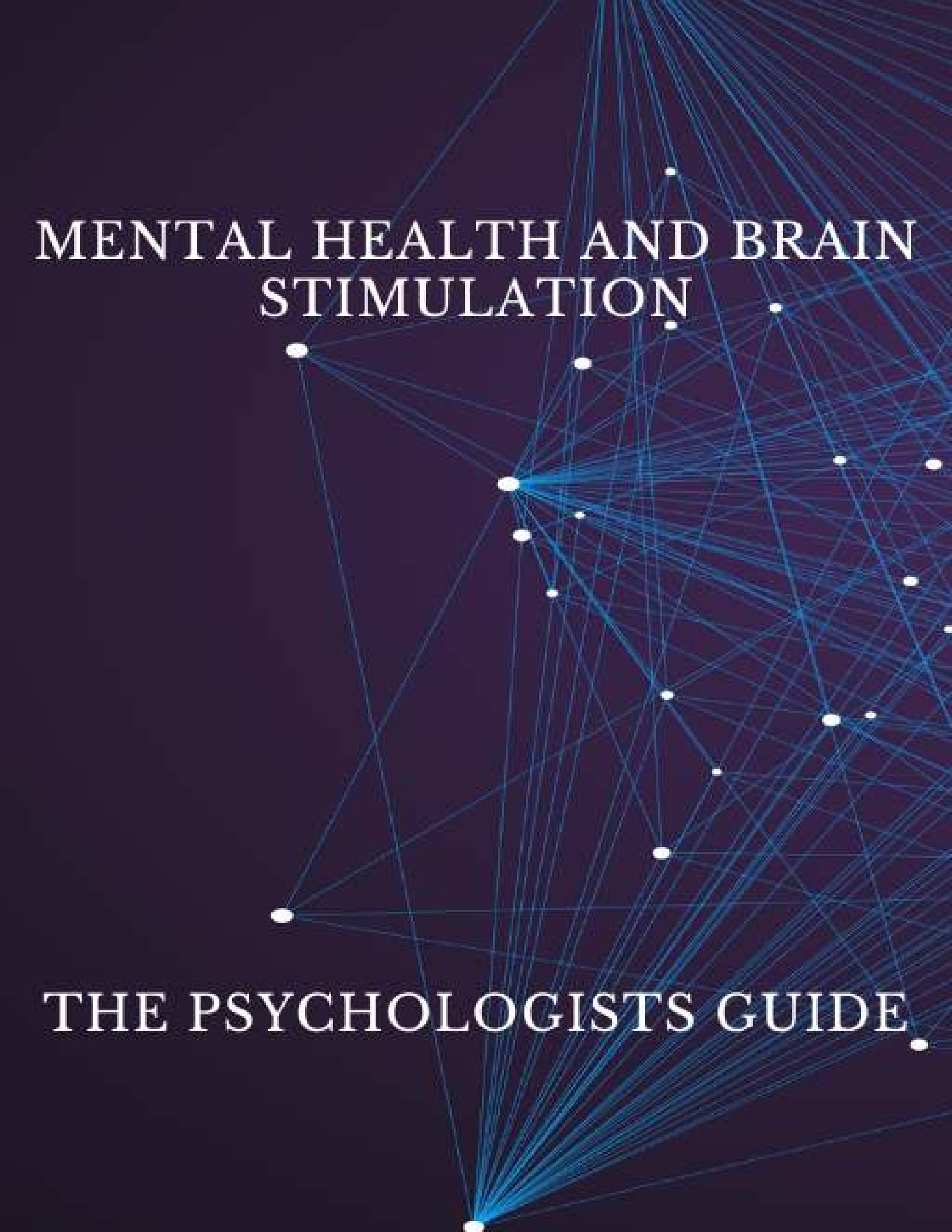
MENTAL HEALTH AND BRAIN STIMULATION



THE PSYCHOLOGISTS GUIDE

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Brain Stimulation: A Guide for Psychologists

1. Introduction

Brain stimulation therapy has become increasingly important as a tool in treating a range of mental health conditions.

