ATTENTION DEFICIT HYPERACTIVITY DISORDER

TREATMENT FOR PEDIATRICS

by

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A scholarly project submitted in partial fulfillment
of the requirements for the degree

of

Doctor of Nursing Practice

in

Psychiatric and Mental Health

MONTANA STATE UNIVERSITY
Bozeman, Montana

July 2018

ACKNOWLEDGEMENTS

I want to express my gratitude to my advisor, Dr. Tracy Hellem, for her unending support, guidance, and knowledge in the making of this professional project.

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ABSTRACT

Attention deficit, hyperactivity disorder (ADHD) is commonly diagnosed in children, and the frequency of this disorder being diagnosed and treated continues to rise each year. The research regarding treatment for pediatric ADHD has shown varied results ranging from pharmacological and behavioral therapies producing positive effects when combined to standalone behavioral therapy or medication producing positive effects with no therapeutic intervention. There are two published guidelines on the management of pediatric ADHD. The American Academy of Pediatrics and the National Collaborating Centre for Mental Health each created a guideline for evaluating, diagnosing, and treating pediatric patients with ADHD. This project analyzed ADHD treatments for children ages 4 to 18 years in an acute, inpatient psychiatric setting, and in an inpatient, residential-treatment-care setting. A comparison of these treatments with the national guidelines was conducted. This scholarly project compared pediatric ADHD treatment in an inpatient, acute-care unit versus a residential-care unit of a psychiatric children's hospital. Readmission rates within 30 days of discharge from a psychiatric children's hospital have been analyzed, and care practices have been compared with the national guidelines. Data was extracted from electronic medical records from the psychiatric children's hospital's healthcare record system. The types of data that were extracted included demographics, such as age, comorbid diagnoses, and concomitant medications; in addition to types of treatment, readmission rates, and treatment setting. Type-of-treatment data included type of medication versus treatment setting. The findings suggest that medications other than methylphenidate may have similar efficacy as methylphenidate for treating pediatric ADHD. The inpatient psychiatric unit is not necessarily following the National Clinical Guidelines for treating pediatric and adolescent ADHD, but the results reveal that methylphenidate versus non-methylphenidate treatment for ADHD does not demonstrate a statistically significant difference with respect to inpatient readmission rates. The research identified that patients receiving residential care for ADHD had a higher likelihood of being readmitted to the hospital than patients receiving acute care, and patients' readmission rates were not statistically significantly different regarding methylphenidate versus non-methylphenidate medication-treatment regimens. Overall, this research identified that medications other than methylphenidate can be effective in treating patients with ADHD.

CHAPTER ONE

INTRODUCTION

Attention deficit, hyperactivity disorder (ADHD) is one of the most commonly diagnosed disorders in children, and the prevalence of this disorder continues to increase each year (Felt, Christner, & Kochhar, 2014). The Centers for Disease Control and Prevention (CDC) report that 6.4 million children, in 2014, were diagnosed with ADHD, which represents a 31% increase in diagnoses since 2013 (Centers for Disease Control and Prevention [CDC], 2014). There are several guidelines for the treatment of pediatric ADHD, such as the National Collaborating Centre for Mental Health (NCCMH) and the American Academy of Pediatrics (AAP). These guidelines provide information for the evaluation, diagnosis, and treatment of ADHD. The guidelines are clear about treatment recommendations for ADHD, and these guidelines group recommendations by age, with the overall guidelines covering the pediatric population from age 4 to 18 years.

The research regarding treatment for pediatric ADHD has revealed mixed results ranging from pharmacological and behavioral therapies producing positive effects when combined to standalone behavioral therapy or medication producing positive effects (Sibley, Kuriyan, Evans, Waxmonsky, & Smith, 2014). There is also a gray area that exists when treating pediatrics, which is treating the patient, but accommodating the wants of the parent. This can lead to alternative treatments that are outside the professional guidelines. The goal of this project is to examine ADHD treatments for children ages 4 to 18 years in an acute, inpatient psychiatric setting, as well as in an

inpatient, residential-treatment-care setting. Subsequently, a comparison of these treatments with the national guidelines will be conducted. In the following sections, the background and significance of pediatric ADHD will be reviewed, in addition to a review of the literature of treatment for pediatric ADHD.

Background and Significance

The AAP (2011) states that ADHD can profoundly affect the academic achievement, well-being, and social interactions of children, and that co-occurring conditions can frequently impact treatment. Clinical management of ADHD must also address multiple comorbid conditions and, therefore, therapeutic approaches and treatments may need to be tailored for patients with comorbid diagnoses (Larson, Russ, Kahn, & Halfon, 2011). There have been several decades of research dedicated to evaluating interventions for pediatric ADHD; however, studies that have been completed demonstrate conflicting results. There are clear guidelines provided from the AAP and the NCCMH that address the evaluation, diagnosis, and treatment of pediatric ADHD. There are situations that arise clinically, though, that do not allow for the guidelines to be followed; additional research is warranted regarding effective alternative-treatment recommendations.

