lewis (2020) created a 20-item Knowledge, Attitudes, and Practices (KAP) questionnaire which contained three subsections. The first subsection included seven questions that assessed providers' knowledge, the second subsection included seven questions that assessed providers' attitudes, and the third subscale included six questions that assessed providers' behaviors regarding LAI antipsychotics. The KAP questionnaire was determined to be reliable with a good intraclass correlation coefficient ($ICC = .816$) and content validity was verified by experts including a board-certified psychiatrist and a board-certified psychiatric mental health nurse practitioner.

In summary, LAI antipsychotics are an effective alternative approach to oral antipsychotics for the treatment of schizophrenia to improve adherence and reduce relapse. LAI antipsychotic use, however, has been limited in clinical practice due to various clinician, patient, and systemic barriers (Lindenmayer et al., 2020). Web-based educational programs are an effective method to overcome clinician barriers when attempting to influence clinician behavioral change (Kane et al., 2019; Lewis, 2020). There are gaps in the literature including limited research concerning LAI antipsychotics for early-phase schizophrenia or SAD, superiority of LAIs over oral formulations in specific capacities, research with newer LAI antipsychotics, and effective education interventions to improve LAI prescribing behaviors (Cahling et al., 2017; Kane et al., 2020; Stone et al., 2018).

Methods

Design

  This QI project was an observational descriptive pre-post-educational design. For this quality improvement project, a web-based LAI education module was developed including a PowerPoint presentation discussing LAI antipsychotics with additional resources and handouts centered on evidence-based practices. To assess the effectiveness of the education, the 20-item KAP questionnaire was conducted to assess advanced practice providers' knowledge retention, attitude changes, and practice modifications regarding LAI antipsychotics and prospective patient chart reviews were performed.

Setting

  The setting for this QI project was a large, non-profit community-based mental health organization in the Intermountain West region. This organization served approximately 20,000 patients and employed over 800 employees. The practice setting had over 400 local mental health providers that deliver care to a population of 1.16 million.

Sample

  This project used a convenience sample of 17 advanced practice providers, which included a Psychiatrist, Nurse Practitioners, and Physician Assistants all employed at the practice setting. Inclusion criteria included advanced practice providers that were board certified. Exclusion criteria included advanced practice providers that switched roles during the project timeframe and new hires.

Data Collection/Analysis

Chart review and education data was de-identified and a unique participant code that consisted of a unique four-digit code was utilized. Participant names were entered onto a password protected word document with associated unique participant codes on a locked participating organization's computer that the primary investigator (PI) possessed. Additional participant data remained on the secured and encrypted online learning system, Talent LMS, to which only the PI had access and electronic health records (EHR) to which the PI had no access. EHR data was provided by the Chief Medical Officer. Participant codes and data was stored on a password protected Excel sheet on the PI's locked personal computer.

Data was gathered using the 20-item KAP questionnaire, administered before, immediately after, and again one-month after participants viewed the web-based LAI education module. SPSS Statistics was used to analyze data and descriptive statistics were used to analyze each subsection and total scores between the pre-, post-test, and one-month posttest KAP questionnaires. To assess if prescribing behaviors improved and if those improvements were maintained, a prospective chart review of prescribing behaviors one month after the education module was compared to a prospective chart review one month prior to the education module. Prescribing behaviors documented in the patient chart was measured by the number of times the provider prescribed a LAI to a patient with a diagnosis of schizophrenia or SAD. Freidman tests were used to analyze total KAP and subsection scores before, after, and one-month after the education module. Descriptive statistics and a sign test were used to analyze the prospective chart reviews using SPSS Statistics.

Approval Processes

The project protocol was assessed and determined to be a quality improvement project with minimal risk to human subjects. This project was approved by the Chief Medical Officer of the participating organization on November 11, 2021, the three-member Advisory Committee on November 13, 2021, and the University of Missouri - St. Louis IRB on February 18, 2022.

Procedure

Various stakeholders were met with several times during project development. The pre-, post-test, and one-month post-test questionaries, and web-based education module were uploaded to Talent LMS prior to the start date. Advanced practice prescribers were notified two weeks prior to the education module start date about basic information regarding preparation for and encouragement to participate in the project via Slack, the organization's main communication platform. At the start date, prescribers were sent a web-link to Talent LMS via Slack. Prescribers had two weeks to create an account and complete the module between March 2, 2022 and March 16, 2022.