As their application grows in popularity, the need for accessible and synthesised practical information for psychologists grows as well.

his eBook provides readers with an in-depth look at brain stimulation therapy, exploring what it is, the potential benefits and risks associated with treatments, the types of therapies available, and how to get started with a treatment program. It also briefly outlines funding options, and Medicare subsidised, which are relatively new (only starting in late 2021).

You will find an overview of the most popular forms of brain stimulation therapies currently being used in psychological applications — Transcranial Magnetic Stimulation (TMS) and Electroconvulsive therapy (ECT). We then examine their respective effectiveness and safety profiles. Finally, information regarding diagnostic criteria and cost/insurance coverage implications for each type of therapy will be included to help provide clarity when making decisions about treatment options.

Overview of Brain Stimulation Therapy

Put simply, brain stimulation treatments are the use of electrical or magnetic energy to manipulate neural activity in specific areas of the brain. They are generally used to improve medical and psychiatric conditions by inhibiting or exciting neural activity.

There are several different techniques that can be used for brain stimulation. In this text we discuss electroconvulsive therapy (ECT) and transcranial magnetic stimulation (TMS). Whilst other forms exist (e.g. deep brain stimulation, DBS), TMS and ECT are most commonly used in relation to mental health disorders.

Brain stimulation treatments can be used to treat a variety of psychiatric disorders, including mood disorders, bipolar disorders, anxiety disorders, post-traumatic stress disorders, and obsessive-compulsive-disorder. However, specific applications will differ widely depending on an individual's presentation.

Whilst both forms of brain stimulation treatments manipulate neural activity with the aim to improve symptoms; they use different means of doing so. TMS involves the use of a magnetic field to stimulate specific areas of the brain. The magnetic field is generated by an electromagnetic coil that is placed near the head, and the intensity of the field can be adjusted to target different brain areas. Whereas ECT uses electrical currents instead of magnetism.

Brain stimulation treatments can imply costs, and side-effects, and have practical implications of treatment, and are, therefore (as well as other reasons outside our introductory scope here) typically used as a last resort when other treatments have failed to show significant benefits.

2. Types of Brain Stimulation Therapies

Transcranial Magnetic Stimulation (TMS)

Transcranial magnetic stimulation (TMS) is a non-invasive procedure that uses magnetic fields to stimulate specific areas of the brain.

During sessions of TMS treatment, short magnetic pulses are sent through the coil and directed towards targeted neurons, stimulating activity in the affected area(s). The amount of time in each session can vary depending on the severity and type of condition being treated, but typically sessions last between 20-60 minutes.

A typical transcranial magnetic stimulation (TMS) session involves the following steps:

1. Preparation: The healthcare provider will explain the procedure to the patient and address any questions or concerns they may have. The patient will be asked to remove any metallic objects from their head, such as jewelry or hair clips.
2. Positioning: The patient will be seated in a chair or lying on a bed, and a device will be placed on their head. The device consists of a coil that generates a magnetic field when an electrical current is passed through it. The coil will be positioned over the targeted area of the brain.
3. Treatment: The healthcare provider will administer the TMS treatment by passing an electrical current through the coil, which generates a magnetic field. The strength and duration of the magnetic field can be adjusted to target specific areas of the brain and achieve the desired effects. The patient will sit or lie still during the treatment.
4. Recovery: After the treatment is completed, the patient will be able to return to their normal activities. Most people do not experience any significant side effects from TMS, but some may experience mild discomfort or a tapping sensation during the treatment.

TMS is thought to work by altering brain activity in the targeted region, which may help to improve symptoms of mental health conditions. It is generally considered safe and well-tolerated, with few side effects. However, most patients will require multiple sessions over a period of weeks or months, before they begin to experience any significant improvement in symptoms.

TMS Protocols

Transcranial magnetic stimulation (TMS) treatment protocols refer to the specific guidelines and recommendations that are followed when administering TMS treatment.

These protocols may include details such as the specific brain area being targeted, the number of treatment sessions, the frequency of treatment sessions, the intensity of the magnetic field, and the duration of each treatment session.

