Lit Review – Abigail Wren

Psychotropic Medications and Suicidal Ideation during Pregnancy

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Mental Illness

Suicidal Ideation

Suicidal ideation (SI) is the act of thinking about or planning one’s own suicide. SI can be a symptom of mental illnesses, including depression and anxiety disorders (Mayo Clinic, 2015).

Anxiety Disorders

Stress is a common and healthy response to risky or high-stake situations. Fear of failing a test motivates a student to study, just as fear of not getting one’s “dream job” motivates a person to build a strong resume. Anxiety disorders are characterized by excessive feelings of fear, tension, or stress that interfere with a person’s ability to live and function normally. Women are more likely to be diagnosed with an anxiety disorder than men (Parekh, 2017). The most common types of anxiety disorders are: Generalized Anxiety Disorder, Panic Disorder, Social Anxiety Disorder, and Phobias.

People with Generalized Anxiety Disorder (GAD) feel persistent stress and apprehension, and they find it difficult to turn their concentration away from their worries. They likely have inconsistent sleeping habits, which means they tire easily, and can seem irritable (NIMH, 2016; MedlinePlus, 2017).

People with Panic Disorder experience reoccurring short episodes of extreme fear accompanied by physical symptoms including heart palpitations, nausea, sweating, and chest pain called panic attacks. Panic Disorder can occur simultaneously with GAD or other anxiety disorders (NIMH, 2016; MedlinePlus, 2017).

Social Anxiety Disorder, formerly called Social Phobia, is defined as having excessive amounts of fear towards social situations and interactions; this may include eating or drinking in public, public speaking, or having a conversation with a new person. People with Social Anxiety Disorder are prone to
isolation because they frequently avoid interactions that may trigger their anxieties (NIMH, 2016; MedlinePlus, 2017).

Phobias are excessive amounts of anxiety that people feel towards specific objects, topics, or situations. Like people with Social Anxiety Disorder, people with Phobias will often take extreme measures to avoid their triggers (NIMH, 2016; MedlinePlus, 2017).

Once diagnosed, Anxiety Disorders are typically treated with a combination of therapy (group or individual) and medication. Antidepressants (see Antidepressants) or anti-anxiety medications (see Anti-Anxiety Medications) may be used to treat anxiety disorders (NIMH, 2016; MedlinePlus, 2017).

**Depression**

Chronic depression (also called major depression disorder) is characterized by prolonged episodes of negative symptoms, which include: feelings of sadness, low self-esteem, low energy levels, and thoughts of self-harm or suicide. Depressive episodes can be triggered by events in a person’s life (such as the death of a loved one) and last for months at a time. During a depression episode, a person’s appetite, sleeping habits, and daily behaviors are affected. People with chronic depression may withdraw and isolate themselves from friends and family and lose interest in activities that they used to enjoy. Women are twice as likely to be diagnosed with chronic depression than men. Once diagnosed, depression is typically treated with a combination of antidepressants and psychotherapy (Encyclopædia Britannica, 2017).

**Bipolar Disorder**

The term “psychotic disorder” refers to a mental illness that affects a person’s perception of reality. The hallucinations and delusions that a person with a psychotic disorder experiences are called
psychosis. Although it used to be considered a depressive disorder, bipolar disorder (also called manic-depression) is now considered a psychotic disorder because psychosis is a major symptom of the mental illness (Medline Plus, 2017).

Bipolar Disorder is characterized by extreme mood swings in a person. A given mood swing falls into one of two categories: manic or depressive. During a manic episode, people with Bipolar Disorder experiences extremely high levels or energy, making them feel “buzzed” or “jittery” as well as making their mind race. A manic swing may cause people to overestimate their abilities and lead them to engage in risky behaviors. During a depressive episode, people act similar to those with depressive disorders. People’s energy levels are lower than normal, and they feel sad or empty. During depressive episodes, people with Bipolar Disorder may contemplate hurting themselves or committing suicide (NIMH, 2016).

**Antidepressants**

Despite the name, antidepressants are actually used to treat both depression and anxiety disorders. Antidepressants are considered anxiolytics because they can reduce anxiety symptoms. The most commonly prescribed antidepressants are selective serotonin reuptake inhibitors (SSRIs). The medication blocks the reabsorption of the neurotransmitter serotonin in the brain; the body continues to produce serotonin. As a result, serotonin levels in the brain increase- which is thought to reduce the symptoms of depression (Mayo Clinic, 2016).

**Anti-Anxiety Medications**

Anti-anxiety medications are often not the primary medication taken for anxiety disorders because they only treat the physical and immediate symptoms of anxiety, such as the ones associated with panic attacks: rapid heartbeat, sweating, and shaking. Anti-anxiety medications are used to temporarily manage
anxiety symptoms, and are taken daily for weeks at a time (NIMH, 2016). Like antidepressants, anti-anxiety medications are a type of anxiolytic, and can also be referred to as “nerve pills” or “tranquilizers” (National Survey of Drug Use and Mental Health, 2014).