Participants completed the pretest questionnaire, followed by the web-based education module. Then, participants completed the post-test questionnaire immediately after the education module and again one month later via Talent LMS. Within the education module, participants were instructed to document in the patient chart if the provider prescribed a LAI to a patient with schizophrenia or SAD.

Results

A total of 22 provider participants volunteered for the study, of which five were excluded from the data analysis. Four participants identified their credentials as registered

nurses or nurse assistances and not advanced practice providers. Another participant was

excluded because they changed positions within the organization during the

implementation phase of the project. The final analysis included 17 participants. Nurse

practitioners comprised 82% of the sample (*n* = 14), physician assistants made up 12% (*n*

= 2), and physicians made up 6% (*n* = 1) (see Appendix A).

In total, 420 LAIs were prescribed before the education module and 425 LAIs

were prescribed one month after the education module was completed, an increase of five

LAIs prescribed. An exact sign test was conducted to determine if there was an effect of

the LAI education module on LAIs prescribed. Of the 17 participants who participated,

the LAI education module elicited an increase in LAIs prescribed in eight participants

post-education, whereas six participants decreased LAIs prescribed post-education and

three participants saw no improvement (see Appendix B). There was no statistically

significant median increase in LAIs prescribed (*Mdn* = 0.00) from pre-education (*Mdn* =

18.00) to post-education (*Mdn* = 19.00, *p* = .791).

Friedman tests were conducted to determine if there were differences in total KAP

and subsection scores before, immediately after and one-month after the LAI education

module (see Appendix C). Practices subsection KAP scores increased between pre- (*Mdn*

= 5.00), post- (*Mdn* = 6.00), and one-month post-education module (*Mdn* = 6.00), and the

differences were statistically significant, $\chi2(2) = 11.455$, *p* = .003. Pairwise comparisons

were performed and LAIs prescribed was determined to be statistically significantly

different between the pre- and post-education module (*p* = .021). Differences in total

KAP scores and other subsection scores were determined not to be statistically

significant.

Discussion

This quality improvement project investigated if a LAI education module would change the knowledge, attitudes, and practices of prescribers regarding LAI use. LAIs prescribed for patients with a diagnosis of schizophrenia or SAD increased from 420 to 425, a one percent increase. This small change in total LAI use could be due to random variations; however, clinically, this positively impacts the quality of care to additional patients within an organization that already prescribes LAIs to around 40% of its patients when the national average is 13-30% (Kane et al., 2019; Lindenmayer et al., 2020). Furthermore, this project determined there was a statistically significant change in LAI practice behaviors according to the practices subsection KAP scores between the pre-test $Mdn = 5.00$) and post-test ($Mdn = 6.00$) but not between the pre-test ($Mdn = 5.00$) and one-month post-test ($Mdn = 6.00$). This increase in the Practices subsection KAP scores coupled with a total increase in LAIs prescribed ($n = 5$) suggests after the education module, prescribers understood that important behavioral practice changes could increase the use of LAIs. Consider, however, one-month later LAI practice subsection KAP scores decreased to near pre-test levels. In future QI projects, additional follow-up, interactive activities, or refresher trainings may help sustain improvements observed.

Additional clinical significance was determined by this project. The data analysis revealed that total KAP and subsection scores were high before the education module which suggests participants already had adequate levels of knowledge, attitudes, and practices regarding LAI use. This may suggest that this organization's advanced practice prescribers have a higher degree of LAI knowledge, attitudes, and practice behaviors compared to other advanced practice prescribers across the U.S., or, more interestingly,

prescribers across the U.S. have high degrees of LAI knowledge, attitudes, and practices in general, but unidentified barriers exist or known barriers are poorly addressed which limits LAI use.

Furthermore, LAI knowledge and attitude scores were relatively high prior to the LAI education module suggesting participants already had a high degree of understanding within these two areas. Improvements in LAI practice behaviors according to KAP questionnaire scores and total LAIs prescribed, suggests knowledge acquisition and negative attitudes towards LAIs may not be as problematic as described in some of the research literature (Cahling et al. 2017; Lin et al., 2013; Lindenmayer et al., 2020), but improvements in prescriber practice behaviors should receive intensified focus. Similarly, direct changes to major barriers such as improving insurance coverage or decreasing pharmaceutical costs may be necessary to further increase access and affordability of LAIs.

