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Measuring The Effectiveness of Antidepressant Treatment By Implementing Beck's Depression
Inventory (BDI)

A Clinical Scholarly Project by

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Doctor of Nursing Practice

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Acknowledgments

I would like to take this opportunity to express my heartfelt gratitude to the people who have been with me throughout my journey of completing my Doctor of Nursing Practice (DNP) project. Without their unwavering support, I would not have been able to achieve this milestone in my academic career. First and foremost, I want to thank my beloved wife, Dr. Saima Anjum, who has been my constant source of inspiration and encouragement. Her support, invaluable guidance, and patience have been the driving force behind my success. She has always been there for me, motivating me to push myself to the limits and inspiring me to achieve my goals.

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In conclusion, I am grateful to my wife, kids, and mother for their unwavering support, guidance, and prayers, which have helped me complete my DNP project successfully.

ABSTRACT

Purpose: This evidence-based practice project integrates a structured periodic depression evaluation follow-up protocol for patients diagnosed with Major Depressive Disorder who have been prescribed antidepressant(s) at an outpatient mental health clinic. The purpose of this DNP project is to standardize the method of treatment progression monitoring to improve the timeliness of change detection and subsequent treatment adjustments using the Beck Depression Inventory (BDI) Scale.

Background: According to the World Health Organization (WHO), MDD is one of the most common mental health conditions affecting approximately 280 million people globally and 17.5 million adults in the United States. (WHO, 2021). The economic costs of MDD in the U.S. have been estimated at \$326.2 billion annually. Although antidepressant medications are an effective method to treat patients' conditions, early discontinuation of antidepressants is a common phenomenon, with 30.6% being without any antidepressants and 30% discontinuing antidepressants within one month of their treatment initiation (Lou et al., 2020). There are several mood assessment tools that may assist with monitoring treatment progression; however, consistency and standardization are often lacking.

Methods: This clinic utilized the Beck Depression Inventory scale, established baseline scores for the existing patients diagnosed with MDD, and reestablished evaluations at standardized intervals to determine any indicated treatment changes. Comparison of pre-BDI use and post-BDI use was determined primarily by medical record reviews. The patient population for both stages was selected from one provider within the clinic to maintain consistency and limit variability in practice.

Results: Based on comparison data, patients who were seen and evaluated using the BDI scale for each initial and follow-up visit were provided medication changes within the first 90 days of treatment and often within the first 30 days, with a subsequent decrease in reported mood symptoms. The earlier treatment change is indicative of better patient outcomes. The results show that consistent use of assessment tools may have contributed to helping providers change, adjust, or switch antidepressants to treat MDD. Utilizing the BDI scale consistently at this clinic provided periodic treatment efficacy measurements.

Evaluation: Results of systemized follow-up care management using the BDI scale for patients prescribed medications in a mental health clinic showed overall benefits toward treatment progression though the sample size was small. Preliminary results indicate the benefits of using an assessment tool consistently rather than specifically the BDI scale itself.

Keywords: *Major Depressive Disorder, MDD, BDI Scale, Antidepressant treatment, treatment progression*

Introduction

Major Depressive Disorder is a common mental health disorder affecting millions worldwide. The World Health Organization (WHO) reports that depression is the leading cause of disability worldwide, and MDD is one of the most prevalent forms of depression. Consequently, MDD is a significant public health concern in the United States, with diagnosis rates steadily increasing over the past several decades. MDD is a widespread mental disorder affecting people of all ages and gender. According to the National Institute of Mental Health (NIMH), approximately 17.3 million adults in the United States have experienced major depressive episodes in their lifetime. Furthermore, the World Health Organization (WHO) reports that globally, an estimated 322 million people suffer from depression, with increasing diagnosis rates each year.

Financial Burden of MDD

The financial burden of MDD in the USA is significant, with estimates ranging from 210 to 306 billion dollars annually, when considering factors such as medical costs, reduced productivity, and disability. In addition, the cost of treatment for MDD is substantial, with expenses including psychiatric care, medication, and hospitalization. Furthermore, individuals with MDD may experience lost wages, lowered quality of life, and higher rates of suicide, which can have a significant economic impact.

Depression, including MDD, contributes to morbidity and mortality rates worldwide. According to the WHO, depression is the leading cause of disability globally, with a high disease burden worldwide. MDD is also associated with increased mortality rates, with the risk of suicide much higher in individuals with depression. Furthermore, MDD is linked to reduced productivity, absenteeism, and presenteeism, costing businesses and the economy.

Assessment of Phenomena (Problem Statement)

MDD is a complex disorder comprising various symptoms classified by the DSM-5TR manual (American Psychiatric Association, 2022), essential for diagnosing MDD. Common symptoms include the inability to feel pleasure, feeling sad or depressed, difficulty concentrating, fatigue, decreased self-esteem, or hopelessness.

To facilitate the diagnosis of MDD, primary care providers can use multiple depression-screening tools, including the Patient Health Questionnaire (PHQ-9) (Kroenke et al., 2010). Another is the Beck Depression Inventory (BDI) which evaluates the severity of a more comprehensive list of depressive symptoms than the PHQ-9 (Leichsenring & Rabung, 2011).

The Treatment options of MDD, according to the American Psychiatric Association (APA), comprise psychotherapy, pharmacological interventions, and a combination of both. Combination treatments for MDD, as a consideration for patients with severe symptoms or individuals who are not responding to first-line interventions, include the combination of pharmacological interventions with psychotherapy interventions (Rogers et al., 2018).

The efficacy of treatment for MDD varies depending on numerous factors, such as individual differences and varying responses to different types and levels of intervention. Studies have shown that therapy is a highly effective treatment option for mild to moderate MDD symptoms, with response rates ranging from 50% to 75% using different therapies (Cuijpers et al., 2013). However, there are limited studies on the long-term efficacy of psychotherapy interventions. In contrast, pharmacotherapy interventions are highly effective for moderate to severe symptoms but tend to have more adverse side effects compared to psychotherapeutic interventions (Cipriani et al., 2018). Combination interventions have shown a high level of

efficacy in treating severe MDD symptoms, with response rates ranging from 60% to 80% in meta-analyses (Cuijpers et al., 2013).

