DEVELOPMENT AND EVALUATION OF A WEB-BASED EDUCATIONAL TOOLKIT ON THE KNOWLEDGE, ATTITUDES, AND PRACTICES OF PSYCHIATRIC PRESCRIBERS REGARDING LONG-ACTING INJECTABLE ANTIPSYCHOTICS

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October 2020

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Acknowledgments

I want to thank Dr. Jill Rodgers for her support and guidance throughout completing this DNP

research project. To my other committee members, Amanda Yost and Lisa Rovelli, your time

commitment, encouragement, and input into this project have been integral to its' conclusion.

Development and Evaluation of a Web-Based Educational Toolkit on Knowledge,

Attitudes, and Practices of Psychiatric Prescribers

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Abstract

Long-acting injectable antipsychotics (LAIs) are underutilized pharmacological treatment options for those with schizophrenia. Research examining psychiatric prescribers' relationship with LAIs hypothesized that their knowledge deficits, uninformed attitudes, and poor prescribing practices contribute to the underutilization of LAIs in clinical practice. There is a gap in the literature regarding educational interventions to address psychiatric prescribers' knowledge deficits, uninformed attitudes, and poor prescribing practices. The purpose of this Doctor of Nursing Practice (DNP) research project, based on the Knowledge to Action Framework, was to develop and evaluate the impact of a web-based educational toolkit on the knowledge, attitudes, and practices of psychiatric prescribers. A seven-part web-based module that included a presentation of the created educational toolkit regarding LAIs and a before and after knowledge, attitudes, and practices questionnaire was hosted on an online-open source learning management system and disseminated to psychiatric prescribers. Findings indicated that the web-based educational toolkit slightly improved the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs. It also revealed a relationship between a positive change in attitudes and psychiatric prescribers practicing in a hospital setting. This DNP research project reflects the essentials of the DNP degree. It contributes to the body of knowledge of psychiatric nursing, created a lasting reference tool for prescribing LAIs, filled gaps in the literature regarding LAIs, supports the use of continuing web-based education and toolkits, and serves as a catalyst for other studies regarding LAIs.

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Chapter 1

Introduction

"Long-acting injectable antipsychotics (LAIs) are among the most effective treatments in psychiatry, yet they remain underutilized in clinical practice" (Correll et al., 2016, p. 6). The primary pharmacological treatment for schizophrenia is an oral antipsychotic. However, non-adherence to oral antipsychotic medication is a common problem associated with relapse, rehospitalization, and worsening of the course of schizophrenia (Haddad et al., 2014; Patel & David, 2005). LAIs have unique pharmacokinetics and offer advantages over oral antipsychotics. They were designed to serve as a practical solution to oral antipsychotic non-adherence in those with schizophrenia (Patel & David, 2005). LAIs are long-term pharmacological treatment options that assure continuous compliance with antipsychotic medication. They are an essential yet underutilized tool for both psychiatric prescribers and patients in the fight against schizophrenia.

Clinical guidelines for schizophrenia recommend using LAIs when non-adherence is a concern (Kaplan et al., 2013). Research and experts support the broadened use of LAIs to minimize the neurodegeneration and disability associated with untreated schizophrenia (Nasrallah, 2018). Despite their benefits, unique pharmacokinetics, advantages over oral antipsychotics, and support of their use by clinical guidelines, research, and expert guidance, LAIs continue to be underutilized in clinical practice.

The underutilization of LAIs in clinical practice is not completely understood due to limited research investigating the problem. Research studies that examined the knowledge, attitudes, and practices of psychiatric prescribers hypothesized that barriers to the underuse of LAIs are the knowledge deficits, uninformed attitudes, and poor prescribing practices of

psychiatric prescribers (Ciglar et al., 2016; Correll et al., 2016; Heres et al., 2006; Iyer et al., 2013a; Iyer et al., 2013b; Llorca et al., 2013; Miles et al., 2011; Patel et al., 2003; Patel et al., 2020; Sajatovic et al., 2018a; Sajatovic et al., 2018b; Samalin et al., 2013; Weiden et al., 2015). Those barriers prevent translation of the evidence supporting the use of LAIs into the practice of prescribing them. LAIs are effective pharmacological treatment options for those with schizophrenia that have the potential to decrease personal suffering, family burden, and societal costs associated with the illness (Kane et al., 1998). However, knowledge deficits, uninformed attitudes, and poor prescribing practices among psychiatric prescribers remain barriers to the utilization of LAIs in clinical practice.

There is a gap in the literature regarding evidence-based interventions that positively affect psychiatric prescribers' knowledge, attitudes, and prescribing practices regarding LAIs. Specific education needs to be developed for psychiatric prescribers targeting their knowledge deficits, uninformed attitudes, and poor prescribing practices that are barriers to the utilization of LAIs (Correll et al., 2016). If the barriers are not addressed, LAIs will continue to be underutilized in clinical practice and deprive those with schizophrenia of pharmacological treatment options that improve outcomes.

The clinical problem that serves as the basis for this Doctor of Nursing Practice (DNP) research project was outlined. By establishing the background to the underutilization of LAIs due to psychiatric prescribers' knowledge deficits, uninformed attitudes, and poor prescribing practices, it will prove the importance of this DNP research project. Review of the problem statement, research question, hypothesis, definition of terms, need for the study, the significance of the problem, assumptions, and limitations will serve to highlight the necessity for the

development of a web-based educational toolkit aimed at improving the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs.

Background of the Problem

Schizophrenia is a chronic, debilitating, severe mental illness that affects approximately 20 million individuals in the United States (NIMH, 2018). It is a leading cause of disability (NIMH, 2018) and is estimated to cost the United States approximately 155 billion dollars related to healthcare, lost productivity, and unemployment (Cloutier et al., 2013). In addition to schizophrenia being a mental illness, it is also a medical illness with neurodevelopmental and neurodegenerative mechanisms (Kaplan et al., 2013; Nasrallah, 2018). The symptoms of schizophrenia are manifested as behavioral abnormalities that have significant psychosocial consequences for those afflicted. The ripple effect of schizophrenia is far-reaching and encompasses patients, families, communities, and the economy of health care.

The course of schizophrenia is marked by periods of remission and relapse. Relapse in schizophrenia is associated with incarceration, homelessness, suicide, violence, mortality, and morbidity (Hamer, 2006). "The prevention of relapse in schizophrenia remains an enormous public health challenge worldwide, and improvements in this area can have tremendous impact on morbidity, mortality, and quality of life, as well as direct and indirect health care costs" (Kane et. al, 1998, p. 55).

Patients that are non-adherent to oral antipsychotic medication have five times the risk of relapse (Caseiro et al., 2012 as cited in Morrissette & Stahl, 2012). Non-adherence to antipsychotic medication occurs "for various reasons, including side effects and continuing psychotic cognitive processing" (Limandri, 2019, p. 7). Relapse into psychosis due to non-adherence to antipsychotic medication can result in "neurotoxicity and neurodegeneration with a

progressive loss of gray matter and ventricular dilation with each psychotic episode" (Jeon et al., 2005 as cited in Hamer, 2006, p. 2). If those with schizophrenia decrease or discontinue prescribed antipsychotic medication, their relapses into psychosis become more frequent, more severe (Hamer, 2006) and worsen the course of illness over time (Haddad et al., 2014).

Prevention of relapse and pursuit of meaningful recovery are treatment goals for those with schizophrenia; both goals are contingent upon continued adherence with prescribed antipsychotic medication. Relapse, rehospitalization, reduced quality of life, poor outcomes, high economic costs, and worsening of the course of illness are all associated with non-adherence to antipsychotic medications (Haddad et al., 2014). Non-adherence to antipsychotic medication is a prevalent problem for those who have schizophrenia and a clinical challenge for psychiatric prescribers (Desai & Nayak, 2019; Lasser et al., 2009).

Those with schizophrenia require uninterrupted, long-term pharmacological management with antipsychotic medication to treat the illness, attain stability, prevent relapse, and promote recovery. LAIs are evidence-based, long-term pharmacological treatment options that assure continuous antipsychotic medication therapy and serve as a practical solution to non-adherence in those with schizophrenia. The pharmacokinetics of LAIs offer advantages over oral antipsychotics, including consistent bioavailability of the antipsychotic due to prolonged dosing intervals and a reduction in peak and trough plasma levels (Brissos et al., 2014 as cited in Samalin et al., 2016; Geerts & Schreiner, 2013).

Schizophrenia treatment guidelines from the American Psychiatric Association (APA), Florida Best Practice Psychotherapeutic Medication Guidelines for Adults, National Institute for Health and Clinical Excellence (NICE), Texas Medication Algorithm Project (TMAP), and World Federation of Societies of Biological Psychiatry (WFSBP) advocate for the use of LAIs in

patients with schizophrenia that are non-adherent to antipsychotic medication (APA, 2019;

Florida Medicaid Drug Therapy Management Program for Behavioral Health, 2018; Hasan et al.,

2013; NICE, 2013; TMAP, 2008) and experts in the pharmacological management of

schizophrenia advocate for the broader use of LAIs in the treatment of those with schizophrenia

(Nasrallah, 2018). Research reveals that LAIs are effective at decreasing psychotic symptom

severity, relapses, rehospitalizations, and ER visits while improving adherence in those with

schizophrenia (Buckley et al., 2014; Lafeulle et al., 2013; Lafeulle et al., 2016; Lin et al., 2019;

Poloni et al., 2019; Subotnik et al., 2015).

LAIs are underutilized treatment options for schizophrenia that are supported by experts,

clinical guidelines, and research. Underutilization of LAIs denies those with schizophrenia of a

pharmacological treatment option with many benefits. The reasons for the underutilization of

LAIs are not entirely understood. However, research that examined the views psychiatric

prescribers had of LAIs hypothesized that contributing factors to the problem were their

knowledge deficits, uninformed attitudes, and poor prescribing practices (Ciglar et al., 2016;

Correll et al., 2016; Heres et al., 2006, Iyer et al., 2013a; Iyer et al., 2013b; Llorca et al., 2013;

Miles et al., 2011; Patel et al., 2003; Patel et al., 2020; Sajatovic et al., 2018a; Sajatovic et al.,

2018b; Samalin et al., 2013; Weiden et al., 2015). Many psychiatric prescribers believe LAIs are

coercive and that patients will reject them as a treatment option (Iyer et al., 2013b). The attitudes

held by psychiatric prescribers about LAIs often prevent patients from learning about or being

offered a LAI as a treatment option (Correll et al., 2016). Psychiatric prescribers need education

about LAIs to correct their knowledge deficits, uninformed attitudes, and poor prescribing

practices that lead to the underutilization of LAIs in clinical practice. There is a gap in the

literature regarding effective educational interventions to target the knowledge deficits,

uninformed attitudes, and poor prescribing practices of psychiatric prescribers that are barriers to the use of LAIs.

The Knowledge to Action Framework assists in bringing evidence into clinical practice (Graham et al., 2006), and toolkits are a tangible example of the framework in action. Toolkits are effective educational methods for prescribers (Yamanda et al., 2015), and if within a web-based form, are easily accessible to many for use. Web-based education is convenient and has become a preferred model of delivering continuing education. With the emergence of the global pandemic, COVID-19, and the practice of social distancing, all forms of education are moving toward distance learning through web-based platforms. A web-based educational toolkit is an appropriate intervention to reach psychiatric prescribers to address their knowledge deficits, uninformed attitudes, and poor prescribing practices that are barriers to the use of LAIs.

Statement of the Problem

Long-acting injectable antipsychotics are underutilized in clinical practice due to the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers.

Research Question

Does a web-based educational toolkit have an effect on the knowledge, attitudes, and practices of psychiatric prescribers regarding long-acting injectable antipsychotics?

Hypothesis

A web-based educational toolkit will have a positive effect on the knowledge, attitudes, and practices of psychiatric prescribers regarding long-acting injectable antipsychotics.

Definition of Terms

For clarity, the definition of essential terms used in this Doctor of Nursing Practice

(DNP) research project will be defined. The definition of terms are as follows:

1.Attitudes- a mental position regarding a fact ("Attitude", 2020).

2.Educational Toolkit-a grouping of multiple knowledge translation tools that provide specific

knowledge to educate and change behaviors (Yamada et al., 2015).

3.Knowledge- information and skills acquired from education and experience ("Knowledge,"

2020).