There have been a variety of studies completed that evaluate the effectiveness of various ADHD treatments, but many of the studies have failed to collect data on the same outcome. There are studies that have analyzed the effect of treatment on symptoms, as well as studies that compare the effect on outcomes, and this has led to a variety of

conclusions. There is a large body of evidence that suggests that stimulant medications are an effective approach for the treatment of pediatric ADHD (Majewicz-Hefley & Carlson, 2007). However, concerns have been raised about treating young children with medications that have documented serious side effects (Vitiello, 2008). The long-term effects from using stimulant medications in a pediatric population have prompted a search for how to safely and effectively treat pediatric patients diagnosed with ADHD (Vitiello, 2008).

A combination of behavioral therapy and stimulant medication treatment may reduce the dosage of medication needed, as well as adverse effects associated with medication, while comprehensively treating symptoms of ADHD (Majewicz-Hefley & Carlson, 2007). Currently, there is limited information from studies on behavioral therapy and stimulant medications used concurrently to treat pediatric ADHD. Given this lack of evidence, there is a gap in our knowledge about the effectiveness of these treatments used together. The AAP (2011) states that evidence is clear regarding the diagnosis of ADHD and appropriate diagnostic criteria, as well as identifying co-occurring conditions and effective treatment with both behavioral and pharmacological interventions. However, there is still research required to sustain successful long-term outcomes in addition to long-term treatments (American Academy of Pediatrics [AAP], 2011).

CHAPTER TWO

REVIEW OF THE LITERATURE

There are two published guidelines on the management of pediatric ADHD that are organized by evaluation, diagnosis, and treatment regarding it, and they further provide detailed considerations with regard to age, coexisting conditions, and other special circumstances. First, the AAP (2011) guideline will be discussed, followed by the NCCMH (2016) guideline.

The American Academy of Pediatrics, or AAP (2011), designed a process-of-care algorithm that clearly identifies the steps for evaluation and management of ADHD, and that is a broad outline of the requirements of evidence-based care. Further, in the AAP (2011) guideline, there are six key action statements that are accompanied by an evidence profile and special considerations for each of the six statements. These action statements are outlined in Table 1 and also listed here: first, any child aged 4 to 18 years who presents with academic or behavioral problems and symptoms of inattention, hyperactivity, or impulsivity, should be evaluated for ADHD. Moreover, the guideline states that the primary-care clinician should initiate an ADHD evaluation because the number of children that ADHD affects is far greater than can be managed by the mental health care system (AAP, 2011). Second, the guideline suggests that the diagnosis of ADHD should be made with regard to current Diagnostic and Statistical Manual (DSM) criteria after alternative causes have been ruled out. This action statement also includes special circumstances with respect to age of diagnosis and clinical presentation.

Third, regarding evaluation for ADHD, assessment for other conditions that may coexist, including emotional, behavioral, developmental, and physical conditions, should occur in compliance with the AAP (2011) guideline. There are a variety of behavioral, developmental, and physical conditions that coexist in children evaluated for ADHD, and there is a high likelihood that another condition exists (AAP, 2011). Fourth, ADHD should be recognized as a chronic condition and, thus, children and adolescents diagnosed with ADHD should be considered for special healthcare needs that consist of the principles of the chronic-care model in the medical home (AAP, 2011). Many children with a diagnosis of ADHD continue to have symptoms and dysfunction into adulthood, and these treatments also may not be curative. The AAP (2011) states that, "longitudinal studies have found that frequently treatments are not sustained despite the fact that long-term outcomes for children with ADHD indicate that they are at greater risk for significant problems if they discontinue treatment" (p. 1014). Utilization of the chronic-illness approach may help with sustained, long-term care for the disorder.

Fifth, a significant action statement by the AAP (2011) is that recommendations for treatment of children and youth with ADHD should vary depending on the patient's age. Patient ages are grouped by the following ages: preschool-aged children (4 to 5 years of age), elementary school-aged children (6 to 11 years of age), and adolescents (12 to 18 years of age). Behavioral therapy is the first line of treatment for preschool-aged children and methylphenidate is utilized if behavioral therapy is not providing significant improvement. School-aged children should be treated with Food and Drug

Administration (FDA)-approved medications for ADHD and/or behavioral therapy or, preferably, both medications and behavioral therapy.

For adolescents, the recommendation for treating ADHD is the initiation of FDA-approved medications, or behavioral therapy, or, preferably, both medications and behavioral therapy. Stimulant medications are highly effective for most adolescents in reducing core symptoms of ADHD and other medications have demonstrated efficacy, such as alpha-2 adrenergic agonists. Alpha-2 adrenergic agonists are newer, resulting in a smaller amount of published evidence compared to the evidence on stimulant therapy (AAP, 2011). The sixth and final action statement indicates that ADHD medication doses should be titrated to achieve maximum benefit with minimum adverse effects. Titration of medication to maximum doses that control symptoms without adverse effects is recommended instead of titration strictly on a milligram per kilogram basis (AAP, 2011).