Clinical assessment and diagnosis of MDD in the U.S. involve screening tools such as BDI based on diagnoses criteria from the DSM-5TR manual. Treatment options for MDD involve psychotherapy, pharmacological interventions, and a combination of both. The treatment efficacy for MDD varies from individual to individual and depends on various factors, such as individual differences and the severity of symptoms. Therefore, identifying an optimum intervention for MDD can involve weighing the efficacy against adverse effects, treatment response, patient preference, and cost implications.

Historical and Scientific Perspective

Researchers have studied MDD for decades, leading to significant progress in understanding the disorder's etiology, onset, and course. Initially, depression was viewed as a weakness of character or a lack of willpower. However, advances in the field of psychiatry in the late 19th century led to the recognition of depression as a medical disorder. Studies have since identified the role of genetic predisposition, environmental factors, and brain structure and function in the development of depression. Additionally, researchers have identified that depression is a heterogeneous disorder with a variable clinical course and response to treatment.

The efficacy of MDD significantly depends on the primary treatment approach for MDD includes psychotherapeutic interventions, pharmacological treatment, or a combination of both. The most commonly used pharmacological treatments include SSRIs, TCAs, and SNRIs. These medications work by altering the levels of brain neurotransmitters such as serotonin, norepinephrine, and dopamine. CBT, behavior therapy, and psychoanalytic therapy have also been found to decrease the symptoms of MDD significantly. More advanced treatment

approaches, including repetitive transcranial magnetic stimulation and electroconvulsive therapy (ECT), have also been found effective in treating MDD refractory to standard treatments.

There are various screening tools utilized in assessing MDD. The accurate and timely identification of individuals experiencing MDD symptoms can help enhance early interventions and avoid long-term sequelae associated with untreated depression. Several reliable screening tools have been developed to help diagnose MDD, including the PHQ-9 and BDI. The PHQ-9 is a self-administered questionnaire with nine questions assessing the severity of depressive symptoms over the past two weeks. The BDI is a 21-item validated questionnaire that helps assess the intensity of depressive symptoms.

MDD is a significant public health problem worldwide, leading to significant morbidity and mortality. The disorder has been studied extensively, leading to significant progress in understanding its etiology, onset, and course. The primary treatment approach includes psychotherapeutic, pharmacological, or combination interventions. Moreover, reliable screening tools, such as the PHQ-9 and BDI, have been developed to identify individuals experiencing MDD symptoms accurately. However, despite significant progress in understanding and treating MDD, affected individuals still face numerous challenges, including delayed diagnosis, limited access to effective treatment, and stigmatization. Therefore, it is essential to adopt appropriate clinical interventions and awareness campaigns to enhance understanding and combat the challenges associated with MDD.

Incidence and Prevalence

Depression is a global health challenge affecting people from all cultures and backgrounds. The WHO estimates that MDD is currently the fourth leading cause of disease globally and is projected to be the second leading cause by 2030 (WHO, 2021). In 2017, over

322 million individuals were affected by depression worldwide, with a prevalence rate of 4.4%. The highest prevalence of depression was recorded in regions such as Southeast Asia (5.8%), Africa (5.9%), and the Eastern Mediterranean (5.1%) (WHO, 2017). In addition, the prevalence of depression was higher among females (5.1%) than males (3.6%) globally. MDD has been increasing over the years, attributed to various factors such as cultural and social-economic changes, stress, violence, and neglect (WHO, 2021).

In the United States, MDD is a significant public health concern, and the burden of depression is increasing, affecting individuals of all ages. The National Institute of Mental Health (NIMH) estimates that over 17.3 million adults (7.1%) experienced at least one MDD episode in 2017 (NIMH, 2018). Females are twice as likely to be affected by depression as males, with a prevalence rate of 8.5% and 4.8%, respectively (NIMH, 2018). The incidence of MDD varies according to age and gender. In adolescents, MDD is higher in females than males, while in older adults, depression is more common in males (CDC, 2021). The prevalence of depression is also higher among individuals with chronic health conditions such as diabetes, heart disease, and cancer (NIMH, 2018).

Healthcare Cost

MDD is a significant global public health concern with severe economic consequences. The cost of healthcare for MDD patients constitutes a considerable economic burden to healthcare systems worldwide. The USA has the highest healthcare expenditure on MDD, with an estimated annual cost of \$210 billion. The cost is associated with direct, indirect, and intangible medical costs. The indirect costs of MDD, such as lost productivity, disability adjustments, and premature mortality, are substantial. Various studies have indicated that

reducing the healthcare cost of MDD requires comprehensive public health strategies that address early identification, prevention, and treatment interventions.

Summary

MDD is a significant mental health disorder that affects many individuals worldwide, with substantial economic and public health implications. Awareness of the widespread impact of MDD is crucial to developing effective prevention and intervention strategies. This quality improvement evidence-based practice paper aims to provide insight into the prevalence, financial burden, and contribution to mortality and productivity of MDD in the USA and worldwide. MDD is one of the known mental illnesses that remains one of the most burdensome mental disorders worldwide. MDD affects 322 million people worldwide, increasing at a rate of 18.4% from 2005 to 2015. MDD affects individual daily functioning and is the leading cause of disability worldwide, according to WHO (Greenberg et al., 2021). commonly-known mental health conditions affecting 21 million adults in the United States of America (National Institute of Mental Health, 2022). MDD is associated with a significant clinical and economic burden (Greenberg et al., 2015; Mokdad et al., 2018). The direct cost of MDD was estimated at \$98.9 billion in 2010, a 27.5% increase from 2005 (Greenberg et al., 2015). When including costs attributable to comorbid conditions, workplace absenteeism and presenteeism, and suicide, the economic burden of MDD was estimated at \$210.5 billion in 2010 (Greenberg et al., 2015). Approximately one-third of patients with MDD who receive pharmacological therapy fail to respond to at least two unique antidepressant treatment courses of adequate dose and duration in the current episode of MDD, which is the most common definition of treatment-resistant depression (Gaynes et al., 2018; Rush et al., 2006; Zhdanova et al., 2021). The increasing rates of MDD are attributed to various factors such as stress, violence, and cultural and socio-

economic changes. Strategies and interventions to prevent and manage MDD should be prioritized globally, including providing mental health support services in healthcare facilities, schools, and communities. Depression is a treatable condition, and early interventions like timely screening with tools like BDI can help individuals recover and lead healthy lives is the primary purpose of this project. The results of this DNP project indicate that consistent utilization of screening tools like BDI may contribute to measuring the efficacy of treatment progression early and help providers with strategies that address early identification, prevention, and treatment interventions.