4.Long-Acting Injectable Antipsychotics (LAIs)- antipsychotic medications that are formulated

to be injected and are absorbed slowly, allowing for dosing intervals of up to three months

depending on the formulation. Available formulations in the United States are Abilify Maintena,

Aristada, Haldol Decanoate, Invega Sustenna, Invega Trinza, Perseris, Prolixin Decanoate,

Risperdal Consta, and Zyprexa Relprevv.

5.Practice- application of attained knowledge and skills ("Practice," 2020).

6.Psychiatric Prescriber- a person who prescribes psychiatric medications, usually a physician,

advanced practice nurse, or physician assistant ("Prescriber," 2020).

7.Web-Based- using the world wide web ("Web-based," 2020).

Need for the Study

Psychiatric prescribers can offer and utilize LAIs as a treatment option for those with

schizophrenia. Based on the evidence regarding the benefits of LAIs in the management of

schizophrenia, especially in those with non-adherence to antipsychotic medications, psychiatric

prescribers should routinely be offering LAIs as a treatment option (Llorca, 2013). Nevertheless,

LAIs remain underutilized due to knowledge deficits, uninformed attitudes, and poor prescribing

practices amongst psychiatric prescribers. A gap in the literature exists regarding interventions that could address the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers that contribute to the underutilization of LAIs in clinical practice.

The DNP research project's purpose was to develop and evaluate a web-based educational toolkit that would add to the future of healthcare by serving as an educational reference tool to improve the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs. The project addressed a gap in the literature regarding effective educational interventions to target the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers that are barriers to the use of LAIs. The overarching goal was to create an intervention that could change healthcare through the education of psychiatric prescribers.

This DNP research project met several American Association of Colleges of Nursing (AACN) DNP essentials. The project's purpose was to create a web-based educational toolkit about LAIs for psychiatric prescribers as an intervention to positively affect their knowledge, attitudes, and practices regarding LAIs; this was determined by assessing the baseline and impact through a before and after knowledge, attitudes, and practices (KAP) questionnaire. Analysis of the knowledge, attitudes, and practices about LAIs was completed through a literature review. Evidence-based information was obtained, and informatics was incorporated in the development of the web-based module which included the educational toolkit about LAIs. Justification for and development of this project was based upon evidence-based research. Dissemination of this evidence-based research project to psychiatric prescribers was constructed to eliminate knowledge deficits, uninformed attitudes, and poor prescribing practices regarding LAIs and create a long-term resource tool.

Significance of the Problem

The percentage of individuals that are non-adherent to oral antipsychotics is high and varies between 40 % to 90 % (Agid et al., 2010 as cited in Taylor et al., 2018). Medication non-adherence is a barrier to achieving positive outcomes for those with schizophrenia (Emsley, 2013), and psychiatric prescribers frequently overestimate compliance with oral antipsychotics (Taylor et al., 2018). LAIs serve as a practical solution to the common problem of antipsychotic non-adherence in those with schizophrenia and eliminate the negative consequences related to medication non-adherence. However, even with a high percentage of patients with schizophrenia that are non-adherent to oral antipsychotic medication, psychiatric prescribers are reluctant to utilize LAIs due to a lack of knowledge about their use (Correll et al., 2016). In many cases, psychiatric prescribers' knowledge deficits and uninformed attitudes about LAIs prevent the practice of offering a LAI as a treatment option (Correll et al., 2016). In the United States, only 15-18 % of eligible patients with schizophrenia have been prescribed a LAI (Sajatovic et al., 2018a).

Assumptions

It is assumed that LAIs are effective treatment options for those with schizophrenia and ensure continuous adherence to antipsychotic medication for prolonged intervals of up to three months. It is also assumed that by addressing the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers regarding LAIs that it may lead to increased utilization of LAIs, resulting in improved outcomes for those with schizophrenia.

Limitations

The project design had several limitations. Limitations included participants being required to complete multiple steps to take part in the DNP research project and complete the

necessary data collection. The topic was specific and not interesting to all psychiatric prescribers. Due to the time constraints, the impact of the web-based educational toolkit on the utilization of LAIs in psychiatric prescribers' over time was not possible. Lastly, participants' recruitment was limited to a posting on an online professional nursing organization's member forum and via email to psychiatric prescribers found by word of mouth.

Summary of the Problem

LAIs are underutilized in clinical practice in part due to psychiatric prescribers' knowledge deficits, uninformed attitudes, and poor prescribing practices (Ciglar et al., 2016; Correll et al., 2016; Heres et al., 2006; Iyer et al., 2013a; Iyer et al., 2013b; Llorca et al., 2013; Miles et al., 2011; Patel et al., 2003; Patel et al., 2020; Sajatovic et al., 2018a; Sajatovic et al., 2018b; Samalin et al., 2013; Weiden et al., 2015). LAIs are evidence-based treatment options that are a practical solution to the common problem of medication non-adherence in those with schizophrenia and offer unique advantages over oral antipsychotics. They can prevent the negative consequences of untreated schizophrenia (Patel & David, 2005). The underutilization of LAIs deprives those with schizophrenia of a treatment that research, experts, and clinical guidelines support. Although there is limited research about the reasons for the underutilization of LAIs in clinical practice, research has hypothesized that it is in part due to psychiatric prescribers' knowledge deficits, uninformed attitudes, and poor prescribing practices. There is a gap in the literature regarding effective interventions to address the known barriers to the use of LAIs perpetuated by psychiatric prescribers. Web-based education and toolkits are effective, convenient methods of educating healthcare providers like psychiatric prescribers, and offer a possible way to eliminate the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers that are barriers to the use of LAIs in clinical practice.

Finding interventions to eliminate the barriers to the use of LAIs in clinical practice could

improve their utilization and, in turn, improve outcomes for those with schizophrenia.

Chapter 2

Review of the Literature

This chapter is a review of the literature that focuses on LAIs. The research articles included in the review underpin themes and the theoretical framework that support this interventional DNP research project aimed at improving the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs through a web-based educational toolkit. The themes emphasize the importance of this interventional DNP research project whose aim was to overcome the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers that are barriers to the use of LAIs in clinical practice.

Process

A literature search was conducted using the following databases: Academic Search Ultimate, Cumulative Index to Nursing and Allied Health Literature (CINAHL) Complete, Health Source: Nursing/Academic Edition, and Medline Complete. The term "long-acting injectable antipsychotics" was searched in the title along with the keywords "doctors or nurse practitioners or prescribers or physicians or psychiatrists" and "attitudes or practices or knowledge." The search yielded 30 articles. "Toolkit or education or web-based" was added to the search, and the generated results decreased to 2 articles. An additional search using the same databases was completed using the keyword search terms "long-acting injectable antipsychotics" and "barriers" and "doctors or physicians or psychiatrists or nurse practitioners or prescribers," which yielded 3 articles that were contained in the previous original search. Following a review of the 30 articles from the database searches, it was found that many were duplicates or not applicable. Six articles were evaluated and included in the review of the literature. Since the

number of articles yielded by the search of databases was limited, hand searching was done and garnered 21 additional articles, and 16 were included in the review.

Benefits of Long-Acting Injectable Antipsychotics Compared to Oral Antipsychotics

Studies comparing oral antipsychotics to LAIs have produced varied results, most likely due to each study's sample selection and design (Miyamato & Wolfgang-Fleischhacker, 2017). Studies using a traditional randomized-control design and studies with a practical design show differing results. A unique benefit of LAIs is that they assure continuous medication compliance for intervals of up to three months and eliminate the common problem of oral antipsychotic non-adherence in those with schizophrenia. Medication compliance is guaranteed in the sample of a randomized-control study and may not accurately reveal outcomes for those with schizophrenia that struggle with adherence. Therefore, in studies comparing oral antipsychotics to LAIs, the study's design and sample must be considered when determining the real-world translation of the results.

Rehospitalization/ER visits

Lin et al.(2019) compared the length of time to and rate of rehospitalization over a year in 13,087 patients with schizophrenia or schizoaffective disorder discharged from a Taiwan psychiatric hospital on either a LAI or an oral antipsychotic. This observational, cohort, retrospective chart review study found that a year past discharge, 60% of the patients on a LAI were re-hospitalized compared to 64.6% of patients on an oral antipsychotic; and time to rehospitalization was greater in the LAI group (Lin et al., 2019). This study was unique and showed the superiority of LAIs when compared to oral antipsychotics in a natural setting as opposed to a controlled environment which could minimize the advantage of LAIs by assuring oral antipsychotic compliance (Lin et al., 2019).

Lafeulle et al. (2013) conducted a retrospective, matched cohort study of 3,828 patients with schizophrenia and compared the rehospitalization rate and emergency room (ER) utilization in those that switched to a second-generation LAI to those that stayed on an oral antipsychotic. Rehospitalization and ER visits were significantly lower in patients on a second-generation LAI (Lafeulle et al., 2013). This study suggested that patients with schizophrenia were less likely to be hospitalized or visit the ER if they were switched to a second-generation LAI from an oral antipsychotic (Lafeulle et al., 2013).

Poloni et al. (2019) conducted a unique mirror analysis study that examined the length and number of hospitalizations and the number of ER visits one year before and one year following initiation of a LAI in 153 patients in Italy with a schizophrenia spectrum disorder. The study showed that in the same group of patients, there was a decrease in the number and length of hospitalizations and the number of ER visits during the 12 months following the introduction of a LAI (Poloni et al., 2019). The findings highlighted the benefit of a LAI over an oral antipsychotic within the same patient in decreasing ER visits and the number and length of hospitalizations.

Relapse/Psychotic Symptom Severity

The PROACTIVE (Preventing Relapse Oral Antipsychotic Compared to Injectable Evaluating Efficacy) study by Buckley et al. (2015) was a randomized clinical trial that studied 276 patients with schizophrenia or schizoaffective disorder over 30 months at 8 academic centers in the United States and compared the rates of relapse in those that were taking a second-generation oral antipsychotic to those taking the second-generation LAI, Risperdal Consta. The primary outcome was time to relapse, and the secondary outcomes were psychiatric symptom severity and level of functioning (Buckley et al., 2015). The study concluded no significant

difference in relapse rates between the LAI and oral groups (Buckley et al., 2015). However, the

LAI group showed a greater reduction in psychotic symptom severity over time (Buckley et al.,

2015). This study did not find LAIs to be more advantageous than oral antipsychotics in

preventing relapse but did reveal their superiority in reducing the severity of psychotic symptoms

over time.

Subotnik et al. (2015) conducted a randomized clinical trial comparing the effectiveness

of LAI Risperidone with oral Risperidone over 12 months in 86 patients with recent-onset

schizophrenia. Effectiveness was measured by psychotic exacerbation or relapse, and secondary

outcomes measured were psychiatric hospitalization, psychotic symptom control, and drug

discontinuation (Subotnik et al., 2015). Psychotic exacerbation or relapse rates were 5% in those

on LAI Risperidone compare to 33% in those on oral Risperidone (Subotnik et al., 2015). LAI

Risperidone was also associated with greater medication adherence and psychotic symptom

control than oral Risperidone (Subotnik et al., 2015). This study supported a LAI's superiority in

adherence, control of psychotic symptoms, and prevention of relapse.

Adherence

Lafeuille et al. (2016) conducted a longitudinal, retrospective, cohort study of 12,990

patients with schizophrenia, identified by Medicaid claim data, and assessed the effect baseline

characteristics had on medication adherence. Adherence was defined as attainment of the

Healthcare Effectiveness Data and Information Set (HEDIS) measure, which was considered the

proportion of days covered (PDC) with antipsychotic medication as more than or equal to 80%

(Lafeuille et al., 2016). Approximately 49% of study participants achieved defined adherence

over a year (Lafeuille et al., 2016). The baseline characteristic of being prescribed the LAI

Invega Sustenna was associated with a 26% increase in medication adherence (Lafeuille et al.,

2016). This study showed that many patients on oral antipsychotics are non-adherent, and LAIs are superior in attaining medication adherence.

The various studies reviewed show that LAIs are as effective as oral antipsychotics and, in many cases, are more effective at increasing adherence and decreasing relapse, hospitalizations, ER visits, and psychotic symptoms. However, in clinical practice, oral antipsychotics are used more frequently than LAIs. More naturalistic studies need to be conducted to establish the real utility of LAIs compared to oral antipsychotics.

Psychiatric Prescribers' Knowledge, Attitudes, and Practices Regarding Long-Acting Injectable Antipsychotics

Underutilization of LAIs in clinical practice is believed to be due in part to psychiatric prescribers' attitudes toward LAIs (Miles et al., 2011), which are based on their knowledge and affect their prescribing practices. A limited number of studies have investigated the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs. Understanding the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs is instrumental in determining their influence on the underutilization of LAIs.