Antipsychotics

Antipsychotics are used to relieve symptoms of psychosis. There are two types of antipsychotic medications: typical and atypical. Typical antipsychotics are the older of the two types (NIMH, 2016). Typical antipsychotics are prescribed to reduced dopamine transmission in the brain to reduce the delusions experienced by someone with psychosis (Guzman and Farinde, 2016). Atypical antipsychotics (also called second-generation antipsychotics) are typically prescribed to treat patients with bipolar disorder (Grohol, 2016). In addition to interacting with dopamine receptors, atypical antipsychotics react with serotonin, histamine, and acetylcholine receptors in the brain. Atypical antipsychotics are known to have less harmful side effects than typical antipsychotics (Kulkarni et al, 2014). Antipsychotics are a type of mood stabilizer.

Pregnancy

Research and Clinical Trials

Pregnant women are traditionally excluded from clinical drug research. In 1977, the Food and Drug Administration (FDA) recommended that any women of “childbearing potential” (Belton, 2015) not take part in early phase clinical drug trials. This guideline was so accepted by the drug testing industry that pregnant women were also excluded from late phase drug trials. Researchers willingly exclude pregnant women from drug trials because of the ethical complications that come with experimentation of any kind during pregnancy. Although the 1977 guidelines made the ethics less
complicated, they also excluded a large percentage of the female population from drug testing, meaning that most drug trials were carried out primarily on male subjects. Underrepresentation in drug trials is problematic for women because their bodies’ process medications differently than men. A woman may be unable to safely take certain drugs that a man can (or vice versa), or women may have to take certain drugs at higher or lower quantities than men. In 1993, the FDA lifted the ban, allowing women of childbearing potential to participate in clinical trials. Pregnant women were still not explicitly allowed to participate in drug research. Underrepresentation of pregnant women in drug testing can be harmful because women’s bodies undergo changes in how they process different substances during pregnancy. A nonpregnant woman cannot accurately represent her pregnant counterpart in a drug trial.

There are very few clinical trials run specifically for pregnant populations today. The current industry guidelines for including pregnant women in clinical trials require “minimal risk and direct benefit” (Belton, 2015) to the mother and her baby. Because there is so little data on pregnant women from clinical trials, researchers typically use observational studies. Although observational studies lack the controlled variables of experiments (i.e. clinical trials), they are considered a safer and less-intrusive alternative than clinical trials (Belton, 2015).

**Mental Health**

During pregnancy, women with mental illness may stop taking their psychotropic medications because some studies have found that the medications can have teratogenic effects (causing birth defects). One such study is described in the 2014 paper “Patterns of psychotropic medicine use in pregnancy in the United States from 2006 to 2011 among women with private insurance” which found the use of SSRI antidepressants during pregnancy to be associated with higher rates of congenital heart defects (Hanley and Mintzes, 2014). Also, the Food and Drug Administration has not yet declared any psychotropic
medication to be safe to use during pregnancy (Massachusetts General Hospital, 2015). However, women with histories of mental illness are likely to experience relapses during pregnancy - especially if they stop taking their medications during this time. Despite the risks to their own mental wellbeing, many women do choose to stop taking their psychotropic medications during pregnancy to minimize the risk of birth defects (Massachusetts General Hospital, 2015).

Statistics

National Survey on Drug Use and Health

The National Survey on Drug Use and Health (NSDUH) is an annual survey that acts as a source of data for drug use and mental health in the United States. Since 1988, the NSDUH has been run by the Research Triangle Institute International, “an independent nonprofit research institute” (RTI, 2017). The NSDUH is funded by the Substance Abuse and Mental Health Services Administration, an agency of the U.S. Department of Health and Human Services.

The NSDUH surveys a random sample of 70,000 non-institutionalized American teens and adults, ages 12 and older. The survey’s questionnaire asks for mental illness histories of respondents. The NSDUH has asked respondents about treatment for their mental illnesses since 2001 (ISPCR, 2017; National Survey on Drug Use and Health, n.d.).

Data from the NSDUH are available for free to researchers via the University of Michigan’s ICPSR Institute for Social Research’s online database. The raw data can be downloaded and imported into different data analysis softwares that are capable of using a variety of methods to analyze the data.
Frequentist Methods

Frequentist methods are the most commonly used methods in the field of data analysis. Frequentist tests rely on assuming predetermined population parameters apply to a set of data. This assumption is called the null hypothesis ($H_0$). The data is then tested against the $H_0$ to obtain the probability the predetermined population parameters do apply to the data. If the probability of the $H_0$ being true for the data set (the p-value) is below the $\alpha$-level (alpha-level) of the test, the $H_0$ can be rejected in favor of the alternative hypothesis ($H_a$). The $H_a$ is a statement that the parameters which apply to the data set are different than the predetermined population parameters which were assumed to apply to the data set with the $H_0$. Frequentist statistical methods describe the data in the context of the population the data was taken from.