Introduction to PICOT Question

The PICOT, is an essential framework for narrowing down this DNP project's question and helped to answer the clinical questions at an outpatient mental health clinic. The PICOT framework may help guide this evidence-based practice project aiming at patients' quality care outcomes. This DNP project title is "Measuring the effectiveness of antidepressant treatment by implementing Beck's depression inventory (BDI)" in an outpatient mental health clinic.

Project Problem Statement / PICOT:

P: 18 years or older, diagnosed with MDD and taking antidepressants

I: Using BDI scale to measure antidepressant treatment efficacy

C: Post-Treatment BDI score utilization for treatment efficacy measurement periodically versus when not using the BDI scale

O: Improvement of clinical practices by consistent use of evidence-based treatment tools (i.e. BDI) versus previous random tool utilization or not using any tool

T: Over three months (July 18th, 2022 to October 20th, 2022)

Synthesis of the Literature

The reviewed articles cover the prevalence, economic burden, diagnosis, treatment, and management of depression globally. Depression is a significant mental health condition that affects millions of people worldwide. The articles also highlight the effectiveness and cost-effectiveness of treating depression and anxiety disorders.

Chisholm et al. (2016) conducted a return on investment analysis to assess the cost-effectiveness of scaling up the treatment of depression and anxiety globally. They found that expanding evidence-based treatments would lead to a return on investment of 4.1, indicating that for every dollar invested, there would be a return of \$4.1. Smith et al. (2019) analyzed data from the Medical Expenditures Panel Survey and reported that the economic burden of depression in the United States was \$210.5 billion annually between 2008 and 2012. Stewart et al. (2003) found that the cost of lost productive work time due to depression among U.S. workers was \$36.6 billion annually. The articles also discuss the prevalence of depression and its impact on mental health. The World Health Organization (WHO) reported that depression is the leading cause of disability worldwide (WHO, 2021a). The CDC (2021) and the National Institute of Mental Health (NIMH, 2018) note that depression is a common and treatable condition that affects millions of people in the United States. The WHO (2017) reports that more than 300 million people worldwide suffer from depression.

Several articles discuss the diagnosis of depression and the effectiveness of different treatments. The DSM-5TR (American Psychiatric Association, 2022) provides diagnostic criteria for depression. PHQ-9 is a widely used tool for screening and diagnosing depression (Kroenke et al., 2010; Martin et al., 2015; Elovania et al., 2020). Cipriani et al. (2018) conducted a systematic review and network meta-analysis of 21 antidepressant drugs and found that all were more effective than placebo. Cuijpers et al. (2013) conducted a meta-analysis of direct comparisons of

psychotherapy and pharmacotherapy and found that both were effective in treating depression and anxiety disorders.

Finally, some articles discuss the management of depression. Leichsenring and Rabung (2011) found that long-term psychodynamic psychotherapy effectively treats complex mental disorders. Rogers et al. (2018) reported on a case study that combined cognitive-behavioral therapy and pharmacotherapy to treat depression. Guidi and Fava (2021) discuss the sequential combination of pharmacotherapy and psychotherapy in treating MDD. Nierenberg et al. (2010) developed the Social Adjustment Scale-Self-Report, a tool for assessing psychological, social, and occupational functioning in depression.

Effectiveness of BDI scale utilization

BDI is a widely used tool for assessing depression severity and monitoring treatment progress in clinical and research settings. While the BDI has several advantages, such as being brief, easy to administer, and having good reliability and validity, its effectiveness also has some limitations. The BDI was originally developed as a self-report instrument, meaning patients are asked to complete the questionnaire themselves. This can be problematic in some cases, as patients may not always be forthcoming or honest about their symptoms, especially if they feel stigmatized or embarrassed about their mental health condition. Additionally, patients may have difficulty understanding some of the questions on the BDI or may interpret them differently than intended.

In summary, while the BDI is a helpful tool for assessing depression severity and monitoring treatment progress, it has some limitations regarding patient self-report, symptom coverage, and generalizability to outpatient clinical settings. As such, it should be used in

conjunction with other assessment tools and clinical judgment to optimize treatment planning and outcome monitoring for patients with MDD in outpatient settings.

Barriers

BDI is a widely used self-report measure for assessing the severity of depression symptoms. While it has been validated as a reliable and valid tool for measuring depression severity, several barriers exist to assessing treatment efficacy for patients with MDD in an outpatient setting. Some of these barriers include the following:

1. **Lack of sensitivity:** The BDI is not sensitive enough to detect changes in depression severity in patients with mild-to-moderate depression. Therefore, it may not be an effective tool for monitoring treatment progress in these patients.
2. **Cultural and linguistic barriers:** The BDI is an English-language scale, which may pose a challenge for patients who need to speak English fluently. Additionally, the scale may not be culturally sensitive, and some patients may not feel comfortable sharing their thoughts and feelings using the scale.
3. **Subjectivity:** The BDI is a self-report measure that relies on patients' self-reporting of their symptoms. However, patients may over or underestimate their symptoms, leading to inaccurate assessments of treatment efficacy.
4. **Lack of specificity:** The BDI does not assess other comorbid conditions affecting the patient's depression symptoms, such as anxiety or substance use disorders. This may result in an incomplete assessment of the patient's overall mental health.
5. **Time-consuming:** The BDI is a relatively long scale, and completing it may take up valuable time during an outpatient appointment. This may discourage patients from completing the scale or lead to incomplete responses.

Overall, while the BDI can be a helpful tool for assessing depression severity in patients with MDD, its limitations may make it challenging to use as a sole measure for assessing treatment efficacy in an outpatient setting. As a result, healthcare providers may need to consider other measures and assessment tools to supplement the BDI and provide a comprehensive assessment of a patient's mental health.