Ciglar et al.(2016) noted the underutilization of LAIs in clinical practice despite their advantages and theorized that psychiatrists' attitudes likely impacted their prescribing practices. They investigated 48 psychiatrists' attitudes in Croatia regarding LAIs via a questionnaire (Ciglar et al., 2016). General attitudes toward LAIs were positive; 81.25% reported a tendency to prescribe LAIs, and 91.66% considered LAIs to significantly contribute to the treatment of schizophrenia (Ciglar et al., 2016). However, only 37.5% said they preferred LAIs over oral antipsychotics, and 66.67 % believed patients preferred oral antipsychotics over LAIs (Ciglar et al., 2016). Researchers concluded that even though psychiatric prescribers had positive attitudes

toward LAIs, they also had unsupported beliefs about LAIs and limited utilization (Ciglar et al., 2016).

Heres et al. (2006) conducted a survey study on 246 psychiatrists that examined why LAIs were not chosen as a treatment option for those with schizophrenia or schizoaffective disorder. Reasons for not prescribing LAIs included concern for extrapyramidal symptoms, patient refusal, and beliefs that patients were adherent to their oral antipsychotic medication (Heres et al., 2006). The survey also revealed that 64.5% of the psychiatrists' eligible patients had never been offered a LAI (Heres et al., 2006). Researchers concluded that the reported reasons for not prescribing LAIs were unsupported by evidence-based knowledge (Heres et al., 2006).

In the first part of a two-part qualitative study by Iyer et al. (2013b), the attitudes of 24 psychiatrists from Canada regarding LAIs were explored through a questionnaire and focus group. Information gleaned from the questionnaires revealed that psychiatrists prescribed oral antipsychotics more than LAIs, did not frequently offer LAIs as a treatment option, had limited LAI prescribing experience, and would only prescribe a LAI if there were no other option (Iyer et al., 2013b). Psychiatrists reported believing that patients would refuse LAIs, be unconvinced about their benefits, fear pain, be aversive to needles, and interpret the suggestion of their use as a lack of trust by the psychiatrist (Iyer et al., 2013b). Researchers hypothesized that psychiatric prescribers' lack of knowledge and experience with LAIs, lack of offering of LAIs to patients, and personal biases about LAIs might contribute to their underutilization of LAIs (Iyer et al., 2013b).

In the second part of the two-part qualitative study by Iyer et al. (2013a), patients with psychosis in Canada were examined to determine their perceptions about LAIs. Thirty-four

patients at multiple sites provided their views on LAIs through a questionnaire and focus group (Iyer et al., 2013a). Patient perspective themes identified were unawareness and lack of understanding of LAIs, negative perceptions of LAIs, cost and convenience issues, and coercion involved with the presentation of LAI treatment (Iyer et al., 2013a). This study identified patient barriers to the use of LAIs, which could be mitigated by educating psychiatric prescribers on the improved prescribing practices of discussing and offering LAIs to patients through shared decision-making.

Miles et al. (2011) conducted a two-phase, qualitative study that examined psychiatrists' attitudes and knowledge from New Zealand regarding the LAI Risperdal Consta and the impact of their attitudes upon their prescribing practices. Data in the first phase was gathered from 16 psychiatrists by utilizing a focus group, and in the second phase, data was collected from 35 psychiatrists through a focus group based on the results of the phase one data (Miles et al., 2011). In both phases, a gap was identified between the psychiatrists' knowledge about best practices regarding LAIs and their reported prescribing practices (Miles et al., 2011). There were significant discrepancies in psychiatrists' initiation, dosing, titration, and monitoring strategies, indicating that utilizing the LAI Risperdal Consta was needed (Miles et al., 2011). Many psychiatrists reported negative perceptions of the LAI Risperdal Consta and described it as a last resort option, harmful to the psychiatrist-patient relationship, and unpleasant due to needle administration (Miles et al., 2011). This study revealed the varied and limited knowledge, uninformed attitudes, and poor prescribing practices of psychiatric prescribers regarding the LAI Risperdal Consta.

Patel et al. (2003) conducted a questionnaire study about the attitudes, beliefs, and knowledge of 143 European psychiatrists regarding LAIs and how they impacted their utilization

of LAIs. The study showed that 94% of psychiatrists surveyed knew LAIs prevented relapse, 91% knew they were as effective as oral antipsychotics, 81% knew they increased adherence, 69% believed they were not acceptable to patients, 48% thought they were stigmatizing, 40% thought they were old fashioned, and 38% believed LAIs had more side effects than oral antipsychotics (Patel et al., 2003). Researchers concluded that LAIs are underutilized in part due to a dichotomy between psychiatric prescribers' knowledge and attitudes, which affects their prescribing practices (Patel et al., 2003).

Patel et al. (2020) conducted a questionnaire study to investigate the beliefs and attitudes of 136 European physicians regarding the acceptance and usage of LAIs for the treatment of schizophrenia. Physicians reported an increase in their utilization of LAIs within the last five years preceding the study but reported offering oral antipsychotic treatment more than LAIs (Patel et al., 2020). The prescribing of LAIs was directly correlated to physician attitudes regarding LAIs (Patel et al., 2020). The researchers concluded that psychiatric prescribers' poor attitudes regarding LAIs influence patient acceptance of LAIs and, ultimately, psychiatric prescriber usage (Patel et al., 2020).

Weiden et al. (2015) conducted an observational study that examined 33 psychiatrist-patient conversations in which psychiatrists offered LAI therapy to determine if the conversation impacted patient acceptance or refusal of a LAI. Analyses of the conversations revealed that 91% focused on the actual injection or mode of delivery, and 9 % focused on the benefits of the LAI (Weiden et al., 2015). Researchers also noted a tentative offer presented as an inconvenience and not a beneficial treatment option (Weiden et al., 2015). Of the 33 offers to start a LAI, 67% of the patients had a neutral or positive reaction; but only 50% of those with a positive or neutral reaction agreed to start a LAI (Weiden et al., 2015). The study concluded that the low use of

LAIs could be partially related to the ambivalence exhibited by psychiatric prescribers when offering LAIs.

The research studies investigating the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs revealed valuable information regarding the underutilization of LAIs in clinical practice. Psychiatric prescribers have limited knowledge about and experience with initiating, titrating, and managing LAIs. The attitudes held by psychiatric prescribers about LAIs are often negative and associated with coercion, patient rejection, and harm to the prescriber-patient relationship. The prescribing practices of psychiatric prescribers are affected by their attitudes and knowledge regarding LAIs. Oral antipsychotics are prescribed and offered more than LAIs. Many psychiatric prescribers have never educated or offered those with schizophrenia a LAI. If psychiatric prescribers offer LAIs, the benefits of the option are not highlighted. Barriers to the use of LAIs are the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers. Patients' choice of treatment and acceptance of treatment is largely influenced by psychiatric prescribers' knowledge, attitudes, and practices.

Gap in the Literature Regarding Interventions to Improve the Knowledge, Attitudes, and Practices of Psychiatric Prescribers Regarding LAIs

A gap in the literature exists between the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers, which are barriers to the use of LAIs in clinical practice, and interventions that could alleviate them. Psychiatric prescribers need education about LAIs to correct their knowledge deficits, uninformed attitudes, and poor prescribing practices that contribute to the underutilization of LAIs in clinical practice. The management of LAIs can be complicated and requires specific knowledge about practical issues such as dosing and switching to a LAI (Correll et al., 2016); there are insufficient data and

recommendations within the literature (Llorca et al., 2013). "Tailored education about LAIs should be developed for different groups of professionals who interact with patients, including physicians, nurse practitioners, nurses, physician assistants, pharmacists, social workers, residents, peer counselors, and others" (Correll et al., 2016, p. 21). Psychiatric prescribers should have easy access and evidence-based education about LAIs to offer and prescribe them as treatment options for those with schizophrenia. Development of education to address psychiatric prescribers' knowledge deficits, uninformed attitudes, and poor prescribing practices that prevent LAIs from being utilized as a treatment option in those with schizophrenia is needed.

Development and Implementation of a Toolkit

Abdulrehman et al. (2019) addressed the problem of unrecognized and untreated iron deficiency in pregnancy with the development and implementation of a toolkit for prescribers to enhance iron deficiency identification and treatment in pregnancy (Abulrehman et al., 2019). The toolkit's implementation resulted in improved study outcome measures (Abulrehman et al., 2019). This study demonstrated the effectiveness of an educational toolkit for prescribers in promoting positive practice changes.

Yamada et al. (2015) conducted a systematic review of the literature on toolkits to evaluate their effectiveness as a knowledge translation strategy. The review included 39 research studies, all of which used a toolkit as a knowledge translation strategy, but all had varying methodologies and content (Yamada et al., 2015). Researchers concluded that a toolkit could be an effective strategy to translate evidence into practice if the toolkit's content is based on evidence, and the evaluation is thorough (Yamada et al., 2015).

Web-Based Education for Prescribers

Madsen et al. (2014) investigated the effects of a web-based educational module on pediatric emergency medicine physicians' knowledge, attitudes, and behaviors regarding youth violence. Researchers developed a short, web-based educational program about youth violence (Madsen et al., 2014). The 18 participating pediatric emergency department physicians completed a pre-module assessment, and one month later, a post booster module and post-module assessment (Madsen et al., 2014). The pre and post-module assessments examined knowledge and attitudes, and behavior changes were measured by a pre and post-module chart review of youth violence patients for specific discharge instructions (Madsen et al., 2014). Results indicated a significant increase in physician knowledge and attitudes regarding youth violence (Madsen et al., 2014). Before the module, 1.6% of youths treated for violence-related injuries were discharged with violence discharge instructions, and one month following the web-based module, 15.7% received youth violence discharge instructions (Madsen et al., 2014). This study proved the utility of web-based education as a method that can positively affect physicians' knowledge, attitudes, and behaviors.

Oliveira et al. (2017) conducted a study to evaluate the impact of an e-learning pediatric cardiology course on the knowledge and user satisfaction of 62 doctors, nurses, and medical students (Oliveira et al., 2017). The impact of the e-learning course using the learning platform, Moodle®, was measured using a pretest and posttest; and user satisfaction was evaluated using a questionnaire (Oliveira et al., 2017). The mean satisfaction rating of the e-learning course was 87% (Oliveira et al., 2017). In pretest scores, 67% passed, and in the posttest scores, 100% passed (Oliveira et al., 2017). This study supported using an e-learning course on Moodle® as a useful method to increase knowledge in health care providers.

Theoretical Framework: Knowledge to Action (KTA) Framework

The Knowledge to Action (KTA) Framework was the foundation of this DNP research project. Graham et al. (2006) developed the KTA Framework as a guide to maximizing the transfer of research findings into practice so patients receive the best evidence-based treatment. Field et al. (2014) conducted a systematic review study about the KTA Framework. Ten studies were identified and evaluated that utilized the framework to implemented health-focused evidence-based treatment (Field et al., 2014). Researchers concluded that the KTA conceptual framework could help facilitate bringing evidence into practice within the healthcare arena (Field et al., 2014). The KTA process is flexible yet complex (Graham et al., 2006). It is composed of two concepts, the knowledge creation and the action cycle (Graham et al., 2006). Illustration of the framework shows the phases of the knowledge creation concept encircled by the action cycle concept (Figure 1).

Knowledge Creation

This concept funnels through three phases. It begins with knowledge inquiry, moves to knowledge synthesis, and ends with knowledge tools or products. The funneling reflects the synthesis of knowledge to a useful product that meets identified needs (Graham et al., 2006).

Knowledge Inquiry. Knowledge inquiry represents "first-generation knowledge" or primary studies on the problem being explored (Graham et al., 2006). Following an extensive review of the literature obtained from the knowledge inquiry, it was found that the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers contribute to the underutilization of LAIs.

Knowledge Creation. Knowledge creation is considered "second generation knowledge" and is a synthesis of all the information about the problem being explored in the knowledge

inquiry; it is typically composed of meta-analyses and systematic reviews (Graham et al., 2006). The review of literature represents the knowledge creation phase.

Knowledge Tools or Products. Knowledge tools or products are considered "third-generation knowledge" and are typically practice guidelines, protocols, and clinical pathways (Graham et al., 2006). They are customized to meet the needs of those that will use the knowledge tool (Graham et al., 2006). The web-based educational toolkit development regarding LAIs was based upon information obtained from the knowledge inquiry and the knowledge creation phases and served as a knowledge tool.