<table>
<thead>
<tr>
<th>Decision</th>
<th>Accept $H_0$</th>
<th>Reject $H_0$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_0$ (true)</td>
<td>Correct decision</td>
<td>Type I error ($\alpha$ error)</td>
</tr>
<tr>
<td>$H_0$ (false)</td>
<td>Type II error ($\beta$ error)</td>
<td>Correct decision</td>
</tr>
</tbody>
</table>

Table 1. Types of statistical errors

*Note.* This image is taken from “Type I and Type II Errors,” by CliffsNotes, 2016, retrieved from https://www.cliffsnotes.com/study-guides/statistics/principles-of-testing/type-i-and-ii-errors

There are three possible classifications for the conclusion that was reached from the test: correct, Type I error, or Type II error. The correct conclusion is either when the $H_0$ is rejected and the population from which the data was taken did have different parameters than the assumed parameters, or when the $H_0$ is failed to be rejected and the population from which the data was taken did not have different parameters than the assumed parameters. A type I error occurs when the $H_0$ is mistakenly rejected, and the
H$_{a}$ is mistakenly assumed to be true. The $\alpha$-level represents the probability of a type I error being the outcome of a frequentist test. A type II error occurs when the H$_{a}$ is mistakenly assumed to be false. The probability of a type II error being the result of a frequentist test occurring is the $\beta$-level. $\alpha$-levels and $\beta$-levels are always complementary because both respectively represent the two opposite outcomes of a frequentist test.

**Bayesian Methods**

While frequentist statistics rely on assumed population parameters, Bayesian statistics rely on the data that is collected to determine the population parameters with varying amounts of certainty. Bayesian methods are performed by first assuming that the data is accurate, that the data accurately represents the population from which it was taken. Instead of working from assumed population parameters as with frequentist statistics, statisticians running Bayesian tests must obtain parameters from the data. Bayesian methods work “from the bottom up,” requiring more heavy and complex calculations than frequentist methods because many simulations must be run in order to obtain the parameters. However, as existing technology improves, Bayesian statistics are starting to be more commonly used across the field of statistics (Bååth, 2017).

**SAS (Statistical Analysis System)**

SAS is a data analysis software used by businesses and researchers across the world. One field SAS is commonly used in is epidemiology, the study of causes and correlations of diseases and traits in human populations. Many positions in public health require previous experience and advanced skill level in SAS (Indeed, 2017).
The project that would become SAS (Statistical Analysis System) was funded by the National Institute of Health in 1966 to organize and analyze data from the United States Department of Agriculture (USDA). At the time, the project was called the SAS Institute, led by Jim Goodnight and Jim Bar (both of whom would go on to be founders of SAS, the company). From 1966 to 1972, the SAS was based in the statistics department of North Carolina State University (NCSU). In 1972, the NIH ceased funding the project. In the absence of public funding, SAS became a private company; the software could be licensed to banks, hospitals, and other businesses. SAS was incorporated in 1976. Today, SAS data analysis software is used by businesses and universities worldwide. According to the company’s site, SAS produced $3.2 billion revenue in 2016 globally (SAS, 2016).

SAS Language

SAS, named for the software, is a programming language specifically for data analysis and SAS software. The language is separated into two “steps”: DATA and PROC (procedures). Data steps are for importing, reading, and creating a dataset in the SAS program. Procedure steps are used to analyze, model, and test the dataset (SAS, 2005).

Conclusion

As previously discussed, a common decision made by pregnant women is to stop taking their psychotropic medications during the gestation period. However, the discontinuation of treatment may put pregnant women at higher risks of relapse into their mental illnesses. Many studies about psychotropic drug use and their effects on a pregnancy focus on the medications’ negative effects on the babies, covering the risks of continuing to take psychotropic medications during pregnancy. Less covered are the potential benefits of continuing taking medication throughout gestation. One benefit could be whether
continuing medication during pregnancy puts a woman at a lower risk of relapse. A way of telling whether a person is experiencing a relapse into his or her mental illness is the change or increase of symptoms of the illness. Because of the lack of data from clinical trials with pregnant women as subjects, investigations in this area must use survey and study data to analyze correlations between psychotropic medication use and symptoms of mental illness during pregnancy. Suicidal ideation being a major symptom of common mental illnesses such as anxiety, depression, and bipolar disorder, a research could ask: how does the use of psychotropic medications during pregnancy affect suicidal ideation in women with histories of mental illness?

References