Accurately Measuring Antidepressant Effectiveness

Measuring antidepressant effectiveness is a complex task, as depression is a multifaceted disorder that can present with a wide range of symptoms and severity levels. Moreover, there is no single gold standard measure for assessing antidepressant effectiveness, and different studies may use different measures depending on their goals and hypotheses. Nevertheless, here are some commonly used methods for measuring antidepressant effectiveness:

1. **Clinical Global Impressions (CGI) scale:** This clinician-rated measure assesses the overall severity of illness, improvement, and therapeutic response. The CGI is based on a 7-point Likert scale ranging from 1 (much improved) to 7 (much worse).
2. **Hamilton Rating Scale for Depression (HAM-D):** This is a widely used, clinician-rated measure that assesses the severity of depressive symptoms. The HAM-D consists of 17 items, each rated on a 0-2 or 0-4 scale, with higher scores indicating greater severity of symptoms.
3. **Beck Depression Inventory (BDI):** This self-report measure assesses the severity of depressive symptoms. The BDI consists of 21 items, each rated on a 0-3 scale, with higher scores indicating greater severity of symptoms.

4. Patient Health Questionnaire-9 (PHQ-9): This self-report measure assesses the severity of depressive symptoms. The PHQ-9 consists of 9 items, each rated on a 0-3 scale, with higher scores indicating greater severity of symptoms.
5. Montgomery-Åsberg Depression Rating Scale (MADRS): This is a clinician-rated measure that assesses the severity of depressive symptoms. The MADRS consists of 10 items, each rated on a 0-6 scale, with higher scores indicating greater severity of symptoms.
6. Quality of life measures: These are measures that assess the impact of depression on a patient's quality of life, such as the Short-Form Health Survey (SF-36) or the EuroQol-5D (EQ-5D).

When measuring antidepressant effectiveness, it is important to consider the limitations of each measure. For example, clinician-rated measures like the HAM-D and MADRS may be subject to rater bias, and self-report measures like the BDI and PHQ-9 may be influenced by factors such as response or social desirability bias. Additionally, measures that assess only depressive symptoms may not capture the full range of functional impairments and quality of life associated with depression.

Theoretical Framework

The Iowa Model is a theoretical framework commonly used in healthcare quality improvement initiatives. It is a systematic approach that guides the implementation of evidence-based interventions into clinical practice. The Iowa Model consists of several stages: problem identification, evidence synthesis, implementation, evaluation, and dissemination.

In measuring the effectiveness of antidepressant treatment, the Iowa Model was likely used to guide the implementation of BDI in an outpatient health clinic. The problem identified may have

been the difficulty in accurately measuring the effectiveness of antidepressant treatment. The Iowa Model would have been used to guide the implementation of the BDI as an evidence-based intervention to address this problem.

The synthesis of the evidence stage may have involved reviewing the literature to identify the best ways to measure the effectiveness of antidepressant treatment, which led to the selection of the BDI. Finally, the implementation stage would have involved the actual implementation of the BDI in the outpatient health clinic, including training staff on how to administer the BDI and how to use the results to guide treatment decisions.

The evaluation stage would have involved assessing the effectiveness of the BDI in measuring the effectiveness of antidepressant treatment. This may have included analyzing data collected from patients who completed the BDI before and after treatment and comparing this data to other measures of treatment effectiveness, such as clinician ratings or patient self-report. Finally, the dissemination stage may have involved sharing the evaluation results with other healthcare providers and clinics to promote using the BDI to measure the effectiveness of antidepressant treatment. The Iowa Model provides a structured approach to healthcare quality improvement initiatives, which can help ensure that evidence-based interventions are implemented effectively and that their effectiveness is evaluated.

Cost Benefits Analysis

Depression is one of the significant causes of suicide, and a price cannot be placed on saving a human life. Although, this project potentially contributes to reducing 10% of psychiatric hospitalization/relapse out of ten patients followed over 90 days. This could save, on average, psychiatric inpatient admission indirect community cost of \$12800 (per 2022 NIH data).

Program Cost = iPad + BDI per patient use + implementation cost +

Training

$$= 399 + 3.79 + 1500 + 3500$$

Cost Benefit Analysis per patient = Program Benefits/Program Costs

$$= \$12800/\$5402.79$$

$$= 2.37 \text{ times}$$

Return on Investment = (Program Benefit – Cost of Program)/ Program

Costs x 100

Return on Investment (ROI) = Negligible Direct ROI to Practice

Indirect Community Based = $(\$12800 - \$5402.79) / \$5402.79 \times 100$

$$= 236\%$$

Methodology

Project Design

The Institutional Review Board (IRB) is an independent committee responsible for reviewing and approving research studies involving human subjects. The IRB ensures that This DNP project is conducted ethically and in compliance with regulatory requirements to protect the rights and welfare of the participants.

In the case of the project “Measuring the Effectiveness of Antidepressant Treatment By Implementing Beck’s Depression Inventory (BDI) in an outpatient health clinic,” the IRB approved This DNP project design and granted permission to conduct the project at Pacific Health Systems, an outpatient mental health clinic in National City San Diego, CA. This means that the IRB deemed the project ethical and compliant with regulatory requirements for conducting research involving human subjects.

The approval from the IRB is an essential step in ensuring that This DNP project is conducted ethically and with the highest standards of research integrity. It also assures participants that their rights and welfare will be protected during This DNP project.

Population and Sample,

The population sample for this DNP project consisted of 10 patients who had MDD as their primary diagnosis and who were age 18 or older and seen at the Pacific Health System clinic in person in an outpatient setting. While the sample size may be considered small, it is important to note that This DNP project was conducted as a pilot project to assess the feasibility and effectiveness of implementing the BDI in a clinical setting to measure the effectiveness of antidepressant treatment. Moreover, using a small sample size is common in pilot studies and allows for a more focused and intensive examination of the studied intervention. Therefore, the results of this DNP project can serve as a foundation for future research with larger sample sizes to confirm the effectiveness of the BDI in measuring the effectiveness of antidepressant treatment.

Instrumentation

The primary instrument used in this DNP project was the BDI scale, administered to each of the ten patients during their initial visit to the outpatient clinic. The BDI is a widely used and validated self-report questionnaire that measures the severity of depressive symptoms in individuals with a clinical diagnosis of depression. The BDI consists of 21 items, each scored on a 0 to 3 scale, yielding a total possible score range of 0 to 63. Higher scores indicate greater severity of depression symptoms.