Action Cycle

This concept is a feedback loop that cycles through activities leading to implementing the knowledge tool or product (Graham et al., 2006). The phases of the action cycle are the identification of the problem; identification, review, and selection of knowledge, adapt knowledge to the context, access barriers to use of the knowledge, monitor knowledge use, evaluate outcomes, and sustain the knowledge use (Graham et al., 2006).

Identify Problem. Identification of the problem results from the knowledge inquiry and determines if there is a gap in the literature that needs to be filled (Graham et al., 2006). For this research project, the clinical problem identified was the underutilization of LAIs due to knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers. A gap was identified in the literature regarding interventions to address the barriers to the use of LAIs perpetuated by psychiatric prescribers, which led to this project's conception.

Adapt Knowledge to the Local Context. Adapting knowledge to a context involves determining the importance of knowledge to a group and tailoring it to meet the group's needs (Graham et al., 2006). Barriers to the use of LAIs perpetuated by psychiatric prescribers were

identified in the literature as knowledge deficits, uninformed attitudes, and poor prescribing

practices. Psychiatric prescribers have limited access to evidence-based education about the

complexities of prescribing LAIs, and the toolkit was developed by a psychiatric prescriber for

psychiatric prescribers.

Assess Barriers to Knowledge Use. Assessment of barriers to using the created

knowledge encourages targeting and overcoming barriers to disseminating the new knowledge

(Graham et al., 2006). Determining how to make psychiatric prescribers aware of the web-based

educational toolkit about LAIs was the primary barrier to dissemination. Using a network of

psychiatric prescribers through an online professional nursing organization member forum and

emails to known psychiatric prescribers found by word of mouth were chosen as means of

dissemination.

Select, Tailor, Implement Intervention. Selecting, tailoring, and implementing the

intervention based on the target group successfully implements and disseminates the new

knowledge based on the audience (Graham et al., 2006). The web-based educational toolkit was

tailored to target and overcome the knowledge deficits, uninformed attitudes, and poor

prescribing practices of psychiatric prescribers that contribute to the underutilization of LAIs.

Monitor Knowledge Use. Monitoring knowledge use is focused on determining if there

was a transfer of knowledge and is typically measured by a change in knowledge, attitudes, and

practices (Graham et al., 2006). This research project evaluated the toolkit's effectiveness by

measuring a change in knowledge, attitudes, and practices of psychiatric prescribers.

Evaluate Outcomes. Evaluating outcomes determines the impact of the new knowledge

on the problem identified (Graham et al., 2006). This project evaluated the impact of a web-

based educational toolkit on psychiatric prescribers' knowledge, attitudes, and practices. Due to

the project's time constraints, the long-term outcome of a change in the utilization of LAIs in clinical practice was not part of this project. However, changes to prescribing rates of LAIs by psychiatric prescribers could be considered for investigation in the future.

Sustain Knowledge Use. Sustaining the use of the new knowledge created requires evaluation of barriers to its use (Graham et al., 2006). Continued use of this web-based educational toolkit would include incorporation into the curriculum of psychiatric prescriber programs and endorsement by a professional practice organization. The toolkit would need to be updated yearly to ensure that all the information is up to date, considering the rapid increase in available LAIs over the last several years.

This review of literature detailed the KTA theoretical framework and themes of this interventional DNP research project. Themes included benefits of LAIs over oral antipsychotics, the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs, a gap in the literature regarding interventions to eliminate barriers to the use of LAIs perpetuated by psychiatric prescribers, web-based education, and toolkits. The themes and framework support the importance of developing and evaluating a web-based educational toolkit aimed at improving the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs.

Chapter 3

Methodology

The design and methods of this DNP research project, based on the KTA framework, will be discussed. This DNP research project developed and evaluated the impact of a web-based educational toolkit on psychiatric prescribers' knowledge, attitudes, and practices regarding LAIs. The design and methods of this DNP research project assisted in answering the research question, which asked if a web-based educational toolkit would have an effect on the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs. Participants took part in a web-based module composed of seven-parts. The setting, sample, ethical considerations, instrumentation, data collection, and data analysis of this DNP research project will be detailed in this chapter.

Research Design

This DNP research project had an interventional, one-group, before and after, quasi-experimental design. A web-based educational toolkit was developed to improve the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs. The intervention, a web-based educational toolkit, was presented. A knowledge, attitudes, and practices (KAP) questionnaire was conducted before and then after to determine the effect on participating psychiatric prescribers' KAP questionnaire scores.

Setting

A seven-part web-based module, including the intervention and accompanying before and after KAP questionnaire, was housed on the open-source learning management system, Moodle®. The setting was any location where participants could access and complete the web-based module.

Sample

A convenience, purposive sample of psychiatric prescribers, recruited through an invitation posted to an online professional nursing organization member forum and sent to the email accounts of psychiatric prescribers found through word of mouth, was utilized. The only criterion required to participate was a professional designation as a prescriber of psychiatric medication. The only criterion that excluded an individual from participating was not being a prescriber of psychiatric medication. A DNP research project recruitment announcement and invitation were posted on an online professional nursing organization member forum and sent via email to psychiatric prescribers located through word of mouth to recruit participants. The invitation included the purpose of the DNP research project, a brief description of this DNP research project, and a URL link to the open-source learning management system, Moodle®, where the seven- part web-based module was housed.

Ethical Considerations

The Institutional Review Board of Edinboro University reviewed this DNP research project before initiation and found it to be exempt. Permission was obtained from the organization that governs the online professional nursing membership forum where the recruitment announcement and invitation for participation in this DNP research project were posted. All participants were voluntary, and online consent and verification as a prescriber of psychiatric medication were obtained before the initiation of the web-based intervention. Participants self-enrolled in the web-based module through Moodle®, which required the provision of a personal email address, username, password, and acceptance of the Moodle® user agreement. The demographic information collected was a range of years prescribing medications, sex, age range, practice setting, and professional designation. Data retrieved from

participants was stored in the student researcher's password-protected Moodle® site, and a personal email address identified the data. The data from Moodle® was de-identified from each participant's email by assigning each email address a unique number from 1-100 before being stored in an Excel and a Statistical Package for Social Science (SPSS) file on the student researcher's password-protected computer. The Moodle® site and all data collected will be retained for three years. No risks or discomfort were anticipated for participants except for the time associated with completing the module, which was estimated to be approximately 30 minutes.

Instrumentation

To study the impact of the web-based educational toolkit on the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs, the following tools were developed by the student researcher:

(i). A web-based educational LAI toolkit and presentation were created using PowerPoint and evidence-based information to enhance psychiatric prescribers' knowledge, attitudes, and practices regarding LAIs. The toolkit was comprised of the following elements: an overview of LAIs, review of evidence-based literature about LAIs, prescribing tables for each of the nine LAIs available in the United States based on information from the manufacturers, websites containing guidelines and an algorithm for the treatment of schizophrenia, manufacturer websites, myths about LAIs, resources for psychiatric prescribers, advantages of LAIs, disadvantages of LAIs, patient resources, and tips on how to engage patients in shared decision-making conversations about LAIs. The web-based educational toolkit and presentation were housed on the open-source learning management system, Moodle®. Content validity of the web-based educational toolkit was established by submission to experts for evaluation and was based

on content, clarity, and organization. The consulted experts were a board-certified psychiatrist and board-certified psychiatric mental health nurse practitioner. The toolkit was finalized following suggested modifications from the consulted experts.

(ii). A 20-item KAP questionnaire was created using the content of the web-based educational LAI toolkit (Appendix A). The KAP questionnaire was comprised of three subscales. The first subscale included 11 knowledge questions. The second subscale included six attitude questions. The third subscale included three practice questions. All questions were true or false. The 20-item KAP questionnaire was based on a 56-item, pre-existing knowledge and attitudes questionnaire regarding LAIs. Eleven of the 20-items in the KAP questionnaire were directly used or modified from the pre-existing knowledge and attitudes questionnaire. The 56-item questionnaire was based on and modified from a previous 44-item knowledge and attitudes questionnaire, which had excellent reliability based on the test-retest method and moderate internal reliability (Bawo, Omoaregba, Okonoda, Otefe, & Patel, 2012). Permission was obtained from the author to utilize the knowledge and attitudes questionnaire. The content validity of the newly created 20-item KAP questionnaire was established by submission to the previously mentioned experts for suggestions and modifications. The questionnaire was tested for reliability before its use by the test-retest method with a one-week interval and was found to have a good intraclass correlation coefficient of .816.

(iii). A web-based module that consisted of seven-parts was created using the open-source learning management system, Moodle®. Included in the web-based module was a brief description of the research project and intervention, a question to verify each participant as a prescriber of psychiatric medication with a yes or no option, a consent form with a yes or no

option, five multiple-choice demographic questions, the 20-item before KAP questionnaire, the

presentation of the web-based educational LAI toolkit, and the 20-item after KAP questionnaire.

Data Collection

Data was collected using the web-based, 20-item KAP questionnaire administered before

and after participants received access to the web-based educational toolkit presentation about

LAIs. In the KAP questionnaire, there were 20 questions, all true or false, correct answers got

one point, and incorrect answers got zero points. Knowledge questions were 1-11 (11 items),

attitudes questions were 12-17 (6 items), and practice questions were 18-20 (3 items). The range

for the total KAP score was 0-20, and the range for the three subscale scores were 0-11 for

knowledge KAP subscale score, 0-6 for attitudes KAP subscale score, and 0-3 for practices KAP

subscale score. Higher scores indicated better knowledge, more positive attitudes, and better

prescribing practices of the psychiatric prescribers regarding LAIs. Demographic data was

collected with five questions regarding age, sex, years prescribing medications, practice setting,

and professional designation (Appendix B). Verification that each participant consented to

participate and was a prescriber of psychiatric medication was completed by questions with a yes

or no response. All data was collected electronically by the web-based module created with and

housed on Moodle®.

The open announcement and invitation to participate in the DNP research project were

posted on the online professional nursing organization member forum and sent via email to

psychiatric prescribers found through word of mouth four times over three weeks. The

announcement and invitation provided a URL link to the web-based module on Moodle®, which

was available during the same three-week time frame. Before accessing the web-based module

on Moodle®, participants needed to become a registered user of Moodle® which required

consent to their user agreement, and creation of a username and password. The web-based module included: a brief description of this DNP research project, question verifying the participant as a prescriber of psychiatric medication with a yes or no option, consent form with a yes or no option, demographic questions, before KAP questionnaire, presentation of the web-based educational LAI toolkit, and after KAP questionnaire.

Data collection was concluded after three weeks. Verification as prescriber of psychiatric medication, consent, demographic data and scores from each participant's KAP questionnaire before and after they viewed the web-based educational toolkit presentation was collected by Moodle® and stored in the Moodle® module. A personal email address identified each participant's data. Email addresses were then de-identified by assigning each a unique numeric code from 1 to 100 before transferring the data to an Excel file. After the data was de-identified, it was also stored in both an Excel and a SPSS file on the student researcher's computer. All data was password protected.

Data Analysis

The purpose of this data analysis was two-fold. The first was to determine if there were differences in the knowledge, attitudes, and practices of psychiatric prescribers (measured using the total and three subscales KAP scores) before and after the presentation of the web-based educational toolkit about LAIs. The second was to determine if there were relationships between changes of knowledge, attitudes, and practices (measured as the differences in the after and before total and three subscales KAP scores) of psychiatric prescribers and any of their demographic factors.

The data was imported into and analyzed using the Statistical Package for Social Science (SPSS) version 23 for Windows (IBM Corp., Armonk, NY). Frequency tables were used to

summarize the KAP questionnaire responses and demographics of the participants. Descriptive statistics, including mean, standard deviation, median, minimum, maximum, and range were used to summarize the total and three subscales KAP scores before and after the presentation of the web-based educational toolkit about LAIs.

Shapiro-Wilk tests were used to determine the normality of the data. As the data was not normally distributed, non-parametric procedures, including Wilcoxon signed-rank tests, Mann-Whitney U tests, and Kruskal–Wallis tests were applied (Field, 2013). Wilcoxon signed-rank tests were performed to determine if there were differences in the knowledge, attitudes, and practices (measured using the total and three subscales KAP scores) of psychiatric prescribers before and then after the presentation of the web-based educational toolkit about LAIs. Mann-Whitney U tests (for categorical variables with two levels) and Kruskal–Wallis tests (for categorical variables with more than two levels) were used to determine if there were any relationships between changes in knowledge, attitudes, and practices (measured as the differences in the after intervention and the before intervention total and three subscales KAP scores) of psychiatric prescribers and their demographic factors of age range, practice setting, professional designation, range of years prescribing medications, and sex. For all the utilized tests, a p-value of less than 0.05 indicated statistical significance. All p-values were two-sided.