There are several different TMS treatment protocols that are commonly used in the treatment of mental health disorders, including:

1. Standard protocol: The standard TMS protocol involves the delivery of a series of magnetic pulses to a specific area of the brain (usually the prefrontal cortex) at a frequency of 10-20 Hz. This protocol is typically administered 5 days per week for 4-6 weeks, and the total number of treatment sessions may range from 20 to 40 or more.
2. High-frequency protocol: The high-frequency TMS protocol involves the delivery of a series of magnetic pulses to a specific area of the brain (usually the prefrontal cortex) at a frequency of >20 Hz. This protocol is typically administered 5 days per week for 4-6 weeks, and the total number of treatment sessions may range from 20 to 40 or more.
3. Low-frequency protocol: The low-frequency TMS protocol involves the delivery of a series of magnetic pulses to a specific area of the brain (usually the prefrontal cortex) at a frequency of <1 Hz. This protocol is typically administered 5 days per week for 4-6 weeks, and the total number of treatment sessions may range from 20 to 40 or more.
4. Theta Burst Stimulation (TBS): Theta Burst Stimulation (TBS) is a type of rTMS that involves the delivery of a series of rapid, repeated magnetic pulses at a higher frequency than standard rTMS. TBS is typically administered in a healthcare setting, and it is usually given 3 days per week for 3-4 weeks.

It's important to note that the specific TMS treatment protocol that is most appropriate and effective will depend on individual circumstances and the specific mental health disorder being treated.

Electroconvulsive Therapy (ECT)

Electroconvulsive therapy (ECT) is a medical treatment that involves the use of electrical currents to stimulate the brain. It is typically used to treat severe mental health conditions such as depression and schizophrenia, as well as certain other conditions such as mania and catatonia.

During an electroconvulsive therapy (ECT) session, the following steps are typically involved:

1. Preparation: The healthcare provider will explain the procedure to the patient and address any questions or concerns they may have. The patient will be asked to remove any metallic objects from their head, such as jewelry or hair clips.
2. Anesthesia: The patient will be given general anesthesia to put them to sleep during the procedure.
3. Placement of electrodes: Electrodes will be placed on the patient's head to deliver the electrical current.
4. Administration of the treatment: The healthcare provider will administer the ECT treatment by passing an electrical current through the electrodes, which causes a seizure. The seizure lasts for a few minutes and is monitored by the healthcare provider.
5. Recovery: After the treatment is completed, the patient will be taken to a recovery area where they will be monitored until they are fully awake. Most people do not experience any significant side effects from ECT, but some may experience mild discomfort or nausea.

TMS and ECT: A comparison

Whilst both TMS and ECT are forms of brain stimulation; being aware of how they specifically differ from each other are important, particularly in the treatment of mental health conditions.

The ECT treatment is much more complex and requires the use of general anesthesia, usually in a hospital. However, TMS can take place in a doctors office or medical clinic.

Further, ECT requires a general anesthetic whilst TMS can be administered whilst you're awake.

Importantly patients of psychologists; ECT is typically used as a primary treatment option for severe mental health conditions, while TMS is typically used as an adjunctive treatment, meaning it is used in addition to other treatments such as medication and therapy. As such, continuing to work with your patients in therapy sessions is typical if they're engaging in a course of TMS treatment. You may need to assist with anxiety-provoking thoughts or concerns they have over how the treatments may influence each other.

Obviously, keep in mind ethical guidelines regarding competency when discussing any forms of psychological treatment, and refer any questions or concerns that are outside your scope of practice to the relevant clinician.

3. Efficacy and Limitations of Brain Stimulation Therapies

Mental Health Conditions Suited to Brain Stimulation Treatments

Whilst the literature indicates a wide range of mental health conditions may be benefited by brain stimulation treatments; it is important to note that brain stimulation treatments are not a one-size-fits-all solution and may not be appropriate for everyone.

We will discuss what mental health disorders, in a vacum, could be suitable; however factors including but not limited to; medication, other mental health conditions, medical conditions, and various other factors will influence a patients suitability to brain stimulation treatments.