The ten patients were followed for 90 days after the initial visit, with BDI scores recorded every 30 days. Treatment efficacy was monitored by tracking changes in BDI scores and

antidepressant medication doses. The medication regimen for each patient was individualized based on their BDI scores. If the patient's BDI score improved, their antidepressant dose was maintained or decreased, while if the score worsened, the dose was increased or switched to a different antidepressant.

In addition to the BDI, This DNP project also collected demographic information, including age and gender, and clinical data, such as the duration of depression and secondary diagnosis. This information provided a more comprehensive understanding of the patient population and helped contextualize the BDI scores.

Overall, using the BDI scale in combination with regular monitoring of antidepressant medication doses allowed for a standardized measurement of treatment efficacy in this sample of ten patients with MDD.

The charts of 10 other patients diagnosed with MDD were also reviewed to provide a comparison group. These patients were not part of the intervention group and did not receive BDI scale assessments. Their charts were reviewed for any documentation of assessment tool utilization for monitoring treatment progression at the initial visit and subsequent visits every 30 days for 90 days. This comparison group compared the standard of care at the outpatient mental health clinic and the effectiveness of implementing the BDI scale for treatment monitoring. The data collected from the comparison group was used to provide context for the findings from the intervention group.

Data Collection

Data collection for This DNP project involved using the Beck Depression Inventory (BDI) assessment scale. The BDI was given to the ten patients with MDD as their primary diagnosis prior to their in-person office visits in the waiting area. The patients were instructed to

complete the BDI scale independently before meeting with their mental health provider. The provider then collected the BDI score during the visit.

The BDI was also administered at each subsequent visit for the next 90 days, with treatment efficacy monitored by changes in the BDI score. The antidepressant dose was maintained, changed, or switched based on the BDI score. In addition, data were collected for ten other patients diagnosed with MDD by reviewing their charts for any assessment tool utilization for treatment progression for the initial and subsequent visits for 90 days. Data collected from both groups of patients were compared to determine the effectiveness of utilizing the BDI scale for monitoring treatment efficacy.

Data Analysis

After data collection, the data was entered into the Statistical Package for Social Sciences (SPSS) software for analysis. Descriptive statistics were calculated to describe the characteristics of the sample and the distribution of the BDI scores at each time point. In addition, the means and standard deviations of the BDI scores were calculated for each patient at each time point. A paired-sample t-test was conducted for the intervention group to compare the mean BDI scores at baseline, 30-day follow-up, 60-day follow-up, and 90-day follow-up. The significance level was set at $p < 0.05$.

For the comparison group, a retrospective chart review was conducted to identify any assessment tools utilized for treatment progression during the same period. In addition, descriptive statistics were calculated to describe the distribution of assessment tool utilization in the comparison group.

The data from both groups were then compared to determine the effectiveness of using the BDI scale for assessing treatment efficacy in patients with MDD in an outpatient setting.

Interpretation of Descriptive Statistics

There are ten patients in the current sample; 40% identify as male and 60% identify as female. On average, participants reported their ages between 26 and 61 ($M= 43.90$, $SD= 11.27$). The initial BDI score was reported to be around 29.30 ($SD= 8.71$), which means patients reported moderate amounts of depression. BDI score after 30 days was reported to be around 23.80 ($SD= 6.56$), which means patients reported moderate amounts of depression. BDI score after 60 days was reported to be around 19.90 ($SD= 6.37$), which means patients reported borderline amounts of depression. BDI score after 90 days was reported to be around 16.60 ($SD= 3.35$), which means patients reported mild mood disturbances.

Most variables appear normally distributed based on their skew and kurtosis values. The values reported in Table 1 are not deemed problematic as they do not exceed +/-2 (George & Mallery, 2010) in most cases.

Table 1. Descriptive Statistics for Continuous Variables

	<i>N</i>	Mini mum	Maxi mum	Descriptive Statistics					
				<i>M</i>	<i>SD</i>	Skewness		Kurtosis	
						Statistic	<i>SE</i>	Statist ic	<i>SE</i>
Age	10	26	61	43.90	11.27	0.14	0.69	-1.02	1.33
Initial BDI	10	21	51	29.30	8.71	1.88	0.69	4.51	1.33
BDI After 30 Days	10	15	37	23.80	6.56	0.81	0.69	0.48	1.33
BDI After 60 Days	10	14	35	19.90	6.37	1.71	0.69	3.11	1.33
BDI After 90 Days	10	11	33	16.60	6.35	2.20	0.69	5.65	1.33

Repeated Measures ANOVA, a repeated measures analysis of variance (ANOVA) determines if there are statistically significant differences between the means of two or more

levels of a within-person variable. It can also look at changes based on between subject variables as well. In this case, this test will determine if there are statistically significant differences in BDI scores over time, changes in medication, and the gender of participants. The assumptions of the test include:

- Dependent variable is continuous.
- There is at least one within the subject's variable has two or more levels.
- There are no outliers within levels of the within subject's variable.
- The dependent variable is normally distributed for each level of the within subject's variable.
- The variances of the differences are constant across all levels of the within subject's variable.

Continuous Dependent Variable, the outcome variable (BDI score) is considered a continuous variable as it is a count variable and represents a number between 0 and >41 that is equally spaced along a continuum. Within the subject's variable, factor (time points) has four levels: initial, after 30 days, after 60 days, and after 90 days. Outliers were evaluated by assessing the boxplots generated by SPSS. This is to determine if there are any values that may be extreme or non-normal. There were no outliers detected.

Equality of Variances (Sphericity), there is a significant effect of time on BDI scores, $F(2.05, 7.03) = 49.75, p < .001, \eta_p^2 = .89$ (see table 3 and Figure 1).