Summary of Methodology

The design and methodology of this DNP research project, based on the KTA Framework, were constructed to answer the research question that asked if the web-based educational toolkit would have an effect on the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs. The study was interventional with a quasi-experimental, one-group, before and after design. Participants were a purposive, convenience sample of psychiatric

prescribers recruited from an online professional nursing organization member forum and via emails to psychiatric prescribers found through word of mouth. The module included a brief description of the DNP research project, a question to verify each participant as a prescriber of psychiatric medication, a consent form, demographic questions, before KAP questionnaire, a presentation of the web-based educational LAI toolkit, and after KAP questionnaire. Data was collected by the web-based module created with and housed on Moodle®. The data was analyzed to determine if there were differences in the knowledge, attitudes, and practices of psychiatric prescribers before and after the presentation of a web-based educational toolkit regarding LAIs and to determine if there were relationships between changes in knowledge, attitudes, and practices of the participants and their demographic factors.

Chapter 4

Results and Discussion

In this chapter, this DNP research project's data analysis results will be presented and discussed in detail. Justification of the sample size will be provided with the results of a priori power analysis. The established research question will be answered based on the descriptive and inferential statistical analysis of the obtained data. The results of the descriptive and inferential statistical analysis will be displayed in tables. Discussion about the data and subsequent analysis will include examining the findings in relation to the review of literature and the KTA Framework of the study. The strengths and limitations of this DNP research project and its implications for nursing practice will conclude this chapter.

Results

Power Analysis

A priori power analysis was conducted to determine the minimum number of participants required for this DNP research project for a .80 power of finding statistically significant differences in the knowledge, attitudes, and practices (measured using the total and three subscales of KAP) of psychiatric prescribers before and after a presentation of the web-based educational toolkit about LAIs, using the paired t-test family. The 0.80 for power analysis was the desired power of the test, which means it was probable that the test would correctly reject the null hypothesis when the null hypothesis was false (Cohen, 1988). The power analysis for the paired t-test family was performed using G*power 3.1.9.4 (Faul et al., 2009) to determine the minimum sample size that was needed for this DNP research project. For a large effect size of 0.8 (Cohen, 1988; Cohen, 1992) and an alpha level of 0.05, the minimum sample size needed to achieve a 0.80 power was 15 participants. This DNP research project recruited 17 participants,

which was greater than the minimum sample size needed according to the power analysis to

detect the effects hypothesized in this DNP research project, and hence this DNP research project

had an adequate sample size.

Participant Demographics

A total of 25 participants registered for the study via Moodle®. Out of the 25 participants

that registered, eight were excluded from the data analysis. One participant completed data

collection but answered "no" to the question requesting consent to participate. Two participants

did not answer all the demographic questions. Lastly, five participants did not complete the after

KAP questionnaire. In the final data analysis, 17 participants were included after they consented

to participate, verified themselves as a prescriber of psychiatric medication, viewed the

intervention, and completed both the before and after KAP questionnaire.

Table 1 shows the demographics of the participants. Nearly 60% of the participants

(58.8%) were psychiatric nurse practitioners. Slightly over half of the participants (52.9%) were

51-65 years old. Most of the participants were female (76.5%) and practiced in outpatient

settings (88.2%). Over 40% of the participants (41.2%) had prescribed medications for 11-20

years.

Table 1

Demographics of the Participants

Variable		N	%
Professional designation	Psychiatric nurse practitioner	10	58.8
	Family nurse practitioner	6	35.3
	Physician	1	5.9
Age	20-35	2	11.8

	36-50	4	23.5
	51-65	9	52.9
	66 and over	2	11.8
Sex	Female	13	76.5
	Male	4	23.5
Years prescribing medications	0-5	4	23.5
	6-10	3	17.6
	11-20	7	41.2
	21 plus	3	17.6
Practice setting	Hospital	2	11.8
	Outpatient	15	88.2

KAP Questionnaire Responses

Table 2 summarizes the percentage of participants with correct answers for each KAP

questionnaire item before and after the presentation of the web-based educational toolkit about

LAIs. For the knowledge KAP subscale (Q1-Q11), more participants had correctly answered six

questions (Q2, Q3, Q5, Q6, Q7, and Q11) after the intervention than before the intervention. Side

effects, initiation, plasma levels, duration of effect, pharmacokinetics, and advantages of LAIs

compared to oral antipsychotics were the content of the knowledge KAP subscale questions more

participants answered correctly after the intervention. One question, knowledge KAP subscale

(Q3), which asked about an opportune time to initiate a LAI, had the most remarkable

improvement in scores, with 35.3 % of participants answering the question correctly before the

intervention and 88.2% answering the question correctly after the intervention. Three questions

(Q1, Q9, Q10) had more participants answer incorrectly after the intervention than before the

intervention. The questions pertained to patients that should be offered a LAI, expert recommendations for the use of LAIs, and the steady state of a LAI.

For the attitudes KAP subscale (Q12-Q17), more participants had correctly answered 1 question (Q12) after the intervention than before the intervention. The content of the question was regarding the patient preference of oral antipsychotics over LAIs. Before the intervention, 88.2% of participants correctly answered the question compared to 94.1% after the intervention.

For the practices KAP subscale (Q18-Q20), more participants had correctly answered two questions (Q19 and Q20) after the intervention compared to before the intervention. Question 19 was related to the offering of LAIs to patients with a fear of needles. Before the presentation of the web-based educational toolkit, 94.1% of participants answered the question correctly and after 100% of participants answered correctly. Question 20 was regarding patients being offered a LAI from the first episode of schizophrenia through recovery. Correct responses by participants increased by 17.6 % after the presentation of the web-based educational toolkit regarding LAIs.

Table 2

Percentage of Participants with Correct Answers for Each KAP Item

Item	Before the intervention	After the intervention	% change
Q1	17 (100)	16 (94.1)	-
Q2	16 (94.1)	17 (100)	+
Q3	6 (35.3)	15 (88.2)	+
Q4	17 (100)	17 (100)	
Q5	15 (88.2)	16 (94.1)	+
Q6	16 (94.1)	17 (100)	+

Q7	11 (64.7)	15 (88.2)	+
Q8	16 (94.1)	16 (94.1)	
Q9	16 (94.1)	15 (88.2)	-
Q10	15 (88.2)	12 (70.6)	-
Q11	16 (94.1)	17 (100)	+
Q12	15 (88.2)	16 (94.1)	+
Q13	17 (100)	17 (100)	
Q14	17 (100)	17 (100)	
Q15	17 (100)	17 (100)	
Q16	15 (88.2)	15 (88.2)	
Q17	17 (100)	17 (100)	
Q18	17 (100)	17 (100)	
Q19	16 (94.1)	17 (100)	+
Q20	13 (76.5)	16 (94.1)	+

Note. Q1-Q11 are the knowledge KAP subscale questions, Q12-Q17 are the attitudes KAP subscale questions, and Q18-Q20 are the practices KAP subscale questions. "% change" quantifies the difference in the percentage of participants with correct answers before the intervention and after the intervention, "-" indicating the percentage of participants with correct answers before the intervention was greater than the percentage of participants with correct answers after the intervention, "+" indicating the percentage of participants with correct answers before the intervention was less than the percentage of participants with correct answers after the intervention, blank "+" indicating percentage of participants with correct answers before the

intervention was the same as the percentage of participants with correct answers after the

intervention.

Descriptive Statistics of KAP Questionnaire Data

Table 3 presents the descriptive statistics of the total and three KAP subscale scores

before and after the presentation of the web-based educational toolkit about LAIs. The results of

the Shapiro-Wilk tests indicated that except for the before total KAP scores ($W = 0.919$, $p =$

0.141), all the other data, including the before and the after knowledge KAP subscale scores, the

before and after attitudes KAP subscale scores, the before and after practices KAP subscale

scores, and the after total KAP scores, were not normally distributed (W ranged from 0.262 to

0.872, p < 0.05).

As not all data were normally distributed, median and range were used to summarize the

data. Median was used for the measure of central tendency, and range was used for the measure

of variation of the data. The median knowledge KAP subscale scores were 10 (*range* = 3) and 11

(*range* = 4) before and after the intervention, indicating participants had good knowledge

regarding LAIs before and after the intervention. The median attitudes KAP subscale scores were

6 (*range* = 2) and 6 (*range* = 2) before and after the intervention, indicating participants had

positive attitudes regarding LAIs before and after the intervention. The median practices KAP

subscale scores were 3 (*range* = 1) and 3 (*range* = 1) before and after the intervention, indicating

participants had good prescribing practices regarding LAIs before and after the intervention. The

median total KAP scores were 18 (*range* = 5) and 19 (*range* = 5) before and after the

intervention, indicating participants had good cumulative knowledge, attitudes, and practices

regarding LAIs before and after the intervention.

Table 3

Descriptive Statistics of the Total KAP and Three KAP Subscales Scores

KAP scale		*M*	*SD*	*Mdn*	*Range*	*Min*	*Max*	*W*	*df*	*P*
								Shapiro-Wilk test		
Knowledge	Pre	9.59	0.80	10	3	8	11	0.872	17	0.024
	Post	10.18	1.19	11	4	7	11	0.729	17	< 0.001
Attitudes	Pre	5.76	0.56	6	2	4	6	0.490	17	< 0.001
	Post	5.82	0.53	6	2	4	6	0.391	17	< 0.001
Practices	Pre	2.71	0.47	3	1	2	3	0.579	17	< 0.001
	Post	2.94	0.24	3	1	2	3	0.262	17	< 0.001
Total KAP	Pre	17.94	1.25	18	5	15	20	0.919	17	0.141
	Post	18.94	1.43	19	5	15	20	0.758	17	0.001

Note. M=mean; SD=standard deviation; Mdn=median; Min=minimum Max=maximum; W=

Shapiro-Wilk test statistic ; df=degrees of freedom; P=p-value

Impact of the Web-Based Educational Toolkit on KAP Questionnaire Scores

Wilcoxon signed-rank tests were performed to determine if there were differences in the

knowledge, attitudes, and practices (measured using the total and three subscales scores of the

KAP questionnaire) of psychiatric prescribers before and after the presentation of the web-based

educational toolkit about LAIs. The results are presented in Table 4.

There was no statistically significant differences in the knowledge KAP subscale scores

($T = 81.50$, $Z = 1.904$, $p = 0.057$, $r = 0.461$), attitudes KAP subscale scores ($T = 1.00$, $Z = 1.000$,

$p = 0.317$, $r = 0.243$), and practices KAP subscale scores ($T = 1.00$, $Z = 1.000$, $p = 0.317$, $r =$

0.243) before and after the presentation of the web-based educational toolkit about LAIs (Table

4). However, there was a statistically significant difference in the total KAP scores before and after the presentation of the web-based educational toolkit about LAIs (T = 110.00, Z = 2.933, p = 0.003, r = 0.711; Table 4). In particular, participants had statistically significant higher total KAP scores after the intervention (*Mdn* = 19, *Range* = 5) than before the intervention (*Mdn* = 18, *Range* = 5) (Table 3).

Table 4

Results of Wilcoxon Signed-Rank Tests

KAP scale	N	T	Z	P	R
Knowledge	17	81.50	1.904	0.057	0.461
Attitudes	17	1.00	1.000	0.317	0.243
Practices	17	10.00	2.000	0.125	0.485
Total KAP	17	110.00	2.933	0.003	0.711

Note. N = sample size; T = Wilcoxon signed-rank test statistic; Z = standardized test statistic; p = p-value. r = effect size, computed as $|Z|/\sqrt{N}$, where Z is the standardized test statistic, and N is the number of total observations (Tomczak & Tomczak, 2014).

Association Between Change in KAP and Participant Demographics

Mann-Whitney U tests (for categorical variables with two levels) and Kruskal–Wallis tests (for categorical variables with more than two levels) were used to determine if there were relationships between the changes in knowledge, attitudes, and practices (measured as the differences in the after and the before intervention total and three subscales KAP scores) of psychiatric prescribers and their demographic factors, such as age range, professional designation, range of years prescribing medications, practice setting, and sex. The results are presented in Tables 5-9.