The National Collaborating Centre for Mental Health, or NCCMH (2016), guideline on ADHD provides recommendations on the diagnosis and treatment of ADHD in children, young people, and adults. The purpose of this guideline is to assist clinicians in identifying particular treatment approaches that are evidence-based. Specifically, this guideline examines the diagnosis of ADHD, evaluates the role specific pharmacological agents and nonpharmacological interventions have, examines the effect of specific services on the treatment and management of ADHD, and integrates these options in practice. The populations are divided into children (aged 3 to 11 years), young people (aged 12 to 18 years), and adults (over the age of 18 years). Each age group has specific interventions outlined.

A care pathway for the treatment and care for people with ADHD has been established by the NCCMH. The purpose of the care pathway is to provide recommendations for how children, young people, and adults should receive treatment and care from supporting medical services. The first step in the care pathway is identification and pre-diagnostic intervention. Identification of children and young people with behavioral and attention problems leads to the identified individual being assessed for a diagnosis of ADHD by a primary-care provider (National Collaborating Centre for Mental Health [NCCMH], 2016). The next step in the care pathway is the diagnosis of ADHD. A diagnosis of ADHD is made after a full clinical and psychosocial assessment is completed and the diagnostic criteria for ADHD in the DSM-V have been met. During the evaluation, an assessment for coexisting conditions is completed due to high rates of comorbidity associated with ADHD (NCCMH, 2016). Assessment of behaviors and symptoms within multiple settings, such as school, home, and social settings, is beneficial for diagnosis and is included, if possible (NCCMH, 2016). After an ADHD diagnosis has been made, the care pathway leads to post-diagnostic advice. Post-diagnostic advice includes treatment recommendations, behavioral interventions, and information about special needs associated with ADHD.

The NCCMH (2016) guideline is similar to the AAP (2011) guideline with respect to treating pediatric patients for ADHD. Similar to the AAP guideline, pharmacological treatment is not recommended for preschool-aged children and behavioral therapy should be utilized. Also, school-aged children, as well as adolescents, may be treated with medication, therapy, or both. In the NCCMH (2016) guideline, it

states that drug treatment is not indicated as first-line treatment for all school-aged children and adolescents. Instead, symptom severity and level of impairment should be assessed. For those with a moderate to severe level of symptoms and impairment, or individuals with symptoms that have not responded sufficiently to behavioral treatment, medications should be used (NCCMH, 2016). Another factor that may influence which treatment is utilized is patient or guardian refusal of the original treatment proposed. If medication is being used for treatment, doses should be gradually increased until there is no further clinical improvement and side effects are tolerable (NCCMH, 2016). Once optimal medication dosing has been established, it is recommended that the individual be evaluated at least annually for adequate treatment response.

The AAP and NCCMH guidelines are very similar in regards to diagnosis, treatment, and care. The AAP guideline provides more details about the specific actions or interventions recommended. Special circumstances, as well as other supporting information for each action point listed in the AAP guideline, provide a robust amount of guidance and the amount of information is significantly larger than the amount of information provided by the NCCMH guideline.

The development of the AAP guideline occurred with the collaboration among several organizations to develop a committee that represented a wide range of primary-care and subspecialty groups. The current AAP guideline is a revision of a guideline that was first published in 2000 and revised in 2001. The committee developed a series of research questions to lead an extensive, evidence-based review. The CDC and the University of Oklahoma Health Sciences Center partnered with this committee to assist

with the evidence-based review. A systematic approach was utilized to identify literature that provided an evidence base for both diagnosis and treatment. A total of 8267 references were reviewed for inclusion. References included randomized-controlled trials, diagnostic studies, observational studies (case control and cohort design), expert opinion, case reports, and reasoning from first principles, which were then summarized in evidence tables. The evidence tables were presented to the committee for expert review. Initial guidelines were developed by consensus of the committee regarding the evidence identified through the systematic evidence review. An evidence-quality appraisal was established to determine recommendation strength and balance of benefit and harm. After the guidelines were completed, extensive peer review by committees, sections, councils, and task forces within the AAP and numerous outside organizations was completed and feedback was received. Changes were then reviewed and incorporated into the draft by the chairperson of the committee, which was then reviewed by the full committee.

The NCCMH guideline was originally developed in 2008, and revised in 2016. A systematic, clinical literature review was completed. Eligibility criteria were developed. Eligible systematic reviews of primary-level studies were critically appraised for methodological quality. The eligibility of each study was confirmed by at least one member of the research group. Once each study's eligibility was determined, a table was made to distinguish the strength of evidence for each study. The team then reviewed all of the evidence and made an evidence map that detailed the comparisons within the studies. Once the evidence map was established, the systematic review group produced a clinical evidence summary. Clinical summaries were finalized and agreed upon by the

group after evaluation of all information was completed. The guideline was then written and validated through two consultations. A final draft was submitted to the guideline-review panel for review. Feedback regarding the review of the guideline by the review panel was received and the changes were completed before publication.