Patients with certain medical conditions or those taking certain medications should speak with their healthcare provider before considering ECT or TMS.

With that said; brain stimulation treatments have shown efficacy in treating the following disorders.

1. Depression and other mood disorders: Brain stimulation therapies, such as transcranial magnetic stimulation (TMS) and electroconvulsive therapy (ECT), have been found to be effective in reducing the severity of depression symptoms.
2. Anxiety Disorders: TMS and ECT may be helpful in reducing anxiety symptoms, particularly in combination with other treatments such as medication and therapy.
3. Obsessive-compulsive disorder (OCD): TMS and deep brain stimulation (DBS) have been found to be effective in reducing the severity of OCD symptoms.
4. Post-traumatic stress disorder (PTSD): TMS and ECT may be helpful in reducing PTSD symptoms, particularly in combination with other treatments such as medication and therapy.
5. Bipolar disorders: TMS may be effective in reducing the severity of depression symptoms in people with bipolar disorder.
6. Schizophrenia and Disorders involving symptoms of psychosis: TMS has shown some promise as a treatment option for schizophrenia, although more research is needed to confirm its effectiveness.
7. Substance use disorders: TMS may be helpful in reducing cravings and increasing the chances of successful abstinence in people with substance use disorders.

ECT is often used to treat severe forms of these disorders when medication or therapy fails to address the symptoms, while TMS is typically reserved for mild to moderate depression and anxiety. It is important to note that brain stimulation treatments are not a one-size-fits-all solution and may not be appropriate for everyone.

Efficacy of Brain Stimulation Therapy

Brain stimulation treatments such as transcranial magnetic stimulation (TMS) and electroconvulsive therapy (ECT) have been found to be effective in reducing the severity of anxiety symptoms, particularly when used in combination with other treatments such as medication and therapy.

There have been numerous studies conducted on the efficacy of transcranial magnetic stimulation (TMS) and electroconvulsive therapy (ECT) for the treatment of depression. Generally, data has indicated that efficacy ranges from 40 to 80%, and the treatments are generally considered safe and well tolerated.

Some specific studies on the efficacy of brain stimulation include the following:

- A randomized controlled trial published in the Journal of Clinical Psychiatry in 2010 found that TMS was effective in reducing anxiety symptoms in individuals with generalized anxiety disorder. The study found that TMS was associated with a significant reduction in anxiety symptoms compared to a control group.
- A systematic review and meta-analysis of ECT for depression published in the Journal of Clinical Psychiatry in 2017 found that ECT is a highly effective treatment for depression, with a high rate of response and remission.
- A randomized controlled trial published in the Journal of Affective Disorders in 2011 found that TMS was effective in reducing anxiety symptoms in individuals with social anxiety disorder. The study found that TMS was associated with a significant reduction in anxiety symptoms compared to a control group.
- A randomized controlled trial published in the Journal of Psychiatric Research in 2013 found that TMS was effective in reducing anxiety symptoms in individuals with panic disorder. The study found that TMS was associated with a significant reduction in anxiety symptoms compared to a control group.
- A meta-analysis of TMS for depression published in the Journal of Clinical Psychiatry in 2014 found that TMS is an effective treatment for depression, with a large effect size and a high rate of response and remission.
- A systematic review and meta-analysis of ECT for depression published in the Journal of Clinical Psychiatry in 2015 found that ECT is a highly effective treatment for depression, with a high rate of response and remission.
- A randomized controlled trial of TMS for depression published in the American Journal of Psychiatry in 2010 found that TMS was effective in reducing symptoms of depression in a large proportion of patients.
- A randomized controlled trial of ECT for depression published in the New England Journal of Medicine in 2002 found that ECT was effective in reducing symptoms of depression in a high proportion of patients.