Table 5 presents the results of Mann-Whitney U tests for determining if differences in the total and three KAP subscales scores (After-Before) were associated with a professional designation. The median differences for after the intervention and the before the intervention knowledge KAP subscale scores were 1 (*range* = 3) and 1 (*range* = 4) for psychiatric nurse practitioners and family nurse practitioners. There was no association between professional designation and differences in the after and the before intervention knowledge KAP subscale scores (U = 27.50, Z = -0.285, p = 0.776, r= 0.071).

The median differences for the after and the before intervention attitudes KAP subscale scores were 0 (*range* = 1) and 0 (*range* = 0) for psychiatric nurse practitioners and family nurse practitioners. There was no association between professional designation and differences in the after and the before intervention attitudes KAP subscale scores (U = 27.00, Z = -0.775, p = 0.439, r = 0.194).

The median differences for the after and the before intervention practices KAP subscale scores were 0 (*range* = 1) and 0 *(range* = 1) for psychiatric nurse practitioners and family nurse practitioners. There was no association between professional designation and differences in the after and the before practices KAP subscale scores (U = 37.00, Z = 1.121, p = 0.262, r = 0.280).

The median differences for the after and the before intervention total KAP scores were 1 (*range* = 3) and 1 (*range* = 3) for psychiatric nurse practitioners and family nurse practitioners. There was no association between professional designation and differences in the after and the before intervention total KAP scores (U = 26.50, Z = -0.403, p = 0.687, r = 0.101).

Table 5

Results of Mann-Whitney U Tests for Determining if Differences in Total and Three

Subscales KAP Scores (After - Before) Were Associated with Professional Designation

	Median (Range)		Mean rank					
KAP scale	PMHNP	FNP	PMHNP	FNP	*U*	*Z*	*P*	*R*
Knowledge	1 (3)	1 (4)	8.75	8.08	27.50	-0.285	0.776	0.071
Attitudes	0 (1)	0 (0)	8.80	8.00	27.00	-0.775	0.439	0.194
Practices	0 (1)	0 (1)	9.67	7.80	37.00	1.121	0.262	0.280
Total KAP	1 (3)	1 (3)	8.85	7.92	26.50	-0.403	0.687	0.101

Note. PMHNP = Psychiatric NP, FNP = Family NP. $n = 10$ for PMHNP, $n = 6$ for FNP. $U =$

Mann-Whitney U test statistic; $Z =$ standardized test statistic; $p = p$-value. $r =$ effect size,

computed as $|z|/\sqrt{N}$, where z is the standardized test statistic and N is the number of total

observations (Tomczak & Tomczak, 2014).

Table 6 presents the results of Kruskal-Wallis tests for determining if differences in the

total and three subscales KAP scores (After-Before) were associated with age group. The median

differences for the after and the before knowledge KAP subscale scores were 1 (*range* = 2), 1

(*range* = 2), 1 (*range* = 3), and -0.5 (*range* = 3), for age group 20-35, 36-50, 51-65, and 66+.

There was no association between age group and differences in the after and the before

intervention knowledge KAP subscale scores ($H(3) = 1.563$, $p = 0.668$, $\varepsilon^2 = 0.098$).

The median differences for the after and the before intervention attitudes KAP subscale

scores were 0 (*range* = 0), 0 (*range* = 0), 0 (*range* = 1), and 0 (*range* = 0), for age group 20-35,

36-50, 51-65, and 66+. There was no association between age group and differences in the after

and the before intervention attitudes KAP subscale scores ($H(3) = 0.889$, $p = 0.828$, $\varepsilon^2 = 0.056$).

The median differences for the after and the before intervention practices KAP subscale scores were 0 (*range* = 0), 0 (*range* = 1), 0 (*range* = 1), and 0.5 (*range* = 1), for age group 20-35, 36-50, 51-65, and 66+. There was no association between age group and differences in the after and the before intervention practices KAP subscale scores ($H(3) = 1.325$, $p = 0.723$, $\varepsilon^2 = 0.083$).

The median differences for the after and the before intervention total KAP scores were 1 (*range* = 2), 1.5 (*range* = 2), 1 (*range* = 3), and 0 (*range* = 2), for age group 20-35, 36-50, 51-65, and 66+. There was no association between age group and differences in the after and the before intervention total KAP scores ($H(3) = 1.902$, $p = 0.593$, $\varepsilon^2 = 0.119$).

Table 6

Results of Kruskal-Wallis Tests for Determining if Differences in Total and Three Subscales KAP Scores (After - Before) Were Associated with Age Group

	Median (Range)							
KAP scale	20-35	36-50	51-65	66+	*H*	*df*	*p*	ε^2
Knowledge	1 (2)	1 (2)	1 (3)	-0.5 (3)	1.563	3	0.668	0.098
Attitudes	0 (0)	0 (0)	0 (1)	0 (0)	0.889	3	0.828	0.056
Practices	0 (0)	0 (1)	0 (1)	0.5 (1)	1.325	3	0.723	0.083
Total KAP	1 (2)	1.5 (2)	1 (3)	0 (2)	1.902	3	0.593	0.119

Note. $n = 2$ for age group 20-35, $n = 4$ for age group 36-50, $n = 9$ for age group 51-65, and $n = 2$ for age group 66+. H = Kruskal–Wallis test statistic; df = degrees of freedom; p = p-value. ε^2 = effect size, computed as $H/((N^2-1)/(N+1))$, where H is the Kruskal–Wallis test statistic and N is the total number of observations (Tomczak & Tomczak, 2014).

Table 7 presents the results of Mann-Whitney U tests for determining if differences in the total and three subscales KAP scores (After-Before) were associated with sex. The median

differences for the after and the before intervention KAP knowledge scores were 1 (*range* = 4)

and 0.5 (*range* = 3) for female and male. There was no association between sex and differences

in the after and the before intervention knowledge KAP subscale scores (U = 24.00, Z = -0.241, p

= 0.871, r = 0.014).

The median differences for the after and the before intervention attitudes KAP subscale

scores were 0 (*range* = 1) and 0 (*range* = 0) for female and male. There was no association

between sex and differences in the after and the before intervention attitudes KAP subscale

scores (U = 24.00, Z = -0.241, p = 0.871, r = 0.014).

The median differences for the after and the before intervention KAP practices scores

were 0 (*range* = 1) and 0 *(range* = 1) for female and male. There was no association between sex

and differences in the after and the before intervention practices KAP subscale scores (U =

26.50, Z = 0.077, p = 1.000, r = 0.005).

The median differences for the after and the before intervention total KAP scores were 1

(*range* = 3) and 1 (*range* = 3) for female and male. There was no association between sex and

differences in the after and the before intervention total KAP scores (U = 24.00, Z = -0.241, p =

0.871, r = 0.014).

Table 7

Results of Mann-Whitney U tests for Determining if Differences in Total and Three Subscales

KAP Scores (After-Before) Were Associated with Sex

	Median (Range)		Mean rank					
KAP scale	Female	Male	Female	Male	U	Z	P	R
Knowledge	1 (4)	0.5 (3)	9.15	8.50	24.00	-0.241	0.871	0.014
Attitudes	0 (1)	0 (0)	9.15	8.50	24.00	-0.241	0.871	0.014

Practices	0 (1)	0 (1)	8.96	9.12	26.50	0.077	1.000	0.005
Total KAP	1 (3)	1 (3)	9.15	8.50	24.00	-0.241	0.871	0.014

Note. $n = 13$ for female, $n = 4$ for male. U = Mann-Whitney U test statistic; z = standardized test statistic; $p = p$-value. r = effect size, computed as $|z|/\sqrt{N}$, where z is the standardized test statistic, and N is the number of total observations (Tomczak & Tomczak, 2014). * indicates significance at the 0.05 level.

Table 8 presents the results of Kruskal-Wallis tests for determining if differences in the total and three subscales KAP scores (After-Before) were associated with years prescribing medications. The median differences for the after and the before intervention knowledge KAP subscale scores were 1 (*range* = 2), 1 (*range* = 1), 1 (*range* = 4), and 1 (*range* = 0), for years prescribing medications 0-5, 6-10, 11-20, and 21+. There was no association between years of prescribing medications and differences in the after and the before intervention knowledge KAP subscale scores ($H(3) = 3.379$, $p = 0.337$, $\varepsilon^2 = 0.211$).

The median differences for the after and the before intervention attitudes KAP scores were 0 (*range* = 1), 0 (*range* = 0), 0 (*range* = 0), and 0 (*range* = 0), for years of prescribing medications 0-5, 6-10, 11-20, and 21+. There was no association between years of prescribing medications and differences in the after and the before intervention attitudes KAP subscale scores ($H(3) = 3.250$, $p = 0.355$, $\varepsilon^2 = 0.203$).

The median differences for the after and the before intervention practices KAP subscale scores were 0 (*range* = 0), 0 (*range* = 1), 0 (*range* = 1), and 1 (*range* = 1), for years of practice 0-5, 6-10, 11-20, and 21+. There was no association between years of prescribing medications and differences in the after and the before intervention practices KAP subscale scores ($H(3) = 4.542$, $p = 0.209$, $\varepsilon^2 = 0.284$).

The median differences for the after and the before intervention total KAP scores were

1.5 (*range* = 2), 2 (*range* = 1), 1 (*range* = 3), and 1 (*range* = 1), for years of practice 0-5, 6-10,

11-20, and 21+. There was no association between years of prescribing medications and

differences in the after and the before intervention total KAP scores ($H(3) = 3.929$, $p = 0.269$, ε^2

= 0.246).

Table 8

Results of Kruskal-Wallis Tests for Determining if Differences in Total and Three Subscales

KAP Scores (After - Before) Were Associated with Years of Prescribing medications

	Median (Range)							
KAP scale	0-5	6-10	11-20	21+	*H*	*df*	*P*	ε^2
Knowledge	1 (2)	1 (1)	1 (4)	1 (0)	3.379	3	0.337	0.211
Attitudes	0 (1)	0 (0)	0 (0)	0 (0)	3.250	3	0.355	0.203
Practices	0 (0)	0 (1)	0 (1)	1 (1)	4.542	3	0.209	0.284
Total KAP	1.5 (2)	2 (1)	1 (3)	1 (1)	3.929	3	0.269	0.246

Note. $n = 4$ for years of practice 0-5, $n = 3$ for years of practice 6-10, $n = 7$ for years of practice

11-20, and $n = 3$ for years of practice 21+. H = Kruskal–Wallis test statistic; df = degrees of

freedom; p = p-value. ε^2 = effect size, computed as $H/((N^2-1)/(N+1))$, where H is the Kruskal–

Wallis test statistic, and N is the total number of observations (Tomczak & Tomczak, 2014).

Table 9 presents the results of Mann-Whitney U tests for determining if differences in the

total and three subscales KAP scores (After-Before) were associated with practice setting. The

median differences for the after and the before intervention knowledge KAP subscale scores

were 1 (*range* = 0) and 1 (*range* = 4) for hospital and outpatient settings. There was no

association between practice setting and differences in the after and the before intervention knowledge KAP subscale scores ($U = 12.00$, $Z = -0.475$, $p = 0.635$, $r = 0.115$).

The median differences for the after and the before intervention attitudes KAP subscale scores were 0.5 (*range* = 1) and 0 (*range* = 0) for hospital and outpatient settings. There was an association between practice setting and differences in the after and the before intervention attitudes KAP subscale scores ($U = 7.50$, $Z = -2.739$, $p = 0.006$, $r = 0.664$). Those participants who practiced in a hospital setting had a statistically significant increase in attitudes KAP subscale scores from before to after the web-based educational toolkit presentation compared to the participants that practiced in outpatient settings.

The median differences for the after and the before intervention practices KAP subscale scores were 0.5 (*range* = 1) and 0 *(range* = 1) for hospital and outpatient settings. There was no association between practice setting and differences in the after and the before intervention practices KAP subscale scores ($U = 10.50$, $Z = -0.911$, $p = 0.362$, $r = 0.221$).

The median differences for the after and the before intervention total KAP scores were 2 (*range* = 0) and 1 (*range* = 3) for hospital and outpatient settings. There was no association between practice setting and differences in the after and the before intervention total KAP scores ($U = 4.00$, $Z = -1.742$, $p = 0.081$, $r = 0.422$).