Table 1: Comparison of the Guidelines for the Management of Pediatric ADHD

Comparison of the Guidelines for the Management of Pediatric ADHD	
Six Action Statements from the American Academy of Pediatrics ADHD Clinical Guideline	**Included in NCCMH guideline?**
1. The primary care clinician should initiate an evaluation for ADHD for any child 4 through 18 years of age who presents with academic or behavioral problems and symptoms of inattention, hyperactivity, or impulsivity.	Yes
2. To make a diagnosis of ADHD, the primary care clinician should determine that *Diagnostic And Statistical Manual of Mental Disorders, fourth edition* (DSM-IV-TR) criteria have been met and information should be obtained primarily from reports from parents or guardians, teachers, and other school and mental health clinicians involved in the child's care. The primary care clinician should also rule out any alternative cause.	Yes
3. The evaluation of the child for ADHD, the primary care clinician should include assessment for other conditions that might coexist with ADHD, including emotional or behavioral, developmental, and physical conditions.	Yes
4. The primary care clinician should recognize ADHD as a chronic condition and, therefore, consider children and adolescents with ADHD as children and youth with special healthcare needs. Management of children and youth with special healthcare needs should follow the principles of the chronic care model and the medical home.	Yes, an ADHD diagnosis should lead to evaluation of special healthcare needs. No reference of ADHD being recognized as a chronic condition or principles of the chronic care model and the medical home should be followed.

Table 1: Comparison of the Guidelines for the Management of Pediatric ADHD Continued

Comparison of the Guidelines for the Management of Pediatric ADHD	
Six Action Statements from the American Academy of Pediatrics ADHD Clinical Guideline	**Included in NCCMH guideline?**
5. Recommendations for treatment of children and youth with ADHD vary depending on the patient's age.	Yes
6. Primary care clinicians should titrate doses of medication for ADHD to achieve maximum benefit with minimum adverse effects.	Yes

Patient Preferences

According to Van Brunt, Matza, Classi, and Johnston (2011), individual preferences are a key consideration when deciding on the treatment plan for pediatric patients with ADHD. Van Brunt et al. (2011) performed a meta-analysis of patient preferences with respect to ADHD treatment and analyzed 15 studies that consisted of participants whose ages ranged from 5 years through adulthood. A major limitation of patient-preference studies is that most of the results are from parent reports and not the actual patients (Van Brunt et al., 2011). The authors found that there is no prevailing treatment option to the first choice of patients due to the individualization of patient preferences (Van Brunt et al., 2011).

In a systematic review conducted by Schatz et al. (2015), the authors reviewed patient and parent preferences concerning ADHD treatment. The findings from the review demonstrated that most studies focused on medication treatment alone, and there were a limited number of published studies that evaluated a psychosocial intervention for the treatment of pediatric ADHD. Patient preferences are the key factor in what type of

treatment modalities are utilized, even if the requested treatment does not follow guidelines or best practice.

Proposed Recommendations

There has been a significant amount of research conducted with a focus on children diagnosed with ADHD. Both guidelines from the NCCMH (2016) and the AAP (2011) identify that treatment in children ages 4 to 5 years should start with behavioral therapy and progress to medications if the patient is not symptomatically improved. For children 6 years and older, medications, especially stimulants, are used as a first-line treatment. It is also noted that the recommendation includes behavioral therapy or both medications and behavioral therapy to treat ADHD, if this is available. The recommendation for this project is to follow these guidelines with respect to treating pediatric ADHD in the inpatient, acute, and residential psychiatric units at a psychiatric children's hospital.

Summary Statement

Overall, the guidelines from the AAP (2011) and the NCCMH (2016) are similar, as are the proposed recommendations for treating pediatric patients who have been diagnosed with ADHD. It is clear that the recommendation is to initiate behavioral therapy for children younger than 6 rather than start medications. Children older than the age of 6 years can be treated with medications, particularly stimulants, and also behavioral therapy. Behavioral therapy and medications in children over the age of 6 can

be utilized individually or these treatment options can be utilized together. The guidelines indicate that stimulant medication is the first-line treatment for children aged 6 and older. The AAP (2011) acknowledges stimulant medications as the first-line treatment, but the NCCMH (2016) states that severity of symptoms and level of impairment must be assessed and, if both of these are not moderate to severe, medications should not be used and behavioral therapy, only, should be utilized.

CHAPTER THREE

METHODS

Introduction

This scholarly project compared pediatric ADHD treatment in an inpatient, acute-care unit versus a residential-care unit of a psychiatric children's hospital. Readmission rates within 30 days of discharge from a psychiatric children's hospital have been analyzed, and care practices have been compared with the national guidelines. This information has provided clarity as to the type of ADHD treatments that are being used, whether these treatments are following national guidelines, and whether these treatments are working to stabilize these patients so that they do not return to the inpatient psychiatric hospital within 30 days.

Hypothesis

The main purpose of this project was to compare practices within the acute and residential units with the treatment guidelines in regards to the care of patients with a diagnosis of ADHD. To understand whether there are significant differences between treatment-type settings with respect to outcomes, we also tested the following null hypotheses: Patients discharged from the acute-care unit will not have higher readmission rates compared with patients discharged from the residential units. Given that patients in the residential unit have longer lengths of stay, resulting in more opportunity for evaluation and stabilization, we hypothesized that patients discharged from the acute-care

unit would have higher rates of readmission compared to patients who discharged from the residential units.