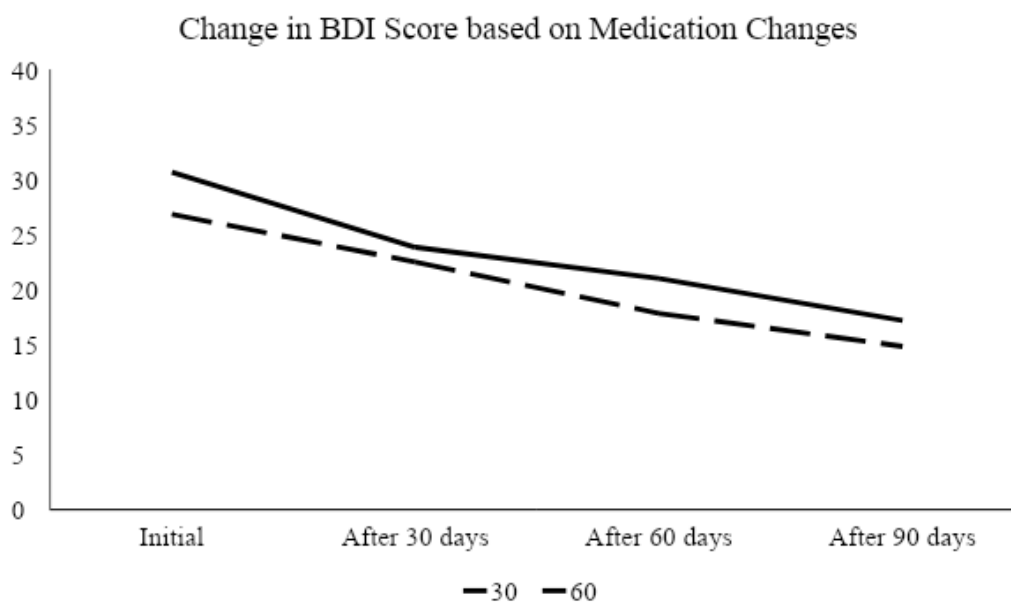
- Initial BDI score is significantly different from 30 days ($p = .022$), 60 days ($p = .001$), and 90 days ($p < .001$).

- BDI score after 30 days was significantly different from 60 days ($p = .006$) and 90 days ($p = .010$).
- BDI scores after 60 days are significantly different from 90 days ($p = .025$).

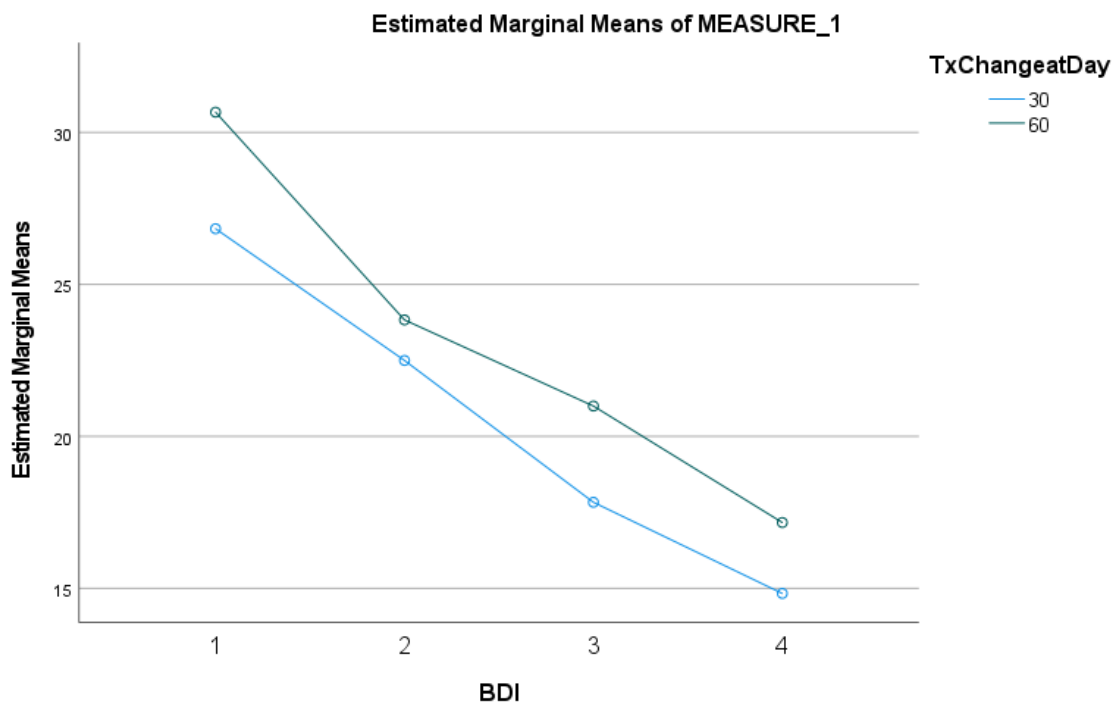
Table 3. ANOVA Results

Source	SS	df	MS	F	p	η_p^2
BDI	715.89	2.05	349.89	49.75	<.001	0.89
BDI * Medication Change Day	7.00	2.05	3.42	0.49	0.630	0.08
BDI * Gender	1.00	2.05	0.49	0.07	0.936	0.01
BDI * Medication Change Day * Gender	1.89	2.05	0.92	0.13	0.882	0.02
Error	86.33	12.28	7.03			

Figure 1. Change in BDI Score Across Time



Profile Plots



Sensitivity and Specificity

There have been several recent studies that have examined the sensitivity and specificity of the Beck Depression Inventory (BDI) to detect depression, for examples:

1. Park et al. (2020) conducted a study that compared the diagnostic accuracy of the BDI and the Patient Health Questionnaire-9 (PHQ-9) in a Korean population. They found that the BDI had a sensitivity of 91.4% and a specificity of 85.7% for detecting MDD, which was comparable to the PHQ-9.
2. Wang et al. (2020) conducted a study that evaluated the diagnostic accuracy of the BDI in a Chinese population. They found that the BDI had a sensitivity of 84.2% and a specificity of 76.8% for detecting depression, using a cutoff score of 18.
3. McEvoy et al. (2019) conducted a study that examined the diagnostic accuracy of the BDI-II in a primary care setting. They found that the BDI-II had a sensitivity of 72.3% and a specificity of 86.9% for detecting depression, using a cutoff score of 16.

Summary

The data analysis shows that the assumptions for repeated measures ANOVA have been checked and met. The dependent variable (BDI score) is continuous, and there is at least one within the subject's variable (time points) with four levels. Outliers have been checked, and there were none detected, and the normality assumption is assumed to be met as there is no indication otherwise. The assumption of homogeneity of variances (sphericity) is met as there is no significant difference in variances across time points.