Table 9

Results of Mann-Whitney U Tests for Determining if Differences in Total and Three Subscales KAP Scores (After-Before) Were Associated with Practice Setting

	Median (Range)		Mean rank					
KAP scale	Hospital	Outpatient	Hospital	Outpatient	*U*	*Z*	*P*	*R*
Knowledge	1 (0)	1 (4)	10.50	8.80	12.00	-0.475	0.635	0.115

Attitudes	0.5 (1)	0 (0)	12.75	8.50	7.50	-2.739	0.006	0.664
Practices	0.5 (1)	0 (1)	11.25	8.70	10.50	-0.911	0.362	0.221
Total KAP	2 (0)	1 (3)	14.50	8.27	4.00	-1.742	0.081	0.422

Note. $n = 2$ for hospital, $n = 15$ for outpatient. U = Mann-Whitney U test statistic; z = standardized test statistic; p = p-value. r = effect size, computed as $|z|/\sqrt{N}$, where z is the standardized test statistic, and N is the number of total observations (Tomczak & Tomczak, 2014). * indicates significance at the 0.05 level.

Discussion

The knowledge, attitudes, and practices of psychiatric prescribers play a vital role in utilizing LAIs in clinical practice. Barriers to the use of LAIs in clinical practice are believed to be the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers (Ciglar et al., 2016; Correll et al., 2016; Heres et al., 2006, Iyer et al., 2013a; Iyer et al., 2013b; Llorca et al., 2013; Miles et al., 2011; Patel et al., 2003; Patel et al., 2020; Sajatovic et al., 2018a; Sajatovic et al., 2018b; Samalin et al., 2013; Weiden et al., 2015). There is a gap in the literature regarding educational interventions to address the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers. This DNP research project was designed to develop and evaluate the impact of a web-based educational toolkit on psychiatric prescribers' knowledge, attitudes, and practices regarding LAIs. The aim of this DNP research project was to develop a web-based educational toolkit for psychiatric prescribers that would improve their knowledge, attitudes, and practices regarding LAIs.

The research question of this DNP research project asked if the web-based educational toolkit would have an effect on the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs. The independent variable of this DNP research project was the presentation of

the web-based educational toolkit regarding LAIs. The dependent variables were the knowledge, attitudes, and practices of psychiatric prescribers. The outcome measures were the differences in the median total and three KAP subscales scores of participants before and after the presentation of the web-based educational toolkit regarding LAIs. It was hypothesized that the web-based educational toolkit would have a positive effect on the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs.

The data analysis of this DNP research project revealed that the web-based educational toolkit regarding LAIs slightly improved the total and three subscales KAP scores of participants. It also showed that the total and three subscales KAP scores were adequate before and after the presentation of the web-based educational toolkit about LAIs (Table 3). The improvement in the total KAP score was statistically significant, with a p-value of 0.003, but the improvements in the three subscales KAP scores were not statistically significant (Table 4). Changes in the total and three subscales KAP scores from before to after the web-based educational toolkit presentation had no association with the participants' demographic factors except for a relationship found between practice setting and changes in attitudes KAP subscale scores of participants. Attitudes regarding LAIs had a statistically significant improvement (p=0.006) for participants working in hospitals compared to participants practicing in an outpatient setting following the presentation of the web-based educational toolkit about LAIs.

The findings of this DNP research project answered the research question and supported the hypothesis. The web-based educational toolkit had a positive effect on the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs, as evidenced by the outcomes of the improved total and three subscales KAP scores. However, improvements were slight and only statistically significant when the totality of the improvements to knowledge, attitudes, and

practices was combined as a total KAP score. Knowledge, attitudes, and practices are separate concepts but culminate to have an overall impact on the utilization of LAIs by psychiatric prescribers in clinical practice.

Even though baseline knowledge, attitudes, and practices of participants were adequate before and after the intervention, the examination of the participants' KAP questionnaire responses revealed specific areas of knowledge, attitudes, and practices regarding LAIs that were impacted by the web-based educational toolkit. There was an improvement in knowledge KAP subscale scores regarding side effects, plasma levels, duration of effect, pharmacokinetics, and advantages of LAIs over oral antipsychotics. Several areas of knowledge deteriorated following the presentation of the toolkit. Participants struggled with complex knowledge regarding expert recommendations for the use of LAIs, steady states of LAIs, and appropriate patient candidates for LAIs. If the toolkit were to be utilized in the future, changes would be made to focus on knowledge areas that deteriorated since the content was complicated. The area of knowledge that showed the greatest improvement by participants after the presentation of the web-based educational toolkit was regarding initiation of a LAI before transitioning from a higher level of care to a lower level of care. Only one area of improvement in attitudes was noted. Following the web-based educational toolkit presentation, participants' attitudes improved concerning the belief that patients only prefer oral antipsychotics. Prescribing practices improved related to the practice of offering a LAI to a patient regardless of a fear of needles or their phase of illness.

In many ways, the results of this DNP research project supported aspects of the review of literature, but in many ways, they contradicted the review of literature. The review of literature revealed knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers regarding LAIs (Ciglar et al., 2016; Correll et al., 2016; Heres et al., 2006; Iyer et al.,

2013a; Iyer et al., 2013b; Llorca et al., 2013; Miles et al., 2011; Patel et al., 2003; Patel et al., 2020; Sajatovic et al., 2018a; Sajatovic et al., 2018b; Samalin et al., 2013; Weiden et al., 2015). Contrary to the review of literature, the psychiatric prescribers of this DNP research project had adequate knowledge, attitudes, and practices regarding LAIs, which may be related to the fact that the sample of psychiatric prescribers within the review of literature were all psychiatrists and in this DNP research project, most participants were primarily experienced nurse practitioners. It raises questions about possible differences in education and training between psychiatrists and nurse practitioners regarding LAIs. Other confounding factors that may have contributed to the unexpected good baseline knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs in this DNP research study include the date of and the various countries' medical culture in which the studies within the review of literature were conducted. This DNP research project was based on a few studies from various countries conducted greater than five years ago. The time-lapse may have led to improved knowledge, attitudes, and practice of psychiatric prescribers. The difference in the medical culture in the United States compared to the medical culture of other countries could result in differences in knowledge, attitudes, and practices regarding LAIs amongst psychiatric prescribers.

The results indicated that web-based education and toolkits were effective methods to transfer knowledge to psychiatric prescribers. It also demonstrated that the KTA Framework assists in translating evidence into practice through the development of tailored educational materials. The KAP questionnaire responses revealed specific deficits in knowledge, attitudes, and practices of psychiatric prescribers that were supported by the review of literature. Knowledge deficits identified by this DNP research project were related to side effects, plasma levels, duration of effect, pharmacokinetics, advantages of LAIs over oral antipsychotics, and

appropriate patient candidates for LAIs. Similar knowledge deficits regarding initiation, dosing, titration, and monitoring of the LAI, Risperdal Consta, were identified in the study by Miles et al. (2011). The only attitude that improved was the belief that patients always preferred oral antipsychotics over LAIs. The belief that patients preferred oral antipsychotics was also found in studies by Ciglar et al. (2016), Iyer et al. (2013b), and Patel et al. (2003). The prescribing practice of psychiatric prescribers that was found to be poor based on the KAP questionnaire responses was related to the practice of not offering LAIs due to fear of needles and the phase of illness of the patient. This finding is similar to studies by Iyer et al. (2013b), Heres et al. (2006), and Weiden et al. (2015) because they discovered that a lack of offering LAIs was a poor prescribing practice of physicians that contributed to the underuse of LAIs in clinical practice.

Strengths and Limitations

The strength of this DNP research project is that if served to fill gaps in the literature regarding LAIs. Few studies evaluated the knowledge, attitudes, and practice of psychiatric prescribers regarding LAIs, and those that did only evaluated only psychiatrists and excluded all other psychiatric prescribers. With the shortage of psychiatrists in the United States, many family nurse practitioners, physician assistants, certified nurse specialists, and psychiatric nurse practitioners prescribe psychiatric medications to treat those who have schizophrenia. To the knowledge of this writer, this DNP research project serves as the first study to examine the knowledge, attitudes, and practices of psychiatric prescribers other than psychiatrists. And there has been no prior study that attempted to develop and evaluate an educational intervention to address the gap in the literature regarding the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers that are barriers to the utilization of LAIs in clinical practice.

Several limitations were associated with this DNP research project. The limitations were related to the design, process, and recruitment strategy of the project. Any of the limitations may have affected the results of the data analysis. Limitations within the project design included the lack of a comparison group. The inclusion of a comparison group in the project's design would have resulted in data that was representative of the intervention's effectiveness. Also, using one group with one KAP questionnaire both before and after the intervention may have subjected participants to sensitization and not revealed the true effect of the web-based educational toolkit presentation about LAIs, but rather of the exposure to the KAP questionnaire.

The study's process was complex. Participants were required to have access to a computer with internet capabilities and register as a Moodle® user. Independent completion of multiple steps by the participants was necessary to finish the module and all data collection. Many participants were excluded from data analysis due to missing portions of the required data collection. This most likely occurred because participants were not automatically advanced but rather had to advance to the next portion of data collection manually. Thus, making it easy to skip portions of the data collection inadvertently. In addition, the process necessitated a significant time commitment of at least 30 minutes.

Recruitment endeavors were unsuccessful and not representative of all psychiatric prescribers. Efforts were made to maximize this DNP research project's visibility to potential participants but were largely unsuccessful. Recruitment opportunities for psychiatric prescribers other than nurse practitioners were limited and resulted in a sample that was not diverse. In addition, the time frame and the specificity of the topic may have contributed to the lack of participation and resultant small sample size. Those who participated in the DNP research project were likely highly motivated, desirous of continuing education, and not fully representative of all

psychiatric prescribers. Due to the limited number of participants and the sample not being representative of all psychiatric prescribers, this DNP research project's generalizability is limited.

Implications for Nursing Practice

This DNP research project contributes to the limited body of knowledge regarding LAIs in many unique ways. It is significant to the profession of psychiatric nursing since it is the first study that examined nurse practitioners' knowledge, attitudes, and practices regarding LAIs. It is the only known study that developed a toolkit that targets the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs. The developed web-based educational toolkit is evidence-based and provides a useful resource for psychiatric prescribers regarding the utilization of LAIs. It stands as a practical reference tool to guide psychiatric prescribers in the process of prescribing a LAI. It supports web-based education and toolkits as effective educational interventions to positively affect the knowledge, attitudes, and practices of prescribers. Web-based education is a convenient, flexible, and effective form of education for medical professionals. During the current COVID-19 pandemic, it has become necessary to practice social distancing, making distance learning through web-based education essential. Lastly, the completion of this DNP research project highlighted areas needing further investigation regarding the underutilization of LAIs and acts as a catalyst for research regarding LAIs.

This chapter reviewed the research question and answered it through the data analysis of this DNP research project. This project aimed to develop and evaluate the impact of a web-based educational toolkit on psychiatric prescribers' knowledge, attitudes, and practices regarding LAIs. There were several limitations to this DNP research project, but the project's aim was

obtained and resulted in several positive implications for psychiatric nursing. Several DNP

Essentials established by the American Association of Colleges of Nursing were utilized

throughout the planning, implementation, and analysis of this project.

Chapter 5

Summary, Conclusions, and Recommendations

The DNP research project will be summarized in this chapter. Conclusions about this project and the findings of the data analysis will be drawn. Dissemination strategies of the results will be discussed. Recommendations for future research based on the findings of this DNP research project will conclude this final chapter.

Summary of Findings

LAIs are useful pharmacologic tools in the fight against schizophrenia. Still, they are underutilized in clinical practice due in part to the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers (Ciglar et al., 2016; Correll et al., 2016; Heres et al., 2006, Iyer et al., 2013a; Iyer et al., 2013b; Llorca et al., 2013; Miles et al., 2011; Patel et al., 2003; Patel et al., 2020; Sajatovic et al., 2018a; Sajatovic et al., 2018b; Samalin et al., 2013; Weiden et al., 2015). A review of the literature revealed few studies investigating the issue. Studies that did examine the issue highlighted the specific unmet educational needs of psychiatric prescribers regarding LAIs. There is a gap in the literature regarding effective educational interventions to address the knowledge deficits, uninformed attitudes, and poor prescribing practice of psychiatric prescribers that are barriers to the use of LAIs in clinical practice. Toolkits and web-based education have shown promise in positively impacting healthcare providers' knowledge, attitudes, and practices. Web-based education is convenient, flexible, and necessary due to social distancing during the COVID-19 pandemic.