Sample

The sample consisted of pediatric patients ages 3 to 18 years that received care in an inpatient (i.e., acute-care unit) and outpatient (i.e., residential) setting of a psychiatric children's hospital from 2015–2017. The anticipated sample size was 300 based on the total number of ADHD hospital admissions by year over the past two years.

Procedures and Variables

Data was extracted from electronic medical records from the psychiatric children's hospital's healthcare record system. The types of data that were extracted included demographics, such as age, comorbid diagnoses, and concomitant medications; in addition to types of treatment, readmission rates, and treatment setting (i.e., acute-care unit versus residential). Type-of-treatment data included type of medication versus treatment setting.

Readmission rates were defined as the patient being readmitted to the psychiatric children's hospital (residential or acute-care unit) within 30 days of being discharged from either the residential or acute-care unit. For patients who were readmitted, the number of days since discharge was calculated. Settings were defined as acute care or residential care. Patients who received care in the acute and residential settings were separated by age groups: elementary school-aged children (ages 5 to 11 years), middle

school-aged children (ages 12 to 14 years), and high school-aged children (ages 15 to 17 years). All of these data were extracted from the electronic medical record, and have been de-identified. Compliance to HIPAA requirements were closely followed throughout the course of this project. The hospital's HIPAA compliance office assisted with de-identifying the patient data that was extracted. This project was submitted to Montana State University's Institutional Review Board for approval prior to data extraction.

Data Analysis

In summary to the above content, the following variables were extracted for this project:

- Age
- Comorbid diagnoses
- Concomitant medications
- Treatment setting (acute-care unit versus residential)
- 30-day readmission after discharge
- Number of days readmitted

Descriptive statistics were analyzed using means and standard deviations for continuous-level variables and frequencies were used for nominal-level variables. Readmissions were evaluated by treatment setting (i.e., acute-care unit versus residential) and by treatment type (i.e., what medications were utilized). To examine the association between treatment type and readmissions, a chi-square of association was used. To assess the relationship between treatment setting, treatment type, and number of days of

readmission, a two-way ANOVA was employed. An alpha value of less than 0.05 was considered significant.

If the treatment for pediatric ADHD did not compare to the national guidelines, the IOWA model for evidence-based change was utilized. The results of the comparison between the national guidelines for the treatment of pediatric ADHD and treatment being implemented in the residential and acute-care units were shared with the executive leadership committee that oversees the residential and acute-care units. Suggestions for change based on the IOWA model were shared with the executive committee to assist with an evidence-based change.

CHAPTER FOUR

CHANGE MODEL

The application of evidence-based practice is vital to refining the quality of patient care and improving patient outcomes. There are a variety of evidence-based practice models that exist to assist clinical professionals with the translation of best evidence into clinical practice (Brown, 2014). The IOWA Model of Evidence-Based Practice to Promote Quality Care is a model that focuses on knowledge- and problem-focused triggers, which initiates questions and ideas about whether care can be improved through the use of current research findings (Doody & Doody, 2011). The IOWA Model outlines a pragmatic, multiphase, change process with feedback loops and is widely recognized for its applicability and ease of use in multidisciplinary healthcare teams (Melnyk & Fineout-Overholt, 2015).