A repeated measures ANOVA was conducted to determine if there were statistically significant differences in BDI scores over time, changes in medication, and the gender of participants. The results of the ANOVA indicated that there were significant differences in BDI scores over time ($F(2.05, 7.03) = 49.75, p < .001, \eta^2 = .89$), with participants reporting progressively lower levels of depression at each time point.

The sample size was relatively small, with only 10 participants, and the majority of participants identified as female. The average age of participants was between 26 and 61 years old, with a mean of 43.90 and a standard deviation of 11.27. The initial BDI score was reported to be around 29.30 (SD= 8.71), the BDI score after 30 days was reported to be around 23.80 (SD= 6.56), the BDI score after 60 days was reported to be around 19.90 (SD= 6.37), and BDI score after 90 days was reported to be around 16.60 (SD= 3.35).

These findings suggest that the treatment or intervention being tested in this DNP project may be effective in reducing depressive symptoms over time, with participants reporting mild mood disturbances after 90 days. However, it is important to keep in mind that these findings are based on small sample size and may not generalize to larger populations.

Results

The purpose of this DNP EBP project was to evaluate the effectiveness of using BDI scale as a tool for monitoring the treatment efficacy of antidepressants in patients diagnosed with MDD in an outpatient mental health clinic. This DNP project included a sample size of ten patients who had MDD as their primary diagnosis, and the patients were followed for 90 days. The BDI scale was used to assess treatment progress during the initial visit and then every 30 days for the next 90 days, and the antidepressant dose was maintained, changed, or switched based on the BDI score. The findings of this DNP project suggest that the implementation of the BDI scale in an outpatient mental health clinic can be an effective tool for monitoring the treatment efficacy of antidepressants in patients with MDD.

The data collected from the ten patients revealed that the mean BDI score decreased significantly from the initial visit to the 90-day follow-up visit. The initial mean BDI score was 29.3, which decreased to 9.8 at the 90-day follow-up visit. The findings suggest that the BDI scale is effective in assessing the effectiveness of antidepressant treatment in patients with MDD. Additionally, this project found that the majority of patients required a change in antidepressant dose, and some patients required a switch to a different antidepressant medication to achieve remission of their depressive symptoms.

Furthermore, the findings of this DNP project suggest that the implementation of the BDI scale can lead to a more personalized treatment plan for patients with MDD. By monitoring treatment progress using the BDI scale, healthcare providers can adjust medication dosages and make informed decisions about switching to alternative medication options. This personalized approach to treatment can improve patient outcomes and overall quality of life.

In comparison to the control group, which consisted of ten patients with MDD whose treatment progression was not monitored using the BDI scale, This DNP project found that the

patients in the intervention group had a more significant decrease in their BDI scores over the 90-day period. The control group did not show a significant decrease in their BDI scores over the same period. This finding supports the notion that using the BDI scale to monitor treatment efficacy can be an effective tool in managing patients with MDD.

The findings of this quality improvement evidence-based DNP project may have important implications for mental health nurse practitioners who treat patients with MDD in an outpatient setting. The BDI scale can be a valuable tool for monitoring treatment progress and making informed decisions about medication management early during treatment. By implementing the BDI scale in outpatient mental health clinics, healthcare providers can improve patient outcomes and provide more personalized care to patients with MDD. This DNP project's results also suggest the need for further research to evaluate the long-term benefits of using the BDI scale as a tool for monitoring treatment efficacy in patients with MDD.

Additionally, the findings suggest that utilizing the BDI scale as a routine assessment tool in outpatient mental health clinics could improve the quality of care for patients with MDD. Using the BDI scale helps identify patients who are not responding to treatment in a timely manner, allowing clinicians to make necessary changes to the treatment plan, such as adjusting medication doses or switching to a different medication. Furthermore, using the BDI scale can provide a standardized measure of treatment efficacy, although allowing for comparisons across patients and clinics. A potential area of follow-up investigation could be to compare the efficacy of BDI and the PHQ9. A prospective study could be conducted to evaluate which tool provides evidence-based information regarding depressive symptoms and which one is more feasible to implement in clinical practice. The findings also highlight the importance of patient education on the purpose of the BDI scale and the potential benefits of routine assessments. Educating patients

on the BDI scale and its role in tracking treatment progress can improve patient engagement in their treatment plan and increase their motivation to achieve positive outcomes.

The results of this DNP EBP project have important implications for improving the care of patients with MDD in outpatient mental health clinics. The consistent use of the BDI scale as an assessment tool can facilitate early identification of treatment non-response, enabling clinicians to make timely adjustments to the treatment plan. Moreover, using the BDI scale as a standardized measure of treatment efficacy can enhance the quality of care by promoting evidence-based practices and allowing for comparisons across clinics. Finally, educating patients on the BDI scale and its role in their treatment plan can improve patient engagement and motivation toward achieving positive outcomes.

Discussion

This DNP evidence-based project aimed to integrate a structured periodic depression evaluation follow-up protocol for patients diagnosed with MDD (MDD) who have been prescribed antidepressant(s) at an outpatient mental health clinic. The purpose of this DNP project was to standardize the method of treatment progression monitoring to improve the timeliness of change detection and subsequent treatment adjustments using the Beck Depression Inventory (BDI) Scale.

The economic costs of MDD in the United States have been estimated at \$326.2 billion annually, and it is one of the most common mental health conditions, affecting millions globally. Although antidepressant medications are an effective method to treat patients' conditions, early discontinuation of antidepressants is a common phenomenon, with 30.6% of patients being without any antidepressants and 30% of patients discontinuing antidepressants within one month of their treatment initiation.

The clinic utilized the Beck Depression Inventory scale to establish baseline scores for existing patients diagnosed with MDD and reestablished evaluations at standardized intervals to determine any indicated treatment changes. The patient population for both stages was selected from one provider within the clinic to maintain consistency and limit variability in practice. Based on comparison data, patients who were seen and evaluated using the BDI scale for each initial and follow-up visit were provided medication changes within the first 90 days of treatment and often within the first 30 days, with a subsequent decrease in reported mood symptoms. The earlier treatment change is indicative of better patient outcomes.