Another limitation of this project was the sample size was heavily skewed towards nurse practitioners ($n = 14$), with only two physician assistants, and one psychiatrist participating. In future projects, a larger sample size with increased proportions of physician assistants and psychiatrists may provide additional insights in practice behaviors for these different groups of prescribers. Future projects should explore if either of these groups prescribe more LAIs than the other prescribing groups and, if so, an analysis should be conducted to improve LAI use.

Participants were recruited voluntarily, and thus, this project most likely missed a subsection of the organization's population that may have impacted the results. Future

projects should consider mandatory LAI training for all prescribers or incentives from the organization would ensure this subsection was not missed.

Another limitation was the duration of the project. LAIs prescribed were tracked one month after the education module and missed potential future LAIs prescribed since it is common for prescribers to schedule greater gaps between visits for stabilized patients. For future projects, increasing the length of the project to six or twelve months would provide additional evidence to help determine if LAIs prescribed are long-term, incremental increases instead of immediate gains as initially expected. Also, KAP scores should be monitored during longer time periods such as six or twelve months to see if knowledge, attitudes, and practice behaviors are sustained or fluctuate over time.

Conclusion

LAI antipsychotics are underutilized as an evidence-based treatment for schizophrenia and SAD. This project attempted to increase LAI use by developing an education module and assessing outcomes by the KAP questionnaire administered before, after and one-month after the education module as well as by tracking LAIs prescribed one-month before and one-month after. The results of this project underscored that sample participants already had a high degree of knowledge, attitudes, and practice behaviors regarding LAIs; however, other organizations with LAI use similar to national averages that desire an increase in LAIs prescribed can benefit from the LAI education module developed for this project.