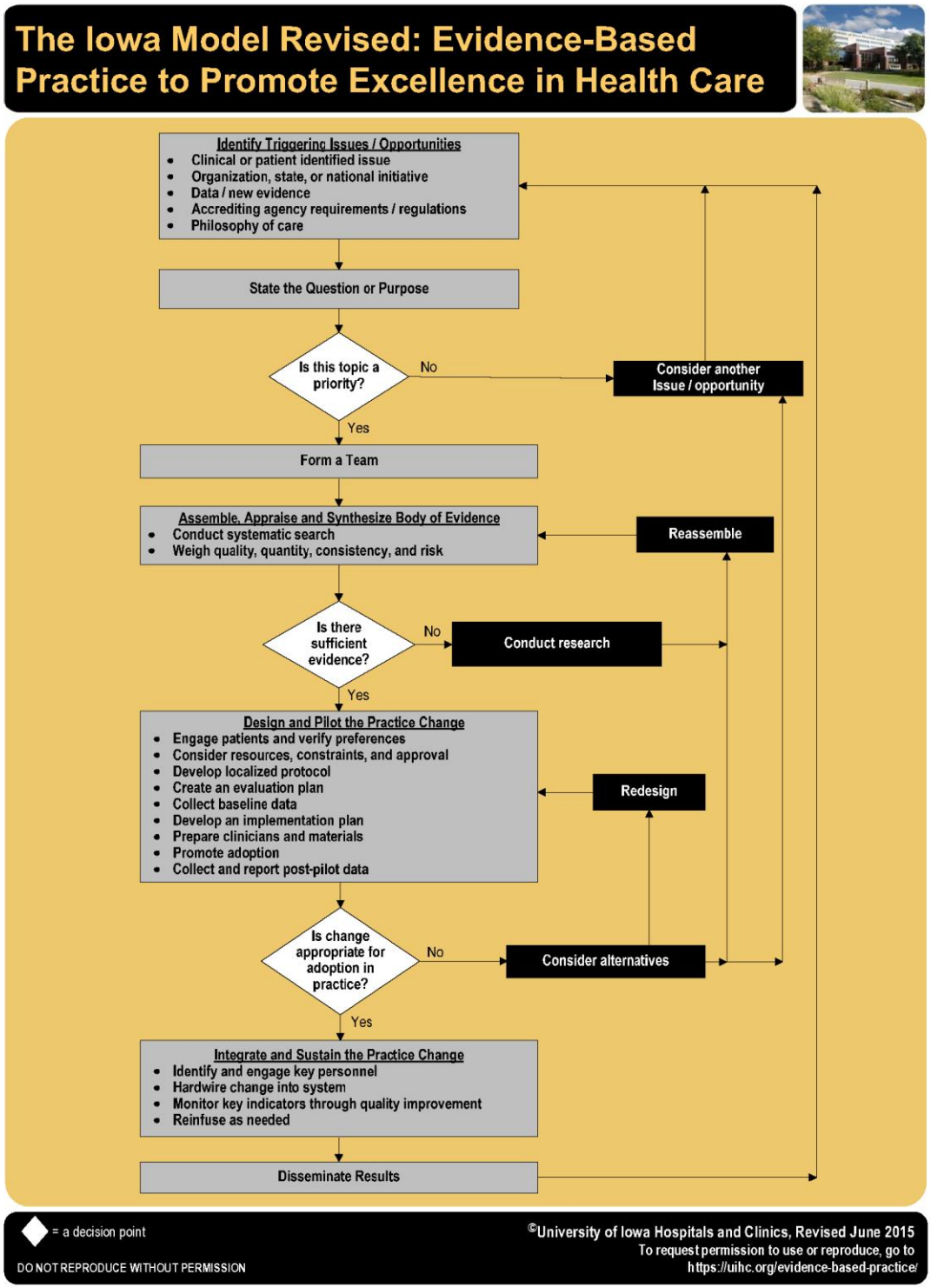
Utilizing the IOWA Model, as the initial step in the model, there was a knowledge-focused trigger related to pediatric ADHD treatment practices at a children's psychiatric hospital. A lot of pediatric patients being admitted to the children's psychiatric hospital have a diagnosis of ADHD, which led to the question, "Are national clinical guidelines being followed in treatment?" The next step of the IOWA Model is to identify if this topic is a priority for the organization. The children's psychiatric hospital that the data for this project were collected from is committed to providing evidence-based care and was in agreement that this project was important to conduct. The third step of the IOWA Model is to form a team. For this project, the team was limited to this

author, the compliance officer at the psychiatric children's hospital, and a clinical informatics professional.

After a team is assembled, the fourth step of the IOWA Model is to conduct a literature search. After the literature search is conducted, there is a determination about whether or not there is currently sufficient evidence to implement a practice change. After this determination is established, a practice-change plan is proposed when the evidence is sufficient, or research is conducted to generate new data regarding whether a practice change is necessary. Finally, after this work is complete, it is time to determine whether the change is appropriate for adoption of practice. If the change is deemed appropriate for a practice change, the results are disseminated.

For this project, there were two clinical guidelines with respect to pediatric care of ADHD that were utilized for determining whether treatment for ADHD at the children's psychiatric hospital is consistent with the guidelines. Chapter Five discusses the results of comparing treatment practices at the children's psychiatric hospital with the guidelines, and Chapter Six discusses the implications and dissemination of these findings.

Figure 1: The Iowa Model of Evidence-Based Practice to Promote Quality Care



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CHAPTER FIVE

RESULTS

Data from 2015–2017 were extracted from medical charts for this project. The total number of medical charts reviewed was n=125, with n=93 male patients and n=32 female patients. The mean age of patients was 12 (SD 3.4) years with a range of 6 to 18 years. The majority of the patients were Caucasian (80%, n=100), and other racial distributions included: 11% (n=13) Native American, 3% (n=4) African-American, and 6% (n=8) other racial categories (not otherwise specified in the medical chart). All of the patients (n=125) were diagnosed with attention deficit, hyperactivity disorder. Comorbid diagnoses included bipolar disorder (34%, n=43), oppositional defiant disorder (34%, n=43), developmental delay (20%, n=25), posttraumatic stress disorder (35%, n=44), autism spectrum disorder (15%, n=19), major depressive disorder (14%, n=17), intermittent explosive disorder (16%, n=20), substance use disorders (2%, n=2), and anxiety disorders (8%, n=10). Only one patient was diagnosed with attention deficit disorder without any comorbidities, whereas n=38 patients were diagnosed with one comorbid disorder, and n=86 patients were diagnosed with two or more comorbid disorders.

There were more patients admitted to the acute-care unit (n=89) compared with the residential-care unit (n=36). With respect to 30-day readmissions, there were n=6 patients readmitted to the acute-care unit and n=6 patients readmitted to the residential-care unit. Given the low number of 30-day readmissions, we also evaluated how many

patients were readmitted within 90 days. We found that n=13 patients were readmitted to the acute-care unit and n=28 patients were readmitted to the residential-care unit.