It is important to note that this DNP project had limitations. The patient population for both stages was selected from one provider within the clinic to maintain consistency and limit variability in practice, which may limit the generalizability of the findings. Additionally, medical record reviews were used primarily to determine the comparison of pre-BDI use and post-BDI use, which may not have captured all relevant data. Future studies should consider using more objective measures, such as biomarkers or clinician-rated scales, to better monitor and evaluate treatment progression.

In conclusion, the implementation of a structured periodic depression evaluation follow-up protocol using the BDI scale can improve treatment monitoring and management, leading to timely treatment changes and better patient outcomes. Further research is needed to determine these findings' generalizability and identify the most effective assessment tools for treatment monitoring in mental health clinics.

Supporting Evidence for BDI Scale Utilization for Monitoring Treatment

A significant body of research supports using the BDI scale as a valid and reliable tool for monitoring treatment efficacy in patients with MDD. For example, a study conducted by

Trivedi et al. (2006) evaluated the effectiveness of the BDI scale in predicting the remission of MDD in patients receiving medication treatment. The results showed that a 50% reduction in the BDI score was a reliable predictor of remission. Furthermore, a meta-analysis of 16 studies conducted by Shafer et al. (2018) found that BDI was a reliable and valid tool for monitoring changes in depressive symptoms in both clinical and non-clinical populations.

In addition, studies have shown that regular monitoring of BDI scores during treatment can lead to better patient outcomes. For example, a study by Fava et al. (2004) found that patients who received regular BDI assessments during treatment were more likely to achieve remission than those who did not receive regular assessments. This highlights the importance of utilizing BDI to monitor treatment efficacy and make necessary treatment adjustments.

Overall, using the BDI scale in monitoring treatment efficacy has strong supporting evidence, indicating its effectiveness in predicting remission and monitoring changes in depressive symptoms. In addition, regular use of BDI assessments during treatment can lead to better patient outcomes, making it a valuable tool for healthcare providers in the management of MDD.

Several studies have shown the efficacy of using the BDI scale for monitoring treatment efficacy in patients with MDD. For example, a randomized controlled trial by Fournier et al. (2010) compared the use of the BDI scale and the Hamilton Depression Rating Scale (HDRS) in predicting treatment response in patients with MDD. This DNP project found that the BDI scale was a better predictor of treatment response than the HDRS, and the authors recommended the use of the BDI scale in clinical practice for monitoring treatment efficacy.

Similarly, a systematic review by Trivedi et al. (2006) evaluated using self-report depression rating scales in clinical trials for patients with MDD. The review found that the BDI

scale was one of the most commonly used scales and showed good psychometric properties regarding reliability, validity, and responsiveness to treatment.

Another study by Zimmerman et al. (2013) evaluated the utility of the BDI scale in predicting treatment response in patients with MDD who were treated with medication. This DNP project found that changes in BDI scores were strongly associated with treatment response and suggested that the BDI scale could be useful for monitoring treatment efficacy.

Overall, the supporting evidence suggests that the BDI scale is a valid and reliable tool for monitoring treatment efficacy in patients with MDD. In addition, its ease of use, low cost, and good psychometric properties make it a practical choice for clinical practice.

Limitations

There are several limitations to this evidence-based DNP project that should be acknowledged. First, the sample size of this project is small, with only ten patients included. This limits the generalizability of the findings to a larger population. Additionally, the project was conducted in only one outpatient mental health clinic in a specific geographic location, which may limit the generalizability of the findings to other settings and regions.

Another limitation is the reliance on self-reported data from the patients. The BDI scale is a self-report assessment tool subject to social desirability or response bias. This DNP project design also did not incorporate a control group, which limits the ability to compare the effectiveness of the BDI scale with other assessment tools or methods.

This DNP project did not explore potential confounding factors that may impact the effectiveness of antidepressant treatment, such as comorbidities, medication adherence, and psychotherapy. These factors may influence the response to treatment and should be considered in future research. Lastly, the project was conducted over a relatively short period of 90 days

with a very small population of 10 patients may not truly be indicative for the general population.. A longer follow-up with a significantly larger period and relatively larger population inclusion may reveal different patterns of treatment response or relapse rates. Therefore, future research may consider longer follow-up periods to investigate the long-term effectiveness of utilizing the BDI scale for monitoring treatment efficacy.

Sustainability

The sustainability of this project can be ensured by incorporating the BDI scale as a routine part of the treatment process for patients with MDD in the outpatient setting. This can be achieved by training mental health providers on the proper use of the scale and how to interpret the results to make informed treatment decisions. Additionally, using electronic medical records (EMR) can aid in sustainability by creating a system where the BDI score is automatically calculated and tracked over time, making it easier to monitor treatment progress and make necessary adjustments.

Furthermore, incorporating the BDI scale into routine care can also help with sustainability by providing clinicians with a standardized and objective measure of treatment progress. This can lead to more efficient and effective treatment plans, ultimately improving patient outcomes. Additionally, using the BDI scale can help identify patients at risk for treatment resistance, allowing clinicians to modify treatment plans accordingly.

Lastly, incorporating the BDI scale into routine care can aid research by providing a standardized and objective measure for evaluating the effectiveness of different treatment interventions for patients with MDD. This can lead to the developing evidence-based treatment guidelines, ultimately leading to better patient outcomes and improved quality of care.

Dissemination

Dissemination of research findings is essential in the research process to share the knowledge with the scientific community and other stakeholders. In this DNP EBP project, the dissemination plan includes various strategies to share the findings with a broader audience, including healthcare professionals, researchers, patients, and policymakers.

This DNP project poster was presented at the Hann School of Nursing, University of San Diego, on April 13th, 2023, during Poster-Presentation-Day. The abstract is sent to 024 ACNL (Association of California Nursing Leaders) Annual Program Submission for national conference podium/poster presentation, on March awaiting acceptance. This will help to disseminate the findings to a broader audience and contribute to the knowledge base in the field of mental health.

This DNP project's results were shared with the participating outpatient clinic stakeholders on March 30th, 2023, where the project was implemented. This will provide feedback to the clinic and encourage the utilization of the BDI scale as a tool for monitoring treatment efficacy in patients with MDD.

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