This DNP research project was based on the KTA Framework, which helped translate evidence into practice through the knowledge creation and action cycle (Graham et al., 2006). It was constructed to develop and evaluate the impact of a web-based educational toolkit on

psychiatric prescribers' knowledge, attitudes, and practices regarding LAIs. The project aimed to develop an effective educational intervention to eliminate barriers to the use of LAIs by improving the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs. It was hypothesized that the web-based educational toolkit would have a positive effect on the knowledge, attitudes, and practices of psychiatric prescribers. Findings of the data analysis of this DNP research project indicated a slight improvement in knowledge, attitudes, and practices of psychiatric prescribers following a presentation of the web-based educational toolkit regarding LAIs, as evidenced by a difference in the before and the after total and three subscales KAP scores. However, the only statistically significant difference was seen in the total KAP scores of participants. There were not statistically significant differences in the before and the after three subscales KAP scores. Changes in knowledge, attitudes, and practices of participants following the presentation of the web-based educational toolkit had no association with participants' demographic factors except for an associaition between improvement in attitudes amongst participants practicing in a hospital compared to those practicing in an outpatient setting.

In assessing the baseline knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs, it revealed that contrary to the review of literature, psychiatric prescribers had adequate baseline knowledge, attitudes, and practices regarding LAIs. However, the KAP questionnaire examination indicated participants of this DNP research study had specific deficits in their knowledge, attitudes, and practices regarding LAIs that were compatible with previous studies. Due to the small sample that was not fully representative of all psychiatric prescribers and its lack of a control group, this DNP research project's results have limited generalizability. Despite this DNP research project's limitations, it was important to the body of knowledge regarding LAIs. Although it wasn't the study's purpose, it stands as the only known study that has

examined the knowledge, attitudes, and practices of psychiatric prescribers other than psychiatrists. This DNP research project is also the first known study that attempted to create an educational intervention aimed at improving the knowledge, attitudes, and practices of psychiatric prescribers to eliminate barriers to the use of LAIs. The results of this DNP research project indicated the effectiveness of the developed web-based educational toolkit at improving the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs. The web-based educational toolkit regarding LAIs stands as an effective resource and support tool for psychiatric prescribers.

Conclusions

In conclusion, this DNP research project answered the established research question. Findings revealed that the developed and evaluated web-based educational toolkit could eliminate barriers to the use of LAIs by providing a foundation for positive change to psychiatric prescribers' knowledge, attitudes, and practices regarding LAIs. It contributed to the limited body of knowledge regarding LAIs in unique ways by filling gaps in the literature. This DNP research project is the first study that attempted to develop and evaluate an educational intervention focused on eliminating the knowledge deficits, uninformed attitudes, and poor prescribing practices of psychiatric prescribers that contribute to the underutilization of LAIs in clinical practice. This DNP research project also stands as the only known study that investigated the knowledge, attitudes, and practices of psychiatric prescribers other than psychiatrists and revealed differences worthy of further investigation. Although the DNP research project generated unique information with some significant findings, it is important to note that the project had flaws that limit generalization. The study sample was small and not representative of all psychiatric prescribers, and the design was not randomized. Still, this DNP research project

serves as a platform for further investigation to guide research regarding knowledge, attitudes, practices, web-based education, toolkits, and LAIs.

Recommendations for Further Research and Dissemination of Findings

This DNP research project indicated that the web-based educational toolkit slightly improved the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs. The project can be considered feasible and should be implemented in a large randomized control trial with a more diverse sample to validate the findings. A rigorous study with a control group would more clearly demonstrate the independent effects of the web-based educational toolkit on the knowledge, attitudes, and practices of psychiatric prescribers regarding LAIs.

Based on this DNP research project's findings, additional gaps in the literature regarding LAIs were identified and should be explored. This DNP research project was the first study that examined the knowledge, attitudes, and practices of psychiatric prescribers other than psychiatrists. The findings of this DNP research project did not agree with the review of literature, which indicated that psychiatric prescribers had knowledge deficits, uninformed attitudes, and poor prescribing practices regarding LAIs. Instead, the results of this DNP research project showed that psychiatric prescribers had adequate baseline knowledge, attitudes, and practices regarding LAIs. Since the psychiatric prescribers that comprised the participants of this DNP research project were primarily nurse practitioners and not psychiatrists, it indicates a possible difference in education and experience regarding LAIs amongst psychiatrists and nurse practitioners. Further examination for differences in the knowledge, attitudes, and practices of various psychiatric prescribers regarding LAIs should be pursued. Most importantly, research exploring the low utilization rate of LAIs despite adequate knowledge, attitudes, and practices of psychiatric prescribers could reveal valuable information in the pursuit of maximizing the use of

LAIs in clinical practice. Lastly, a specific investigation into the practical application of the web-based educational toolkit should be conducted to determine if it influences psychiatric prescribers' use of LAIs in clinical practice. The web-based educational toolkit could be used as part of a protocol in a quality improvement project to maximize the use of LAIs in appropriate patients.

This DNP research project supports web-based education and toolkits as methods to increase the knowledge, attitudes, and practices of prescribers. Web-based education is valuable for busy clinicians related to the convenience of asynchronous learning. Due to the COVID-19 pandemic, which necessitates social distancing, web-based education is a practical necessity. Another advantage of web-based education in the form of a toolkit is that it can be widely and rapidly disseminated through online resources and platforms. The web-based educational toolkit about LAIs could easily be integrated into an existing curriculum for psychiatric prescribers. This study serves as a model for future web-based medical education that supports evidence-based practice.

This DNP research study is a culmination of knowledge and experiences. It reflected the AACN DNP essentials and was an attempt to improve healthcare indirectly through the education of psychiatric prescribers. The intent was to positively impact the lives of those with schizophrenia by educating the psychiatric prescribers that care for them.

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APPENDIX A

Knowledge

1. Long-acting injectable antipsychotics are only for patients that have a history of medication non-adherence. T or F

2. A long-acting injectable version of an antipsychotic causes more side effects than its oral equivalent. T or F

3. A preferred time to start a long-acting injectable antipsychotic is during a transition from a higher level to a lower level of care. T or F

4. If long-term use of an antipsychotic is necessary, a long-acting injectable antipsychotic should be considered. T or F

5. There is less individual variation in plasma levels with a long-acting injectable antipsychotic than an oral antipsychotic. T or F

6. In an adverse event, the duration of a long-acting injectable antipsychotic is a disadvantage. T or F

7. The pharmacokinetics of long-acting injectable antipsychotics are based on elimination pharmacokinetics as opposed to absorption pharmacokinetics. T or F

8. Long-acting injectable antipsychotics offer a practical solution for the common problem of medication non-adherence in those with schizophrenia. T or F

9. Experts recommend limited use of long-acting injectable antipsychotics. T or F

10. An advantage of long-acting injectable antipsychotics is that they typically take a longer time to reach a steady-state. T or F

11. Long-acting injectable antipsychotics are more effective than oral antipsychotics at decreasing rehospitalization rates, relapse rates, psychotic symptom severity, and ER visits. T or F

Attitudes

12. Patients always prefer an oral antipsychotic over a long-acting injectable antipsychotic. T or F

13. The practice of prescribing a long-acting injectable antipsychotic is coercive. T or F

14. Prescribing a long-acting injectable antipsychotic is not part of patient-centered care or shared decision-making. T or F

15. Discussing a long-acting injectable antipsychotic will harm the established relationship with a patient. T or F

16. Patients prescribed a long-acting injectable antipsychotic usually have a history of noncompliance and incarceration. T or F

17. A long-acting injectable antipsychotic is an outdated form of pharmacological treatment for those with schizophrenia. T or F

Practices

18. When discussing a long-acting injectable antipsychotic, both the advantages and disadvantages should be discussed with the patient. T or F

19. If a patient has a fear of needles, a long-acting injectable antipsychotic should not be offered as a treatment option. T or F

20. A long-acting injectable antipsychotic should be offered as a treatment option for those with schizophrenia from the first episode of schizophrenia to those in recovery. T or F

APPENDIX B

1. What is your age?
   a. 20-35
   b. 36-50
   c. 51-65
   d. 66 and over

2. What is your sex?
   a. Male
   b. Female

3. What is the number of years you have been prescribing medications?
   a. 0-5
   b. 6-10
   c. 10-20
   d. 21 plus years

4. What is your professional designation?
   a. Physician
   b. Psychiatric Nurse Practitioner
   c. Physician Assistant
   d. Nurse Specialist
   e. Family Nurse Practitioner

5. What is your place of practice?
   a. Hospital
   b. College/University
   c. Outpatient practice
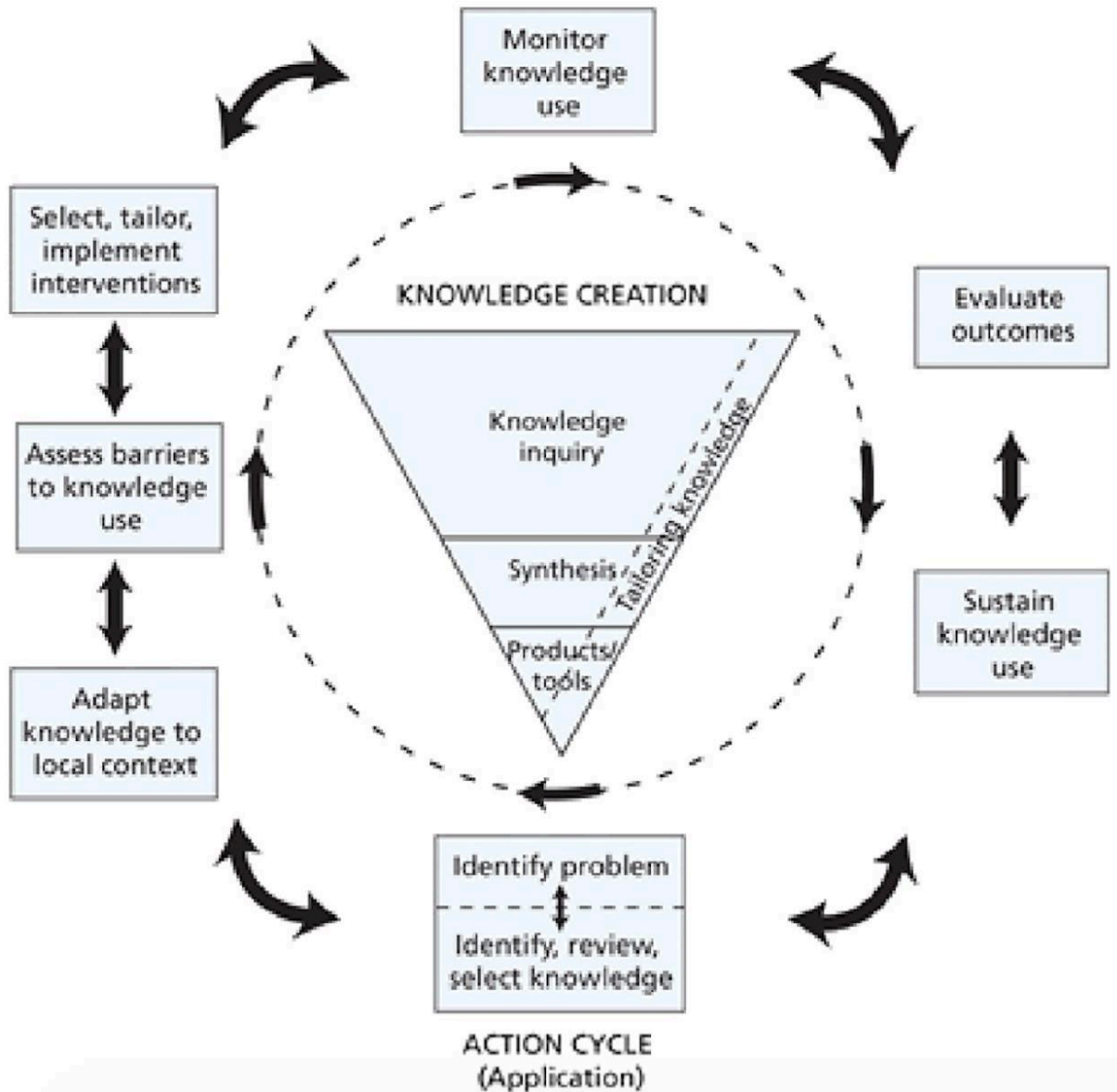   d. Long-term care
   e. Home care

Figure 1. **The Knowledge to Action Framework.** From Graham I, Logan J, Harrison M, Strauss S, Tetroe J, Caswell W, Robinson N: Lost in knowledge translation: Time for a map? *The Journal of Continuing Education in the Health Professions* 2006, 26, (1), p. 19.