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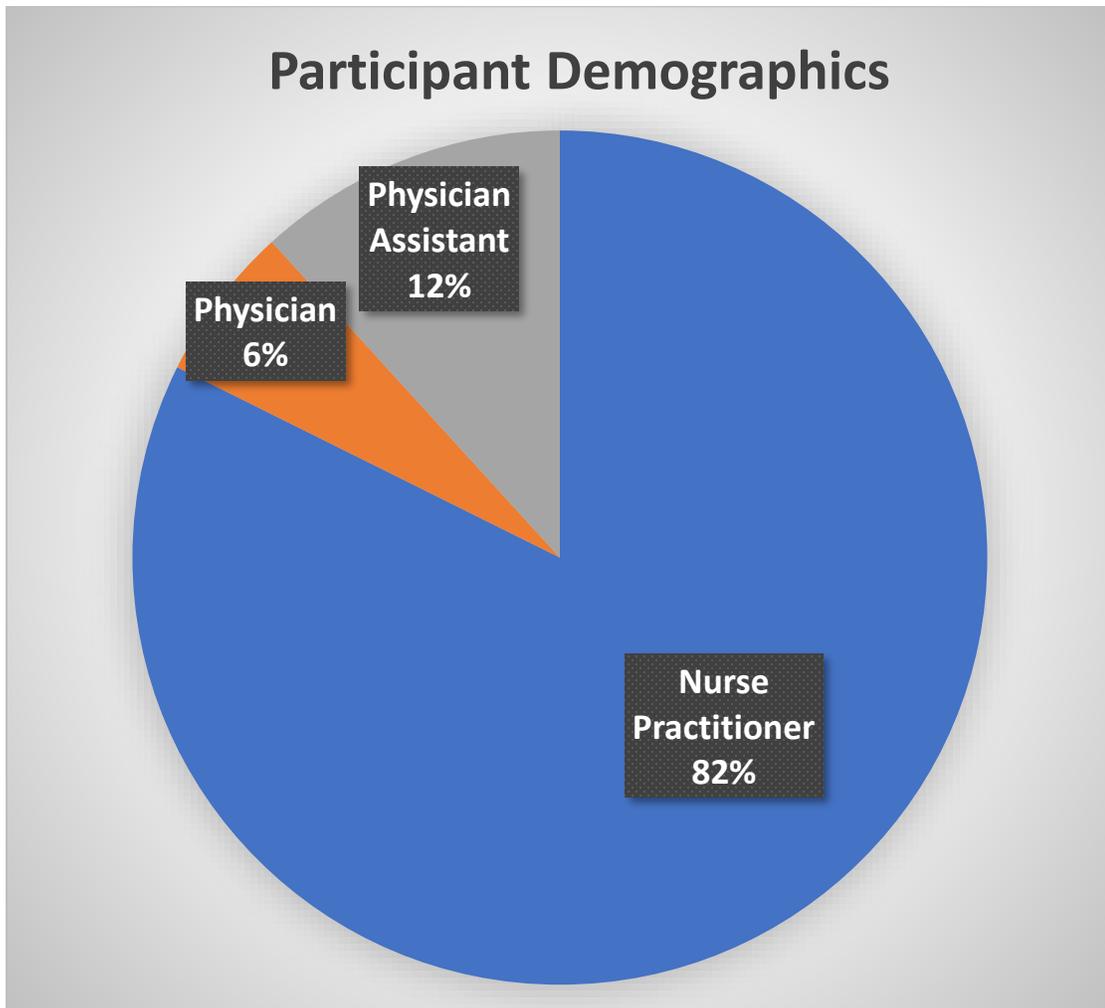
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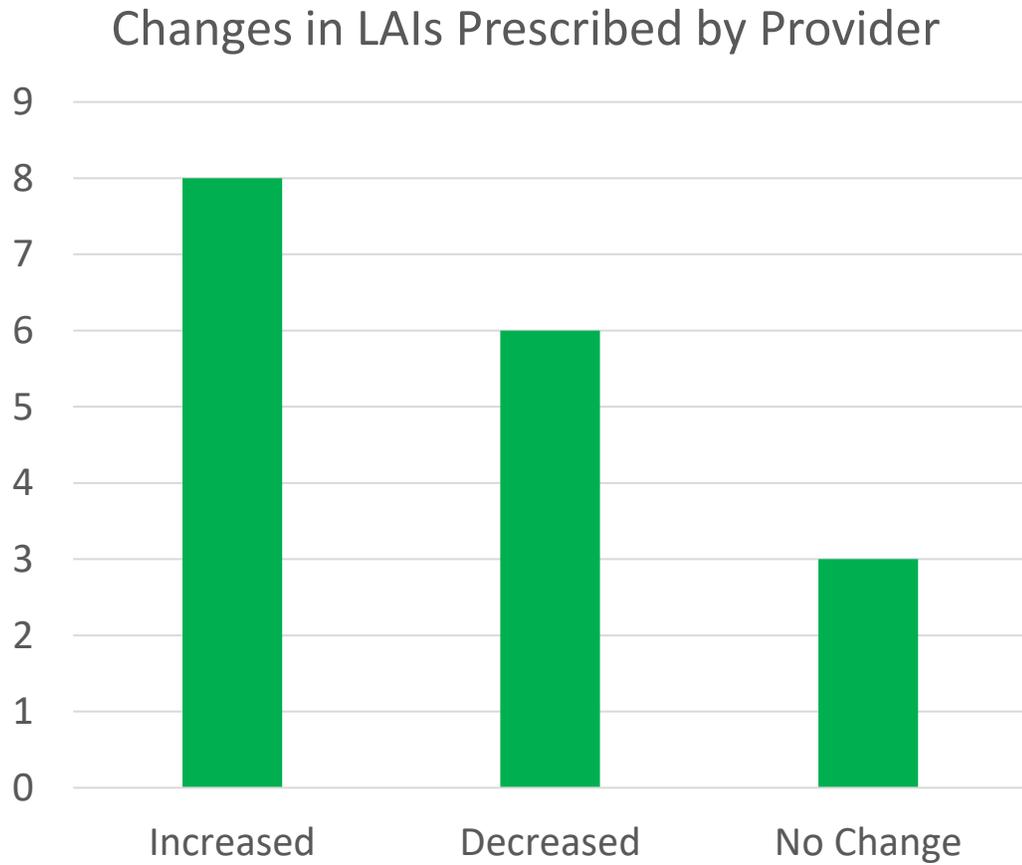
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Appendix A
Participant Demographics

Appendix B
Changes in LAIs Prescribed by Provider

Changes in LAIs Prescribed by Provider

Bar chart with y-axis ranging from 0 to 9. Increased: 8, Decreased: 6, No Change: 3.

Appendix C
Results from KAP Scores

KAP Median Scores

Pre-test | Post-test | 1 Month Post-test