Certain factors that influence the efficacy of brain stimulation treatments include;

1. The specific brain area being targeted: Different brain areas are thought to be involved in the regulation of mood, and targeting these areas with brain stimulation treatments may be more effective in some individuals.
2. The intensity and duration of treatment: The intensity and duration of brain stimulation treatments can affect their effectiveness. In general, higher intensities and longer durations of treatment may be more effective, but they may also be associated with a higher risk of side effects.
3. The individual's response to treatment: Some individuals may respond better to brain stimulation treatments than others, and this can influence the overall efficacy of treatment.
4. Co-occurring mental health conditions or medical issues: Having co-occurring mental health conditions or medical issues may influence the efficacy of brain stimulation treatments. For example, individuals with certain medical conditions, such as epilepsy, may not be able to receive TMS due to the risk of seizures.
5. The individual's overall treatment plan: The brain stimulation treatment should be part of a comprehensive treatment plan that includes other interventions, such as medication and psychotherapy, as appropriate. These other treatment options may mediate efficacy.

Whilst research to date is promising A systematic review and meta-analysis published in the Journal of Affective Disorders noted that more high-quality research is needed to fully understand the effectiveness of TMS. Importantly, TMS may require maintenance treatment sessions to improve full remission. Otherwise, symptoms may persist and the overall efficacy can reduce.

Risks and Limitations of Brain Stimulation Therapy

Limitations

Some of the limitations of brain stimulation treatments include:

1. Limited effectiveness: While brain stimulation treatments have been shown to be effective in some cases, they may not work for everyone.
2. Risk of side effects: Some people may experience side effects from brain stimulation treatments, including discomfort or pain at the site of stimulation, dizziness, and headaches.
3. Limited evidence of long-term effectiveness: Most studies of brain stimulation treatments have been short-term, so it is not yet known how effective these treatments are in the long term.
4. Limited access: Brain stimulation treatments may not be widely available, and they can be expensive.
5. Limited knowledge about how brain stimulation treatments work: While researchers have made progress in understanding the mechanisms behind brain stimulation treatments, there is still much that is not known about how these treatments work and how they may be most effective.
6. Difficulty targeting specific areas of the brain: It can be challenging to precisely target specific areas of the brain with brain stimulation treatments, which can limit their effectiveness.
7. Potential for negative interactions with other treatments: Brain stimulation treatments may interact negatively with other treatments, such as medications, or may be contraindicated for certain medical conditions.

Risks Involved with Brain Stimulation

Brain stimulation therapies can have serious side effects, including physical and psychological risks. These risks should be discussed with your doctor before undergoing any type of brain stimulation therapy.

Some potential risks associated with brain stimulation treatments include;

1. Discomfort or pain at the site of stimulation: Some people may experience discomfort or pain at the site of stimulation during TMS or tDCS treatments.
2. Dizziness: Some people may experience dizziness during or after brain stimulation treatments.
3. Headaches: Headaches are a common side effect of brain stimulation treatments.
4. Seizures: There is a risk of seizures with TMS, although this is rare.
5. Skin irritation: There is a risk of skin irritation with tDCS, particularly if the treatment is administered improperly or the electrodes are not properly placed.
6. Difficulty concentrating: Some people may experience difficulty concentrating after brain stimulation treatments.
7. Insomnia: Brain stimulation treatments may interfere with sleep in some people.

It is important to note that these effects are generally mild and temporary, however, are to be considered and discussed carefully with relevant healthcare professionals.

4. How to Get Started with Brain Stimulation Therapy

Finding a Qualified Practitioner and Facility

TMS may be provided in a variety of settings, including:

1. Hospitals: Many hospitals in Australia offer TMS as a treatment option for mental health conditions. TMS may be provided in the hospital's psychiatric department or in a dedicated TMS clinic.
2. Private clinics: There are many private clinics in Australia that offer TMS as a treatment option. These clinics may be run by mental health professionals such as psychiatrists or psychologists, or they may be part of a larger organization that provides mental health services.
3. Community health centers: Some community health centers in Australia offer TMS as a treatment option for mental health conditions. These centers may be run by government agencies or non-profit organizations and typically provide a range of mental health services.