There was a total of 10 different psychostimulant medications prescribed to patients. Methylphenidate was prescribed to n=50 (40%) patients and Vyvanse was prescribed to n=38 (31%) patients, the other eight medications were prescribed to 10% or less of the patients, as listed in Table 2.

The clinical guidelines indicate that Methylphenidate is the medication of choice when treating a pediatric patient for ADHD. We learned that methylphenidate was prescribed to 40% (n=50) of patients, methylphenidate plus another psychostimulant was prescribed to 7% (n=9) of patients, and non-methylphenidate medications were prescribed to 53% (n=66) of patients. There were a greater number of patients being prescribed non-methylphenidate medications compared to methylphenidate medications. These finding are not consistent with the clinical guidelines regarding the treatment of pediatric ADHD.

To evaluate the null hypothesis that patients discharged from the acute-care unit will not have higher rates of readmission compared to patients who are discharged from the residential units, a Mann-Whitney U test was conducted. A Mann-Whitney U test was used because the dependent variable (readmission rates) did not meet the normality assumption of an independent sample t-test and homogeneity of variances was not achieved. The results of the Mann-Whitney U test indicated that the number of days for a readmission was significantly less for adolescents discharged from the residential unit

(Mdn=26.5) compared to adolescents discharged from the acute-care unit (Mdn=43.0), Z=-3.448, p<0.01.

Due to the national guidelines not being followed, a secondary hypothesis was formed and a subsequent analysis was completed. We hypothesized that patients treated with methylphenidate would have a longer readmission period than patients not treated with methylphenidate. “Readmission period” was defined as the number of days between one admission to the next admission.

The results of a Mann-Whitney U test for the number of days for a readmission in adolescents prescribed methylphenidate compared to adolescents not prescribed methylphenidate did not show any statistical difference (Z=-.222, p=0.825). The rank average number of days for a readmission for the methylphenidate group was 33.92 days, while the adolescents in the non-methylphenidate group had a number of days until readmitted rank average of 34.99 days. The data indicate that the number of readmission days differs by 1.08 days between the two groups. Both the methylphenidate and non-methylphenidate groups have similar readmission rates, and the results of hypothesis testing indicate that the null hypothesis is accepted.

Table 2: Participant Characteristics

Characteristic	
Number of Participants, N (%)	
Males	93 (74%)
Females	32 (26%)
Age	
Mean (SD 3.4)	12
Range	6–18

Table 2: Participant Characteristics Continued

Characteristic	
Ethnicity, N (%)	
Caucasian	100 (80%)
Native American	13 (11%)
African American	4 (3%)
Other	8 (6%)
Treatment Setting, N (%)	
Acute	89 (71%)
Residential	36 (29%)
30 Day Readmission, N (%)	
Acute	6 (50%)
Residential	6 (50%)
90 Day Readmission, N (%)	
Acute	13 (32%)
Residential	28 (68%)
Medications Prescribed, N (%)	
Methylphenidate	50 (34%)
Vyvanse	38 (26%)
Lisdexamphetamine	7 (5%)
Dexmethylphenidate	10 (7%)
Amphetamine	5 (3%)
Adderall XR	11 (8%)
Amphetamine Aspartate/Sulfate	4 (3%)
Atomoxetine HCL	15 (10%)
Dextroamphetamine/Amphetamine	5 (3%)
Metadate CD	1 (1%)
Medication Treatment Choices, N (%)	
Methylphenidate	50 (40%)
Methylphenidate + Another Psychostimulant	9 (7%)
Non-Methylphenidate	66 (53%)

Table 2: Participant Characteristics Continued

Characteristic	
Comorbid Diagnoses, N (%)	
Bipolar Disorder	43 (34%)
Oppositional Defiant Disorder	43 (34%)
Developmental Delay	25 (20%)
Post-Traumatic Stress Disorder	44 (35%)
Autism Spectrum Disorder	19 (15%)
Major Depressive Disorder	17 (14%)
Intermittent Explosive Disorder	20 (16%)
Substance Use Disorders	2 (2%)
Anxiety Disorders	10 (8%)

CHAPTER SIX

RECOMMENDATIONS

ADHD is one of the most commonly diagnosed disorders and the prevalence of this disorder continues to increase each year (Felt, Christner, & Kochhar, 2014). Following clinical guidelines and effectively managing symptoms associated with pediatric ADHD are imperative for the overall functioning of the patient. The primary goal of this project was to compare treatment practices for pediatric ADHD at a children's psychiatric hospital to the clinical guidelines. The results of this comparison indicated that there were a greater number of patients being prescribed non-methylphenidate medications compared to methylphenidate medications. These finding are not consistent with the clinical guidelines regarding the treatment of pediatric ADHD.

As a secondary goal, this project evaluated readmissions to an inpatient psychiatric hospital in both the acute-care and residential-care treatment settings. The hypothesis was that patients discharged from the acute-care setting would have higher readmission rates due to residential patients having longer lengths of stay and more time to be stabilized. The results revealed that patients discharged from the residential-care unit had higher readmission rates at 90 days compared to patients discharged from the acute-care unit by only 1.08 days; although this finding is not statistically significant.

A third aim was added due to the result that the clinical guidelines for treating pediatric ADHD were not followed by the children's psychiatric hospital. This led to a hypothesis that patients who were treated for ADHD with a medication regimen (i.e.,

methylphenidate) that followed the national guidelines would have lower readmission rates than patients treated with a medication other than methylphenidate. Patients who were prescribed methylphenidate compared to patients not prescribed methylphenidate did not show any statistical difference in the number of days for readmission.

Implications

These findings suggest that medications other than methylphenidate may have similar efficacy as methylphenidate for treating pediatric ADHD. While it was discovered that the inpatient psychiatric unit is not necessarily following the National Clinical Guidelines for treating pediatric and adolescent ADHD, the results reveal that methylphenidate versus non-methylphenidate treatment for ADHD does not demonstrate a statistically significant difference with respect to inpatient readmission rates. Vyvanse was one medication that was not included in the clinical guidelines for treating pediatric ADHD, but it was prescribed to 26% of the patients included in this medical chart review. Vyvanse is a frequently used medication in the management of pediatric ADHD, but was not approved by the FDA to treat children ages 6 and above until 2013. The clinical guidelines do not reflect Vyvanse as a treatment option, potentially due to the limited information on this medication. A randomized-controlled trial completed by Wigal, Kollins, Childress, and Squires (2009) found that, in school-aged children (6 to 12 years), Vyvanse provides effective symptom control for children with ADHD throughout the day with a post-dose efficacy of up to 13 hours.

The findings from this project are inconsistent with National Clinical Guidelines. The clinical guidelines state that methylphenidate is the first-line treatment for pediatric ADHD. These clinical findings reveal that methylphenidate and non-methylphenidate medications have similar effects on readmission rates when comparing these rates to a psychiatric children's hospital.

Application

This research applies to the Doctor of Nursing Practice program because doctorate-prepared nurses should be critically evaluating evidence-based practices and maintaining a high level of knowledge on current best practices. Evaluating current research and clinical guidelines to ensure that individuals are receiving the highest level of care available is necessary, and doctorate-prepared nurses should be able to critically evaluate this research and determine how to translate this research into practice. An individual with a Doctor of Nursing Practice degree should be seen as a leader in healthcare. To do that, critical thinking and constant clinical evaluation is necessary, and this was the point of the research on pediatric ADHD and clinical treatment guidelines. Clinical guidelines relating to pediatric ADHD have not changed considerably over the past 10 years, but treatment options have changed. This research is important because it evaluates whether newer treatment options, which are not listed in clinical guidelines, have similar results regarding readmission rates in an inpatient psychiatric hospital or if the current standard of care is the continued best practice.

This research is also applicable to the psychiatric children's hospital that the data were collected from because pediatric ADHD is a common diagnosis at this facility, and individuals working for the hospital want to provide the best care available for their patients. Evaluating treatment options relating to pediatric ADHD helps to ensure that current practices in the hospital and clinical guidelines are aligning, and, if they are not in alignment, evaluation of how other treatment options are affecting care needs to be completed. The information in this research has been shared with clinical leadership at the children's psychiatric hospital for them to analyze and determine whether a change in the practice of treating pediatric ADHD is necessary.

Strengths and Limitations

This study has marked strengths and limitations. A strength of this study is that there was complete access to treatment records while at the hospital; thus detailed patient information was verified with the record. A major limitation of this study is that all of the patients received care at the same facility and are from the same region in the country; so the sample is homogenous. There are also some other notable limitations. One limitation is that there were no data in the medical records on behavioral therapy utilization because this treatment modality is a standard-of-care that is built into the model-of-care delivered at the children's psychiatric hospital. All patients received behavioral therapy; therefore, there was no way to identify or compare behavioral therapies with and without medication treatment. Another limitation of this exploration is that there is limited research available that compares different treatment modalities for pediatric ADHD.

Much of the research that is available is not within the last 10 years and does not include all of the current ADHD therapies that are available today.

Conclusion

Pediatric ADHD is a common psychiatric diagnosis and management of this condition is wide-ranging. This project compared national clinical guidelines with common practices for treating pediatric ADHD in a children's psychiatric hospital; both residential and acute-care settings. The research identified that patients receiving residential care for ADHD had a higher likelihood of being readmitted to the hospital than patients receiving acute care, and patients' readmission rates were not statistically significantly different regarding methylphenidate versus non-methylphenidate medication-treatment regimens. Overall, this research identified that medications other than methylphenidate can be effective in treating patients with ADHD. Going forward, it will be important to share this data with rural primary-care providers as they are the typical initial point of care for most of the patients that arrive in the hospital.

New areas of research could include analyzing overall treatment efficacy of methylphenidate versus non-methylphenidate psychostimulant medication. This could be beneficial in creating updated clinical guidelines that would reflect all of the current, common treatment options. Another area of research would be to analyze patients in an outpatient setting and compare their treatment to clinical guidelines. Inpatient and outpatient services may treat patients differently due to treatment setting.

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