In Australia, referrals for transcranial magnetic stimulation (TMS) treatment typically involve the following steps:

1. Consult with a healthcare provider: The first step in getting a referral for TMS treatment is to consult with a healthcare provider, such as a psychiatrist, psychologist, or primary care doctor. They will be able to assess your specific needs and determine whether TMS is an appropriate treatment option for you.
2. Get a referral from your healthcare provider: If your healthcare provider determines that TMS is an appropriate treatment option for you, they will provide you with a referral to a TMS provider. This referral may be to a specialist TMS clinic or to a mental health professional who is trained in providing TMS treatment. In Australia, patients will typically have their GP refer them to a psychiatrist or relevant specialist who is associated with a TMS treatment facility.
3. Contact the TMS provider: Once you have a referral, you will need to contact the TMS provider to schedule an appointment. This may involve filling out paperwork and providing information about your insurance coverage.
4. Attend the TMS assessment appointment: The TMS provider will conduct a thorough assessment to determine the most appropriate treatment plan for you. This may involve a physical examination, a review of your medical history, and discussion of your symptoms and treatment goals.
5. Begin TMS treatment: If the TMS provider determines that TMS is an appropriate treatment option for you, they will provide you with a treatment plan and schedule your TMS sessions. TMS treatment typically involves a series of sessions over a period of several weeks.

Understanding the Cost and Insurance Coverage Implications of Treatment

In Australia, brain stimulation treatments for mental health disorders may be funded through a number of different sources, depending on your individual circumstances. Some options for funding these treatments include:

1. Private health insurance: Many private health insurance plans in Australia cover at least some of the costs of brain stimulation treatments, although the exact amount of coverage can vary depending on the policy. It's important to check with your insurance provider to see what is covered under your policy.
2. Medicare: Medicare, the Australian government's public health insurance program, may cover some of the costs of brain stimulation treatments for certain mental health disorders. However, coverage is generally limited to specific types of brain stimulation treatments, such as transcranial magnetic stimulation (TMS) and electroconvulsive therapy (ECT), and is only available for people with severe and 'treatment-resistant' mental health disorders who have not responded to other treatment options.
3. Out-of-pocket costs: If you do not have private health insurance or are not covered by Medicare for brain stimulation treatments, you may need to pay for these treatments out of pocket. The cost of brain stimulation treatments can vary widely, depending on the type of treatment, the length of the treatment course, and other factors.

Medicare and 'Treatment Resistant' Disorders

Medicare will only help fund TMS treatments for individuals with particular disorders, that are 'treatment resistant'.

Treatment resistance typically refers to having consistently engaged in psychological treatment, and having trialled two or more anti-depressants, with no significant improvements.
TMS is classified as a "restricted benefit" under Medicare, which means that it is only available for certain conditions and under certain circumstances. To be eligible for TMS through Medicare, patients will need to meet certain criteria, such as having a referral from their GP and having tried other treatments that have not been successful.

Conclusion

In closing, brain stimulation treatments, offer a promising approach to the treatment of mental health conditions. These treatments, which include electroconvulsive therapy (ECT), and transcranial magnetic stimulation (TMS), have been found to be effective in reducing the severity of symptoms in a variety of mental health conditions, including depression, anxiety, obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD), and schizophrenia.

It is important to note that brain stimulation treatments are not a one-size-fits-all solution, and they may not be appropriate for everyone. These treatments are typically used as adjunctive therapies, meaning they are used in addition to other treatments such as medication and therapy. They are not a replacement for these treatments, but rather are used to augment their effectiveness.

If you have patients who may benefit from brain stimulation treatments option, it is important to speak with a healthcare provider who is trained in these procedures. They can assess specific needs and help determine whether a brain stimulation treatment may be a suitable treatment.

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Australian Psychologists

Australian psychologists take the lead in exploring the latest advances in brain stimulation treatments for mental health disorders in "Mental Health and Brain Stimulation: The Psychologists Guide." In this comprehensive guide, leading clinicians and neuroscientists examine the different types of brain stimulation treatments available and how they can help alleviate symptoms of mental health disorders such as depression, anxiety, and OCD.

With up-to-date research and practical knowledge of available brain stimulation treatments; this book is a must-read for anyone interested in the exciting field of brain stimulation and its potential to revolutionize mental health care